

Provision of pharmaceutical care and public health services in an ambulatory elderly population

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DECLARATION

DECLARATION

I, Jo-Ancobe Jaquire, student number 23522984, hereby declare that the work submitted in this dissertation is my own work and that it have not been submitted to any other institution for examination.

A handwritten signature in black ink, appearing to read 'Jaquire', is written over a horizontal line.

Jo-Ancobe Jaquire

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PREFACE

This research study consists of four chapters, with the results of the empirical study presented in two manuscripts. **Chapter 1** provided a general overview of the study, a background to the study, a problem statement, research questions, the overall study aim and specific objectives, and the research methodology utilised in the study.

Chapter 2 entailed a literature review. It provided a general summary of pharmaceutical care and public health services in an ambulatory elderly population. The role of the pharmacist was also determined. This chapter included background information about the elderly and their medication use.

Chapter 3 presented the results of the empirical investigation and a discussion thereof in manuscript form and additional information. Manuscript One was submitted for consideration for publication in *Drugs & Aging* and Manuscript Two in the *International Journal of Pharmacy Practice*. Each of the two manuscripts were written in accordance with their specific guidelines (see Annexure E and Annexure F). Two manuscripts were presented with the following titles:

- Pharmaceutical care expectations and experiences in an ambulatory elderly population
- Availability and use of pharmaceutical services versus community-based care and support services for the elderly

Chapter 4 includes the conclusions, recommendations and limitations of the study. Results not discussed in the two manuscripts are also discussed in this chapter.

A list of references and annexures contains all additional information not included in the different chapters.

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ABSTRACT

Title: Provision of pharmaceutical care and public health services in an ambulatory elderly population

Keywords: Elderly, pharmaceutical care, pharmaceutical services, public health services, pharmacist.

Background: The general aim of this study was to determine an elderly population's expectations and experiences of pharmaceutical care (PC) and public health services (PHS). The study emphasises the important role that the pharmacist should play as part of a healthcare team. It is the pharmacist's responsibility to promote pharmaceutical services such as PC and PHS as members of the public are often not aware of the provision of these services.

A literature review and empirical investigation were conducted. The literature review entailed an overview of the provision of PC and PHS to the ambulatory elderly. The role of the pharmacist in the provision of PC and PHS was also determined. Possible barriers to and benefits of PC were also identified.

Method: The empirical study utilised a quantitative, cross-sectional descriptive method that employed a structured questionnaire to obtain data. The target population consisted of 150 active members of the CBCSS and the study population was 40 participants (a response rate of 26.7%), aged 60 years and older. An all-inclusive sample population was used, which meant that all members of the CBCSS centre who were willing to partake in the study were included. In order to determine the expectations and experiences of the elderly participants, a five-point Likert scale was used, (1) being "strongly disagree" and (5) being "strongly agree".

Data were captured using Excel® and analysed using IBM SPSS *Statistics for Windows*, version 25.0. Variables were measured using descriptive statistics such as frequency, percentage, mean and standard deviation. All statistical significance was considered with a two-sided probability of $p \leq 0.05$. The practical significance of results was calculated when the p -value was statistically significant (i.e. $p \leq 0.05$). A dependent t -test was used to ascertain the difference between experience and expectation. The practical significance of the results was determined using Cohen's d -value (with $d \geq 0.8$ defined as a large effect with practical significance). Lastly, reliability was determined using Cronbach's alpha with a reliable coefficient of 0.07 and higher.

Results: The results of the study were presented in the form of two manuscripts. Manuscript One addressed the elderly population's expectations and experiences of the provision of PC. A statistically significant difference was found between the population's expectations and

experiences. All three phases of PC, namely the assessment, care plan and follow-up phases, were examined. In this study, the results revealed that the elderly population expected to receive PC services when visiting the pharmacy, but this expectation was not necessarily met. Possible shortcomings of PC were also identified. Most of the participants indicated that their pharmacist neglected to contact other health professionals ($d = 0.89$) and identified incorrect medicine dosage(s) ($d = 0.89$) during the assessment phase. Participants mostly disagreed with the statement that the pharmacist provided goal criteria for their treatment ($d = 0.92$). Overall, participants were not aware nor expected the services provided during the follow-up phase.

Manuscript Two dealt with the provision of PC and PHS. This manuscript also investigated the use of CBCSS by the relevant elderly population. Current chronic conditions prevalent in this elderly population were identified, the majority (90.0%) of the elderly suffering from chronic diseases. Overall, most participants (47.5%) still perceived their health as “very good”. Results furthermore showed that patients were generally satisfied with their visit to the pharmacy and that most agreed that the pharmacist was a reliable source of general drug information (4.83 ± 0.39) and information on clinical drug use (4.53 ± 0.88). It was established that only a small number of participants made use of the full spectrum of services offered by their local pharmacy or CBCSS centre. Most of the participants (47.5%) made use of the pharmacy's immunisation services [yearly (47.5%)] and many also used foot care services (47.5%) [monthly (42.5%)] and blood pressure monitoring services (47.5%) [monthly (42.5%)] at the CBCSS centre. The CBCSS centre also provided some activities for the elderly that were divided into three subsections for the purposes of the study, namely physical, social and cultural activities. Most of the members indicated that they participated in pilates (17.5%), Trimgym (12.5%), the Mooirivier Singing Group (15.0%) and art activities (12.5%) on a weekly basis.

Conclusion: In conclusion, this study indicates that participants were generally not aware of the full spectrum of services and/or activities provided by the pharmacy and CBCSS centre, therefore only a few of them made use of these services and participated in the activities on offer. Therefore, pharmacists need to focus on promoting these services to the public, especially to vulnerable groups such as the elderly. Participants also indicated that their expectations of the provision of PC were not met. It is vital that pharmacists change their attitudes toward the provision of PC and services other than the mere dispensing of medicine. Pharmacists are in a position to provide the best possible care such as identifying and monitoring health needs to improve health-related quality of life in elderly individuals. Recommendations for future studies were made.

UITTREKSEL

Titel: Die lewering van farmaseutiese sorg en openbare gesondheidsorgdienste in 'n steeds beweeglike bejaarde populasie

Trefwoorde: Bejaardes, farmaseutiese sorg, farmaseutiese dienste, openbare gesondheidsorgdienste, apteker.

Agtergrond: Die oorhoofse doel van die studie was om 'n bejaarde populasie se verwagtinge en ervarings van farmaseutiese sorg (FS) en openbare gesondheidsorgdienste (OGD) te ondersoek. Die studie beklemtoon die belangrike rol wat die apteker as deel van 'n gesondheidsorgspan behoort te speel. Dit is die verantwoordelikheid van die apteker om farmaseutiese dienste soos FS en OGD te bevorder, omrede die publiek dikwels nie bewus is van die lewering van hierdie dienste nie.

'n Literatuur- en empiriese studie is gedoen. Die literatuurstudie verskaf 'n oorsig van die lewering van FS en OGD aan steeds beweeglike bejaardes. Die rol van die apteker in die lewering van FS en OGD is ook bepaal. Moontlike hindernisse tot en voordele van FS is laastens ook geïdentifiseer.

Metode: Die empiriese studie het die vorm van 'n kwantitatiewe, deursnee-studie aangeneem waarin 'n vooropgestelde vraelys gebruik is om data in te samel. Die teikenpopulasie het bestaan uit 150 aktiewe lede van 'n gemeenskapsgebaseerde versorging- en ondersteuningdienssentrum (GVOD) vir bejaardes, en die studiepopulasie het bestaan uit 40 lede wat bereid was om aan die studie deel te neem (die responskoers was 26.7%), almal bejaardes 60 jaar of ouer. 'n Alomvattende populasie is gebruik, menende dat alle lede, ingesluit is. Ten einde die verwagtinge en ervarings van bejaardes te bepaal, is 'n vyf-punt Likert-skaal gebruik met (1) verteenwoordigend van "stem glad nie saam nie" en (5) verteenwoordigend van "stem heeltemal saam".

Data is vasgevang met behulp van Excel® en geanaliseer met behulp van IBM SPSS "*Statistics for Windows*", weergawe 25.0. Veranderlikes is gemeet deur gebruik te maak van beskrywende statistiese terme soos frekwensie, persentasie, gemiddeldes en standaardafwykings. Alle statistiese beduidendheid is oorweeg met 'n tweesydigse waarskynlikheid van $p \leq 0.05$. Die praktiese beduidendheid van die resultate is bereken in gevalle waar die p -waarde statisties beduidend was ($p \leq 0.05$). 'n Afhanklike t -toets is gebruik om die verskil tussen verwagtinge en ondervindings te bepaal. Die praktiese beduidendheid van die resultate is bepaal deur Cohen se d -waarde (met $d \geq 0.8$ gedefinieer as 'n groot effek met praktiese beduidendheid). Laastens is die

betroubaarheid van die resultate bereken deur middel van Cronbach se alfa met 'n betroubaarheid-koëffisiënt van 0.07 en hoër.

Resultate: Die resultate van die studie is in die vorm van twee manuskripte aangebied. Manuskrip Een spreek die bejaarde populasie se verwagtinge en ervarings van die lewering van FS aan. 'n Statisties beduidende verskil is gevind tussen hulle verwagtinge en ervarings. Al drie fases van FS, naamlik die assessering-, sorgplan- en opvolgfases, is ondersoek. In hierdie studie het die resultate getoon dat alhoewel die bejaardes verwag het om FS-dienste te ontvang tydens hul besoek aan 'n apteek, hierdie dienste nie noodwendig aan hulle gelewer is nie. Moontlike tekortkominge in die lewering van FS is ook geïdentifiseer. Die meeste van die deelnemers het aangedui dat hul apteker nie noodwendig ander gesondheidswerkers gekontak het nie ($d = 0.89$), en verkeerde medisynedosering(s) ($d = 0.89$) te identifiseer tydens die assesseringsfase. Deelnemers het meestal nie saamgestem met die stelling dat die apteker doelwitkriteria vir hul behandeling gestel het nie ($d = 0.92$). Deelnemers was meestal onseker van hulle eie verwagtinge en ervarings van die apteker se dienslewering tydens die opvolgfase.

Manuskrip Twee handel oor die voorsiening van FS en OGD. Die manuskrip stel ook ondersoek in na die gebruik van GVOD deur bejaardes. Chroniese siektetoestande wat tans algemeen voorkom in die bejaarde bevolking is geïdentifiseer. Alhoewel die meerderheid (90.0%) van die bejaardes in hierdie studie aan chroniese siektes ly, het die meeste van die deelnemers (47.5%) hul gesondheidstatus as "baie goed" beskryf. Die resultate van die studie toon verder dat pasiënte oor die algemeen tevrede was met hul besoeke aan die apteek en dat die meeste van hulle die apteker beskou as 'n betroubare bron van algemene geneesmiddelinligting (4.83 ± 0.86) asook inligting oor die gebruik van kliniese geneesmiddels (4.53 ± 0.88). Daar is vasgestel dat slegs 'n klein aantal van die deelnemers gebruik maak van die volle spektrum van dienste deur die plaaslike apteek of GVOD-sentrum gelewer word. Die meeste van die deelnemers (47.5%) het aangedui dat hulle gebruik maak van die immuniseringsdienste [jaarliks, (47.5%)] by die apteek, en vele het ook aangedui dat hulle gebruik maak van die GVOD-sentrum se voetversorgingsdienste (47.5%) [maandelikse (42.5%)] en bloeddrukmoniteringsdienste (47.5%) [maandelikse (42.5%)]. Die GVOD-sentrum het ook sosialiseringssake vir bejaardes aangebied wat in drie onderafdelings verdeel is vir die doel van hierdie studie, naamlik fisiese, sosiale en kulturele aktiwiteite. Die meeste deelnemers het aangedui dat hulle op 'n weeklikse basis deelneem aan pilates (17.5%), Trimgym (12.5%), die Mooirivier Sanggroep (15.0%) en kunsaktiwiteite (12.5%).

Samevatting: Ten slotte dui hierdie studie aan dat deelnemers nie bewus was van die volle spektrum van dienste en/of aktiwiteite wat by die apteek en GVOD-sentrum aangebied word nie, daarom het slegs 'n paar van hulle gebruik gemaak van die dienste en aktiwiteitsgeleenthede. Aptekers moet dus fokus op die bemaking van hierdie dienste aan die publiek, veral aan

kwesbare groepe soos bejaardes. Deelnemers het ook aangedui dat daar nie voldoen is aan hul verwagtinge van die voorsiening van FS nie. Dit is noodsaaklik dat aptekers hul houding teenoor die verskaffing van FS en verwante dienste verander, eerder as om bloot net op die reseptering van voorskrifte te fokus. Aptekers is in 'n posisie om die beste moontlike sorg te verskaf, soos die identifisering en monitering van gesondheidsbehoefte om sodoende bejaardes se gesondheidsverwante lewenskwaliteit te verbeter. Aanbevelings vir toekomstige studies is gemaak.

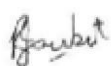
AUTHORS' CONTRIBUTION TO MANUSCRIPT ONE

The contributions of each of the authors for Manuscript One entitled “**Pharmaceutical care expectations and experiences in an ambulatory elderly population**”, were as follows:

Author(s)	Contribution to the study
Ms J Jaquire	Planning and designing the manuscript Conducting the literature review Collecting and capturing the data Interpreting the results Reach conclusions Writing of manuscript
Dr R Joubert (Supervisor)	Supervision of study concept and design Guidance in result interpretation Revision of the manuscript
Dr M Julyan (Co-supervisor)	Co-supervision of study concept and design Guidance in result interpretation Revision of the manuscript
Ms I Kotzé (Co-supervisor)	Co-supervision of study concept and design Guidance in results interpretation Revision of the manuscript

With the following statement the co-authors confirm their role in the study and give their permission that the manuscript may form part of this dissertation.

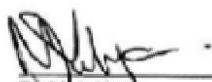
I declare that I have the above-mentioned manuscript and that may role in this study, as indicated above, is representative of my actual contributions, and I hereby give consent that it may be published as part of the MPharm study of J Jaquire.



Dr R Joubert



Ms I Kotze



Dr M Julyan

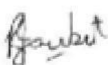
AUTHORS' CONTRIBUTION TO MANUSCRIPT TWO

The contributions of the each authors for Manuscript Two entitled “Availability and use of pharmaceutical services versus community-based care and support services for the elderly”, were as follows:

Author(s)	Contribution to the study
Ms J Jaquire	Planning and designing the study Conducting the literature review Collecting and capturing the data Interpretation of results Reach conclusions Writing of manuscript
Dr R Joubert (Supervisor)	Supervision of study concept and design Guidance in result interpretation Revision of the manuscript
Dr M Julyan (Co-supervisor)	Co-supervision of study concept and design Guidance in result interpretation Revision of the manuscript
Ms I Kotzé (Co-supervisor)	Co-supervision the study concept and design Guidance in results interpretation Revision of the manuscript

With the following statement the co-authors confirm their role in the study and give their permission that the manuscript may form part of this dissertation.

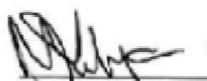
I declare that I have the above-mentioned manuscript and that may role in this study, as indicated above, is representative of my actual contributions and I hereby give consent that it may be published as part of the MPharm study of J Jaquire.



Dr R Joubert



Ms I Kotze



Dr M Julyan

LIST OF DEFINITIONS

Ambulatory elderly person:	An “ambulatory elderly person” is an elderly person who has the mental capability and physical strength to leave a building without anybody helping them and who does not need any mechanical aid in the case of an emergency (Anon., 2008).
Community-based support:	Community-based support is intended to help community-dwelling elderly patients to stay safe in their homes and to prevent institutionalisation by providing wellness programmes, dietary support, educational programmes relating to health and ageing as well as assistance with housing, finances and home safety (Siegler <i>et al.</i> , 2015).
Comorbidity:	“Comorbidity” refers to the presence of two or more chronic illnesses additional to an index disease in a person (Valderas <i>et al.</i> , 2009:359; Nash <i>et al.</i> , 2000).
Drug-related problem:	An adverse effect on the health of a patient due to drug therapy (Milos <i>et al.</i> , 2013:236).
Elderly patient:	According to the Older Persons Act (13 of 2006), an “elderly patient” can be defined as a male who is 65 years of age or older, or a female who is 60 years of age or older.
Free fraction:	Percentage unbound drugs in a serum vs. the entire drug concentration (Hutchison & O'Brien, 2007:6).
Inappropriate prescribing:	The prescribing or dispensing of medication to a patient that is not specified for his or her treatment (Hill-Taylor <i>et al.</i> , 2013:361).
Index disease:	Ording and Sørensen (2013:200) describe “index disease” as the main disease affecting a patient, as opposed to any co-occurring, additional diseases present at the time of diagnosis or later (cf. the definition of “comorbidity” above).

Patient satisfaction:	The assessment of whether healthcare professionals provided a good service and whether it met the expectations of the patient (Bezuidenhout, 2015:219).
Patient-centred:	In patient-centred pharmaceutical care, it is the responsibility of the pharmacist to do everything possible to put the patient's interests first (Alanazi <i>et al.</i> , 2016:9).
Pharmaceutical care:	Hepler and Strand (1990:539) define “pharmaceutical care” as the direct, responsible provision of medication-related care with the aim to establish a positive outcome and improve quality of life.
Pharmacist:	According to the Pharmacy Act (53 of 1974), a “pharmacist” can be defined as an individual who is registered under this Act at the South African Pharmacy Council.
Pharmacodynamic interactions:	Interaction between drugs that influence each other directly without changing their pharmacokinetics (Cascorbi, 2012:547; Hinder, 2011:365).
Pharmacokinetic interactions:	“Pharmacokinetic interactions” refer to the effect that the body has on medication once consumed, such as absorption, distribution, metabolism and elimination (Garner, 2013:19).
Polypharmacy:	Polypharmacy can be the correct or incorrect prescribing of a large number of drugs (Clyne <i>et al.</i> , 2016:109). For the purposes of this study, we will look at the inappropriate prescribing of a large number of drugs.
Professional registered nurse:	The term refers to a registered nurse who possesses the necessary knowledge and skills needed in the profession, specifically in difficult decision-making situations, and the ability to adapt these skills in line with the context of the specific country or place in which the practice is situated (SANC, 2012).

LIST OF ABBREVIATIONS

ADR:	Adverse drug reaction
CBCSS:	Community-based care and support services
DDI:	Drug-drug interaction
DRP:	Drug-related problem
FIP:	International Pharmaceutical Federation (Fédération Internationale Pharmaceutique)
GPP:	Good pharmacy practice
HREC:	Health Research Ethics Committee
MUSA:	Medicine Usage in South Africa
NSAID:	Nonsteroidal anti-inflammatory drug
NWU:	North-West University
OTC:	Over the counter
PC:	Pharmaceutical care
PDD:	Prescribed daily dose
PEER:	Pharmaceutical Care of the Elderly in Europe Research
PHS:	Public health services
PSC:	Potchefstroom Service Centre
SAPC:	South African Pharmacy Council
SPSS:	Statistical Package for the Social Sciences
WHO:	World Health Organization

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CHAPTER 1: INTRODUCTION AND SCOPE OF STUDY

1.1 Introduction

This study focused on the provision of pharmaceutical care (PC) and public health services (PHS) in an ambulatory elderly population of the Potchefstroom Service Centre (PSC) in North West Province, South Africa. More specifically, the study examined ambulatory elderly patients' perceptions, experiences as well as expectations of the provision of PC and PHS.

"Public health" is defined as the quality of health and safety in a population, generally upheld through the efforts and guided choices of the public, organisations, communities and individuals in preventing diseases and prolonging life (Strand *et al.*, 2016:248; Krska *et al.*, 2001:3). Achieving these goals depends on a multidisciplinary approach that includes PHS and the services of the pharmacy (Strand *et al.*, 2016:248). According to Stanko and Fulmeková (2005), "pharmaceutical services" are defined as *"the basic part of pharmacy, the principal task of which is to provide pharmaceutical care as an inseparable part of providing health care"*. Pharmaceutical services are related to PC, clinical services, medication management services and drug therapy (Moullin *et al.*, 2013:992).

In 1990, Hepler and Strand (1990:539) defined PC as the delivery of drug therapy with definite outcomes to improve a patient's quality of life. According to the South African Pharmacy Council (SAPC), PC is defined as a patient-centred, outcome-oriented pharmacy practice aimed at improving health outcomes and avoiding diseases (South Africa, 2011). It includes the assessment and monitoring of medication use while working with patients and other healthcare providers to guarantee the safe and effective use of medication (South Africa, 2011).

Pharmaceutical care plays an essential part in decreasing the mortality and morbidity of individuals (Maw *et al.*, 2016:93). Elderly populations benefit from PC since they are at risk of drug-related problems (DRPs) such as inappropriate prescribing, drug interactions and non-compliance with medication use, all factors that can affect their quality of life (Crealey *et al.*, 2003:455). The need for a better healthcare system, higher quality of life and correct medication use in the elderly population grows as the size of this population increases (Al-Omar *et al.*, 2013:616). Therefore, the purpose of the study was to investigate the provision of PC and PHS in an ambulatory elderly population.

1.2 Background of the study and problem statement

1.2.1 The elderly population

Globally, ageing can be seen as a natural and on-going process (Mapakshi, 2015:408). The Older Persons Act (13 of 2006) of South Africa states that an “elderly patient” can be defined as a male patient who is 65 years of age or older, or a female patient who is 60 years of age or older.

According to the World Health Organization (WHO) (2015b), the world’s population now has a longer lifespan than before. The elderly population is increasing globally; 22% of the global population will be 65 years of age or older by 2050 (Lenander *et al.*, 2015:2). In 2015, South Africa had a population of 54 million, with an estimated 4.54 million (i.e. 8.41%) being 60 years or older (South African Government News Agency, 2015).

Ageing is associated with multiple chronic diseases. Consequently, the higher medication intake in the elderly population than in the younger population results in a greater potential for the development of DRPs among the elderly population (Hughes *et al.*, 2001:64; Lenander *et al.*, 2015:2).

In 2008, the prevalence of a single chronic disease among the South African elderly population (aged 60 to 79 years) was 51.8%, while 22.5% of this population had two or more chronic diseases (comorbidities) (Phaswana-Mafuya *et al.*, 2013:20936). The reason for an increase in inappropriate prescribing is the use of multiple drugs for the treatment of more comorbidities (Chan *et al.*, 2012:167; Hajjar *et al.*, 2007:347). Potential factors in the elderly population that could influence the safety of medication usage are polypharmacy, drug interactions, side effects of the medication and doses of medication that are too high (Metsälä & Vaherkoski, 2014:12). It is known that polypharmacy can lead to drug interactions and adverse drug actions in the elderly population (Marković-Peković & Škrbic, 2016:435). Medication doses that are too high result in toxicity as well as drug interactions (Cipolle *et al.*, 1998:151). According to Chan *et al.* (2012:168), the elderly population is at risk of DRPs due to two key factors, namely age-related physiological changes that affect the pharmacokinetics and pharmacodynamics of medication, as well as the risk of developing more comorbidities.

Pharmacokinetics refers to the study of the activity of medication and how it moves through the body, including its absorption, distribution, metabolism and excretion (Tripathi, 2013:1). It is essential for a healthcare practitioner to understand what happens to the medicine after it enters the body to provide a therapeutic course of medication. Pharmacodynamics, on the

other hand, is the study of how the body reacts to the medication, the latter ideally attaining the desired therapeutic effect (Hernandez *et al.*, 2011:260-263).

Ageing is associated with changes in the body that can affect the pharmacokinetics and pharmacodynamics of medication. For example, the half-life of some drugs is prolonged in the elderly, which makes it an inappropriate choice when prescribing medication (Beizer, 1994:13-15). Elderly patients can easily overdose on medication because of a higher percentage of body weight fat, which metabolises drugs less actively (Schneider, 2014:508). Therefore, it is vital that the pharmacokinetic and pharmacodynamic changes in elderly patients must be considered when prescribing medication (Beizer, 1994:13-15).

1.2.2 Drug-related problems in the elderly population

Drug-related problems can be defined as actions involving drug treatment that are in fact or potentially harmful and affects the patient's health negatively or prevents patients from achieving their desired goal of treatment (Chau *et al.*, 2016:47).

Statistics have shown that 90% of elderly individuals aged 65 years or older use one prescription medication, while approximately 40% use more than five prescription medications, which increases the risk factor for DRPs and polypharmacy (Kennedy *et al.*, 2015:23). A study of elderly patients has shown that these patients usually consume 4.5 to 8 drugs per day, increasing the risk of polypharmacy in this group (Martín Lesende *et al.*, 2013:293).

Individuals taking two prescription drugs have a 13% chance of developing DRPs, while those taking four drugs have a 38% chance, the likelihood rising drastically to 82% when individuals use seven or more prescription drugs at the same time (Gallagher *et al.*, 2007:114).

In a study conducted by Kristensson *et al.* (2010:1048), it was determined that the elderly population's knowledge of the drugs they used was poor; which may influence compliance and negatively affect adherence. Drug-related problems can be prevented through the process of PC which focuses, *inter alia*, on patient education, monitoring health outcomes and patient assessments (Sturgess *et al.*, 2003:218). Correct health education and monitoring by a pharmacist can help patients to become experts in the use of their medication (Wal *et al.*, 2013:123).

1.2.3 Pharmaceutical care

“Pharmaceutical care” was first described by Mikeal *et al.* (1975:567) as care given to patients to assure that they receive safe and rational drug treatment. Brodie *et al.* (1980:277) then suggested a few years later that PC must include:

“the determination of the drug needs for a given individual and the provision not only of the drugs required but, also of the necessary services (before, during and after treatment) to assure optimally safe and effective therapy”.

Brodie *et al.* (1980:277) emphasised that the idea of a feedback mechanism provided by healthcare practitioners would assist in the provision of continuous care and contribute to safe and effective drug use.

According to Hepler and Strand (1990:539), PC can be defined as *“the responsible provision of pharmacotherapy, with the goal of achieving defined therapeutic outcomes in health and the improvement of quality of life”*. Finally, in 1998, PC was defined by Cipolle, Strand and Morley as *“a practice in which the practitioner takes responsibility for a patient’s drug-related needs and is held accountable for this commitment”* (Cipolle *et al.*, 1998:13).

According to Cipolle *et al.* (2012:45), PC follows a stepwise delivery approach (see Figure 1-1 below).

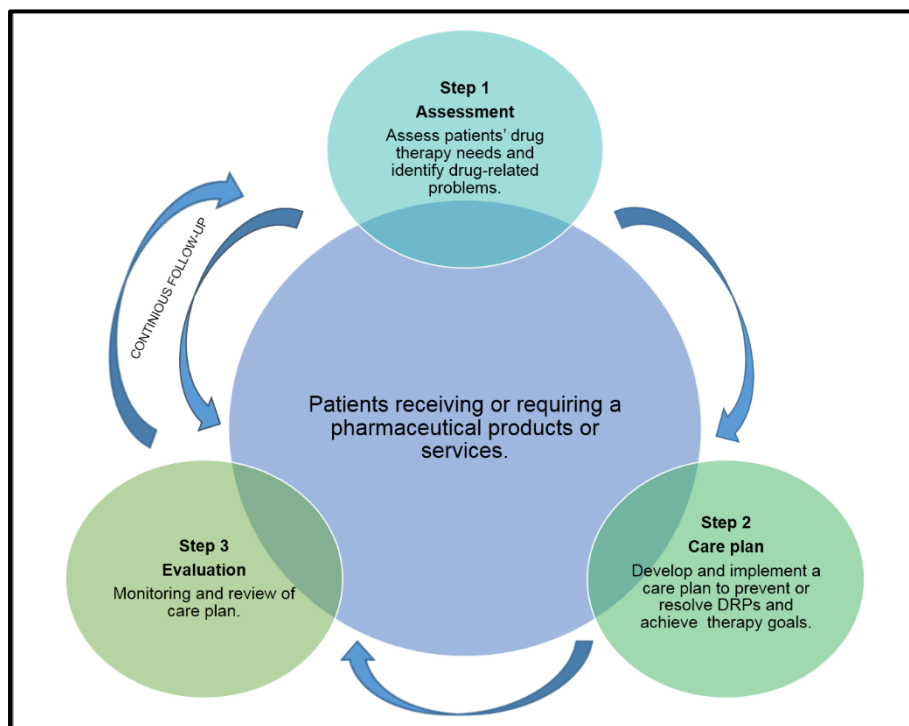


Figure 1-1: The steps in delivering pharmaceutical care

To exclude any PC barriers, a pharmacist can follow the following three steps to prevent any DRPs (Krska *et al.*, 2001:205):

- consult the patient;
- look at the patient's medical records to receive the correct information; and
- regularly assess the prescription for medication.

1.2.4 Role of a pharmacist

The pharmacist plays a vital role in PC, especially in designing, applying and monitoring a healthcare plan to prevent and resolve DRPs. Poor communication between pharmacists, elderly patients, and other healthcare professionals is the main reason for DRPs (Lyra *et al.*, 2007:187). The pharmacist's role has expanded from merely dispensing medication to a more active role in therapy management and patient follow-up (Alhabib *et al.*, 2016:629). Pharmacists now play an essential role in reducing medication errors, stopping the use of specific medication, reducing inappropriate prescribing and regulating medication dosages (Lenander *et al.*, 2015:23).

1.2.5 Public health and public health services

"Public health" can be defined as *"the science and art of preventing disease, prolonging life, and promoting health through the organised efforts and informed choices of society, organisations, public and private communities, and individuals"* (Krska, 2011:3). The purpose of public health programmes or bodies is to improve and increase positive health outcomes of treatment and to ensure better overall health and disease prevention (Strand *et al.*, 2016:248). There are three primary functions of public health programmes, namely assessment, policy development and assurance (Schneider, 2014:5). Public health bodies and pharmacies can partner with each other to improve health outcomes in the population through contributing directly to the ten essential PHS (Strand *et al.*, 2016:248). These services are listed in Table 1-1 below (adapted from Schneider 2014:6).

Table 1-1: Ten essential public health services

Assessment
1. Monitor health outcomes to recognise and solve community health problems. 2. Diagnose and investigate possible health-related problems and health threats in the community.
Policy development
3. Provide information, education and empowerment to individuals about health-related problems. 4. Mobilise community partnerships and action to recognise and resolve health problems. 5. Develop strategies and plans that support individuals and community health efforts.
Assurance
6. Implement laws and regulations that keep individuals safe and protect their health. 7. Connect individuals to the needed personal health services and assure the providing of healthcare when otherwise unavailable. 8. Guarantee individuals a capable public and personal healthcare workforce. 9. Assess the effectiveness, accessibility and quality of personal and population-based health services.
Serving all functions
10. Search for new perspectives on and innovative solutions to health-related problems.

Pharmaceutical PHS include health education interventions, screening for non-communicable diseases and supporting the management thereof (through, for example, weight management programmes and smoking cessation services), as well as the testing of blood pressure and blood sugar levels (Saramunee *et al.*, 2015:706). Public health services should be provided professionally and efficiently to give the public and community the best possible quality of healthcare (Department of Health, 2000).

1.2.6 Pharmaceutical services

The vision of the SAPC (2010), in serving the public interest and in terms of its statutory obligations, is to guarantee that all the people of South Africa receive efficient pharmaceutical services to meet their healthcare needs. Pharmaceutical services can be defined as “*clinical and community-based pharmacy practice services that contribute to population health and prevention*” (Strand *et al.*, 2016:249). A pharmaceutical service, therefore, is an activity conducted in a pharmacy, by a pharmacist or other health practitioner, to improve health

outcomes and healthcare by applying their knowledge of medication and health (Moullin *et al.*, 2013:990).

Healthcare professionals are not always aware of all the medication their elderly patients are consuming (Mallet *et al.*, 2007:186). Polypharmacy continues to increase among elderly patients, and it is the responsibility of healthcare professionals and especially pharmacists to be aware of the risks thereof and to monitor medication usage to prevent it (Hajjar *et al.*, 2007:345).

Because of the increase in the global population age, more elderly individuals will benefit from community-based care and support services (CBCSS), which help the elderly population as well as caregivers by providing wellness programmes and dietary support, improving their knowledge of health and ageing, and also providing assistance with housing, finances and home safety (Siegler *et al.*, 2015).

Healthcare for individuals will improve if the quality of pharmaceutical services provided by pharmacists or other healthcare providers increases (Knapp, 2002:421).

The services provided by the PSC can be divided into primary and secondary services. The primary healthcare services include, among others, social services, clinic services, therapeutic services, home care services, home nursing services and support groups. Besides these primary services, some of the secondary services provided by the PSC include social activities, cultural activities, as well as fitness activities.

Given the above background, the following research questions were formulated:

- What are elderly patients' perceptions of PC, PHS and pharmaceutical services?
- What are elderly patients' understanding or knowledge of PC?
- What are elderly patients' experiences of PC, PHS and pharmaceutical services?
- How do elderly patients manage their medication usage?
- What are the influences of CBCSS on quality of life?

1.3 Research aim and objectives

This research study included an overall aim and specific objectives.

1.3.1 Research aim

The overall aim of the research study was to evaluate the provision of PC and PHS in an ambulatory elderly population.

1.3.2 Specific research objectives

The research study was conducted in two phases namely a literature review and empirical study. The literature study was conducted to create a framework for the provision of PC and PHS in an ambulatory elderly population. This literature study focused on the PC needs of elderly patients and the importance of the pharmacist's role in the provision of PC. The literature study furthermore showed the relationship between PC and PHS in the elderly population.

The empirical study was conducted utilising a structured interview. A questionnaire was administered to members of the PSC to determine the level of provision of PC and PHS in an ambulatory elderly population.

Further information on the two main objectives is provided in the subsections below.

1.3.2.1 Literature review

The following secondary research objectives were met through means of a literature review:

- define the elderly population and their prevalence internationally and nationally;
- determine possible obstacles in prescribing medication to the elderly population;
- define PC and PHS in the context of ambulatory elderly patients;
- determine whether PHS influence quality of life in the elderly population;
- determine the role and responsibilities of the pharmacist in the provision of PC;
- determine how to overcome possible barriers in the provision of PC to the elderly;
- identify from the literature possible factors that could influence elderly patients' perceptions of PC; and
- determine from the literature whether physical, social and cultural activities influence the well-being of elderly patients.

1.3.2.2 Empirical investigation

The following secondary research objectives were met through an empirical investigation:

- determine possible problems with medication use in the study population;

- determine elderly patients' awareness of the indication of their medicine and medication use;
- determine the study population's expectations and experience of the provision of PC and pharmaceutical services by the pharmacist;
- determine whether the secondary services provided by the PSC influence the well-being of participants; and
- determine the study population's public-health-related needs and expectations.

Table 1-2: Specific objectives and the manuscripts in which they were addressed

Manuscript	Objective	Specific research objectives
One	To examine whether the expectations that the ambulatory elderly population of a CBCSS centre have of pharmaceutical care align with their experience thereof.	• Determine the study population's expectations and experiences of the provision of PC and pharmaceutical services by pharmacists.
Two	To review the availability and use of pharmaceutical services and CBCSS in an ambulatory elderly population.	• To determine the study population's expectations and experience of pharmaceutical services by pharmacists. • To determine whether the secondary services provided by the PSC influence the well-being of participants. • To determine the study population's public health-related needs and expectations.
Additional results		• Determine possible problems with medication use in the study population. • Determine elderly patients' awareness of the indication of their medicine and medication use.

1.4 Research methodology

“Research methodology” refers to how the study was conducted to answer the research questions. The research consisted of two phases: a literature study and an empirical study.

1.4.1 Literature study

The literature study examined the questions established in the problem statement by reviewing publications, recent articles on related subjects and books. It provided an international and local literature basis for the empirical study. Keywords used for the search were: pharmaceutical care, public health services, ten essential public health services, role of the pharmacist, ambulatory elderly, ageing, medicine prescribing to elderly, pharmaceutical services, benefits and barriers to PC.

1.4.2 Empirical study

This section includes information on the study setting, target population, research design and sampling method. A structured questionnaire was administered to determine the experience and expectations of the elderly in terms of pharmaceutical care.

1.4.2.1 Study setting

The study was conducted among a section of the elderly population who are members of the PSC in Potchefstroom in North West Province, South Africa.

As Dr Jansen van Rensburg, deputy director of the PSC, indicated to the School of Pharmacy during a meeting, there is a need for pharmacist services at the PSC. The PSC provides primary and secondary services to elderly retired people to help them function more independently in the community.

For this research study, individuals from 60 years of age who are members of the PSC were included as participants.

1.4.2.2 Target population and study population

The target population for this research study was all individuals 60 years and older using the services of the PSC. (Only individuals above the age of 60 years qualify for a membership at the PSC.)

1.4.2.2.1 Inclusion criteria

The following inclusion criteria were applied:

- participants could be either male or female;
- participants had to be aged 60 years or older;
- participants had to be members of the PSC; and
- participants had to be able to understand Afrikaans or English. According to the deputy director of the PSC, Dr Jansen van Rensburg, all the members of the PSC were able to understand Afrikaans or English. She based this statement on the information regarding language preference that is to be found in the PSC members' personal information files.

1.4.2.2.2 Exclusion criteria

- Patients with mental incapacity, as identified by the caregivers of the PSC, were excluded from the study because they would not be able to understand the relevant information given to them concerning the research study. The professional registered nurse at the PSC, a healthcare professional in direct service of the centre, personally works with all the members and knew exactly which patients were mentally incapacitated. As such, she helped the researcher identify those patients.

1.4.2.3 Sampling

According to Beck and Polit (2014:177), “[s]ampling involves selecting a portion of the population to represent the population”.

1.4.2.3.1 Sampling technique

A convenience sampling technique was used for this research study, which meant that all available participants were involved. This study was also an all-inclusive study, therefore all the members willing to participate were included. This sampling technique was least costly in terms of time and money (Brink *et al.*, 2012:140).

Approximately 90 to 150 members attended the meetings held by the PSC every Tuesday. The researcher participated in these meetings for a month to provide information about the study and to recruit participants.

1.4.2.3.2 Determination of sample size

A power analysis helped the researcher to determine the appropriate sample size. According to Tomczak *et al.* (2014:196), *“the power of a test tells us how likely we are to detect a difference in our data (by finding it to be statistically significant), for instance a difference between two groups or a significant correlation coefficient, given that in the population it really exists”*. A power analysis helps a researcher to determine how big the sample size must be to provide reliable results and reach the study goal. Tomczak *et al.* (2014:196) also stated that the bigger the sample size is, the better the results will be. It is essential to refrain from using a sample size that is too small, for example between 20 and 30 participants, because it will suggest that the means are idiosyncratic (Brink *et al.*, 2012:144). After meeting with the biostatistician of the research entity Medicine Usage in South Africa (MUSA) at North-West University (NWU), it was confirmed that for statistically reliable results, the optimum sample size was at least 40 participants, as predicted in the power analysis.

1.4.2.4 Research design

A quantitative, cross-sectional descriptive study was conducted. A quantitative study uses structured procedures and instruments to collect data and emphasises objectivity in the collection and analysis of information. A cross-sectional study may be described as a study that is done at a point in time and that is noncurrent (Brink *et al.*, 2012:11,101).

1.5 Data-collection tool

The researcher compiled a structured questionnaire to obtain information about the provision of PC and PHS to participants (see Annexure D). As recommended by Qu and Dumay (2011:224), a structured questionnaire consists of pre-planned questions that the interviewer asks and limits the number of response categories. All the respondents were asked the same questions in the same order.

1.5.1 Advantages and disadvantages of using structured questionnaires

According to Brink *et al.* (2012:153), the benefits of using questionnaires are as follows:

- When using questionnaires, the data of a larger group of people can be obtained easier, faster and cheaper than when using other methods of data collection.
- Using questionnaires is a straightforward way to determine the validity and reliability of data.

- Participants completing a questionnaire have a stronger feeling of privacy and will therefore complete the questionnaires more honestly than when asked the same questions in an interview setting.

Brink *et al.* (2012:153) list the following disadvantages of using questionnaires:

- Feedback from participants may be low.
- Participants will not always understand the questions correctly, and there is no opportunity for the researcher to clarify the questions.
- Not all the participants will have the knowledge to answer the questions.
- Participants completing the questionnaires sometimes give socially acceptable answers.

1.5.2 Development of the data-collection tool

Pharmaceutical services, as stated in the Pharmacy Act (53 of 1974 as amended in 1995), were used as guidelines in the development of the questionnaire. The researcher also used questions adapted from those used in other studies in the field of pharmaceutical services and PC (Janse van Rensburg, 2016:141-154, PSC, 2016, SAPC, 2010, Strand *et al.*, 2004:3991, Volume *et al.*, 2001:415). To obtain data, the researcher used a structured questionnaire which was designed to obtain information from participants regarding their experience and expectations of PC, pharmaceutical services and PHS. The questionnaire consisted mainly of closed-ended questions to test the participants' levels of general medication knowledge, and obtain information on risk factors, lifestyle changes, medication use, treatment outcomes and complications. A five-point Likert scale was used to determine the elderly's expectations and experiences. The questions focussed on ten main topics, namely personal information, general health, medication information, health service information, patient satisfaction at the respondent's pharmacy, the PC stepwise process, the respondent's expectations and experience when visiting their pharmacy, the primary services provided by the PSC, the secondary services provided by the PSC, and pharmaceutical services provided by the pharmacy. Using this method increased the reliability of the study (see paragraph 1.5.3.2).

When the researcher structured the questionnaire, attention had to be paid to the correct formulation of the questions. The researcher could have either used open-ended questions or closed-ended questions. Open-ended questions allow participants to answer the questions any way they like and closed-ended questions help the researcher to receive structured data, which is easier to analyse (McDonald, 2014). For this research study, the researcher used

closed questions because the study was among elderly patients and it was vital to reduce the risk of misinterpretation and confusion.

According to Kothari (2004:102-103), the following points should be addressed when developing a questionnaire:

- It is essential to start a questionnaire with the right sequence of questions because the first few questions will determine the initial response of the participants and whether they want to co-operate further in the research study.
- The best way to structure a questionnaire is to state general questions first and more specific questions at the end of the questionnaire.
- When formulating the wording for the questionnaire, the researcher should ensure that the questions are clearly asked and that there are no misunderstandings when the participant reads or hears the questions.
- The researcher should ensure that the questionnaire is easily understandable and structured simply with specific and precise questions.

A Likert scale was used to test the attitudes and feelings of the participants during the completion of the questionnaire (Brink *et al.*, 2012:159). A Likert rating scale was used to score a statement, the five or seven possible responses usually being ranked from high to low (see Table 1-3) (Allen & Seaman, 2007:64).

Table 1-3: Example of a Likert scale

Scale	1	2	3	4	5
	Never	Seldom	Sometimes	Often	Always
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	Most important	Important	Neutral	Unimportant	Not important at all

Pharmaceutical services, as stated in the Pharmacy Act (53 of 1974 as amended in 1995), were used as guidelines in the development of the questionnaire. The researcher also used questions adapted from those used in other studies in the field of pharmaceutical services and PC (Janse van Rensburg, 2016:141-154; PSC, 2016; SAPC, 2010; Strand *et al.*, 2004:3991; Volume *et al.*, 2001:415). The researcher administered the questionnaires at the PSC or at the relevant participant's residence, whichever was more appropriate for the participant.

1.5.3 Validity and reliability of the data-collection tool

According to Kimberlin and Winterstein (2008:2276), determining the validity and reliability of the study are essential to determine the quality of the measurement instruments used.

1.5.3.1 Validity

“A valid measure is one which measures what it is intended to measure. In fact, it is not the measure that is valid or invalid but the use to which the measure is put... the validity of a measure then depends on how we have defined the concept it is designed to measure” (Amaratunga *et al.*, 2002:29).

Validity instruments are used to determine whether the data collection tool can accurately measure what it is supposed to measure (Brink *et al.*, 2012:165). The four types of validity instruments are (Heale & Twycross, 2015:66):

- content validity instruments;
- face validity instruments;
- criterion-related validity instruments; and
- predictive validity instruments.

For this research study, face and content validity instruments had to be used. Face validity indicates whether the measurements of a test instrument are valid and content validity refers to how well the instrument represented the components that were measured (Rubio *et al.*, 2003:94). The structured questionnaire focused on elderly patients' perception and experience of PC. The questionnaire was sent to the researcher's supervisor, co-supervisors and all the senior lecturers in the School of Pharmacy Practice and Clinical Pharmacy at NWU; as well as Mrs A Janse van Rensburg who completed her MPharm on a similar topic, using a similar form of questionnaire to test the responses of 67 respondents. The feedback the researcher received was used to improve the questionnaire and so ensure content validity. Mrs M Cockeran, specialist in statistics in the niche area MUSA, approved the final format of the questionnaire and concluded that the methodology of the planned study was more than appropriate. Overall, the feedback received from the various parties assisted in the quality assurance of the questionnaire.

1.5.3.2 Reliability

“...[R]eliability is essential repeatability – a measurement procedure is highly reliable if it comes up with the same results in the same circumstances time after time, even when employed by different people” (Amaratunga et al., 2002:29).

Participants had to complete a questionnaire on their experience, expectations and views of PC through means of a structured interview conducted by the researcher. This interview provided actual data of medication use since participants had to provide a full list of medication prescribed or purchased at their healthcare providers, ensuring reliable data. The questionnaire was designed according to the Likert scale method, which renders the data reliable because there are no neutral areas. According to Neuman (2014:232), the number of responses in a Likert scale increases the reliability of the research, but it levels out at approximately seven choices.

To prevent confusion among the elderly population, the researcher used a scale with five choices, which improved the reliability of the test. The response options “strongly disagree”, “disagree”, “uncertain”, “agree” and “strongly agree” were used in the questionnaire to prevent even the slightest confusion.

1.6 Data-collection process

The data-collection process can be divided into four steps, as seen in Figure 1-2 below.

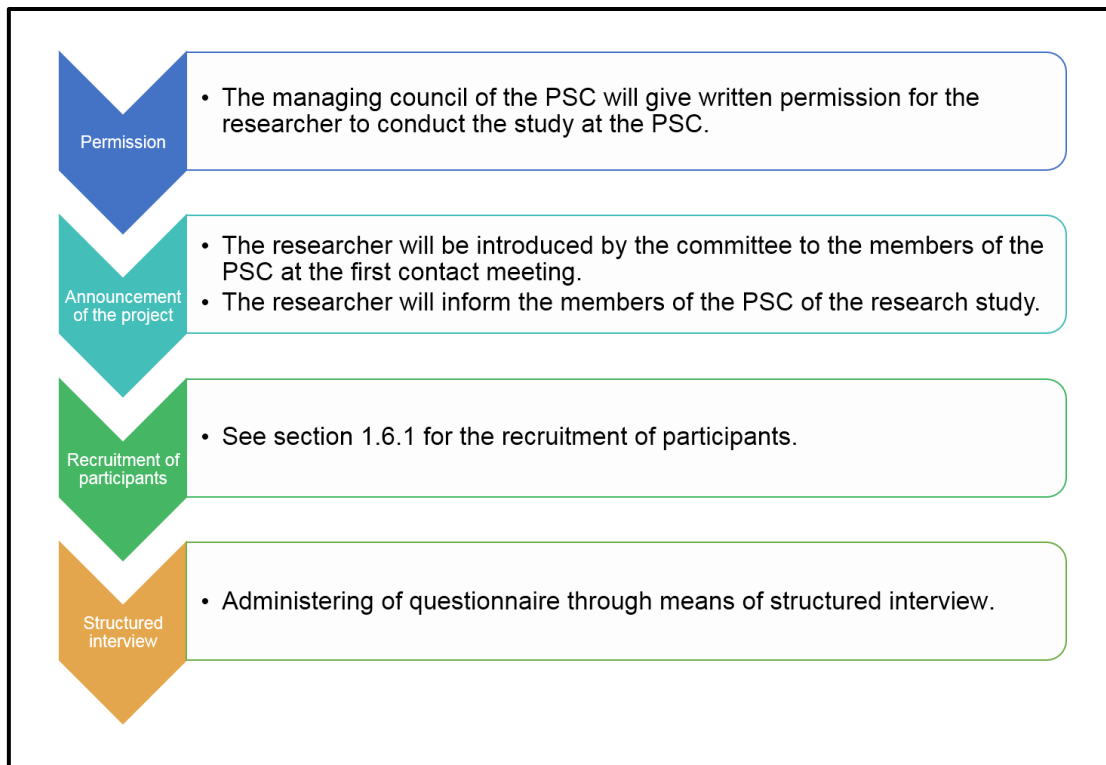


Figure 1-2: Data-collection process explained in four steps

1.6.1 Recruitment of participants

The professional registered nurse at the PSC had to assist the researcher in identifying participants who met the inclusion criteria.

The recruitment of participants is represented schematically in Figure 1-3 and can be described as follows:

- The researcher advertised the research study 14 days before the first meeting (see Annexure A for the advertisement). Printed posters were displayed in the community hall at the PSC, in the PSC newsletter, and in emails to serve as an advertisement for the study.
- The researcher attended the meetings held by the PSC for every week on Tuesdays for a month to inform the members of the PSC of the research study. All the members of the PSC were welcome to attend the weekly meetings.
- The supervisor, Dr Joubert, explained the research study to the PSC members and emphasised that participation was voluntary and that participants could withdraw from the

study at any stage. Any questions the participants had were to be directed to the researcher. Participants were ensured that their identity would stay anonymous.

- An informed consent form (see Annexure C) was given to participants. Participants had the opportunity to take the informed consent forms and make the decision whether to participate in their own privacy. The participants were informed that they should only sign the informed consent form after reflection. A sealed box was placed in the reception area of the PSC where the participants who wanted to take part in the study could hand in their signed informed consent forms. Dr Joubert retrieved the informed consent forms 21 days after the last meeting at the PSC where the research project was advertised (see Figure 1-3).

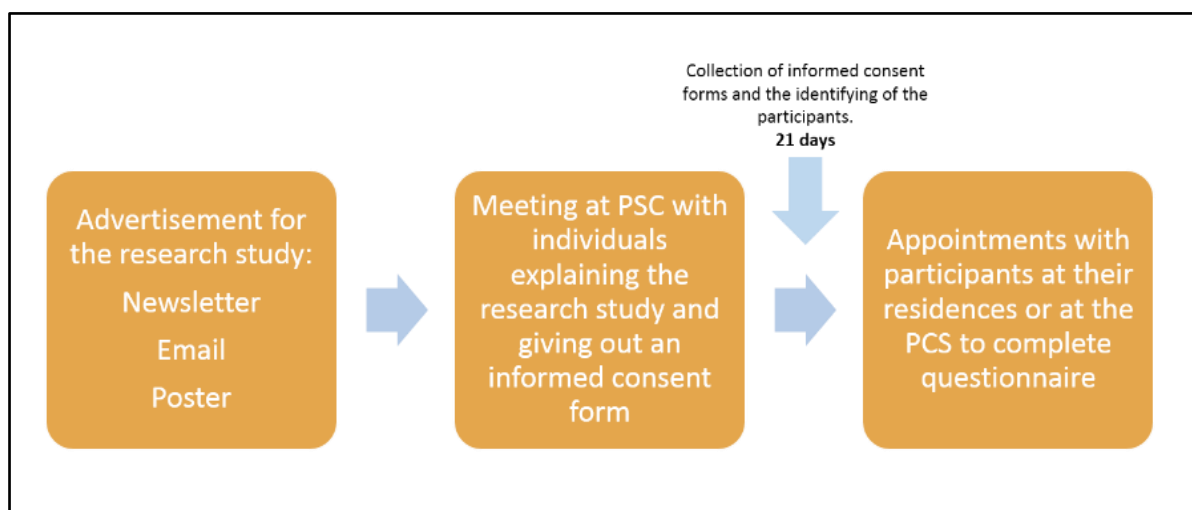


Figure 1-3: Process of recruiting participants

1.6.2 Data gathering process

- The researcher collected participants' personal information and contact details from the signed informed consent forms. The researcher contacted participants.
- In the case of each participant, the researcher made an appointment for a convenient time to meet. The participant had the choice to meet at the PSC, their own residence or any other place of their choice.
- Participants took part in a structured interview led by the researcher. During this interview, the questionnaire was completed. The interview took approximately 60 minutes to complete.
- The data collected was confidential, and participants' privacy was assured (see paragraph 1.9.2 and 1.9.3).

1.7 Data storage

The files containing the captured data, informed consent forms and completed questionnaires were kept in a locked cabinet within the office of the researcher at NWU at all times. Only the researcher, supervisors and statistician had access to the data. The electronic data were saved on an external password-protected memory stick with an anti-virus program and kept safe in a locked cupboard at the office of the research entity MUSA.

After the completion of the study, NWU guidelines indicate, all completed questionnaires and hardcopies of data has to be kept in a secure place for seven years. The offices of MUSA were chosen for this purpose. After seven years, the documents may be destroyed by the MUSA research assistant, as per NWU policy. The electronic data were stored on a dedicated external hard drive. In line with the NWU guidelines, the hard drive will be formatted and data destroyed after seven years.

1.8 Statistical analysis

The Statistical Package for Social Sciences version 25.0[®], SPSS 25.0[®], was used in this research study (IBM, 2017). According to Brink *et al.* (2012:179), descriptive statistics describe and summarise the data to provide a bigger picture. Descriptive statistics such as frequencies (n), percentages (%), means, standard deviations and 95% confidence intervals (CI) were used. The variables in this research study included, *inter alia*, age and gender. Results were considered statistically significant when the *p*-value was ≤ 0.5 .

A dependent *t*-test was used to determine the difference between the means of two-paired groups. The Cohen's *d*-value for an independent *t*-test was used to determine the practical significance of the results (with $d \geq 0.8$). Cronbach's alpha was used to determine reliability (reliable coefficient of 0.70 or higher was an acceptable value).

1.9 Ethical considerations

It is essential to emphasise the importance of ethical considerations in a study of this nature. Important ethical aspects include the obtaining of permission from all relevant parties to conduct the study, the obtaining of informed consent from all participants, and the protection of the participants' identities (Maree, 2016:44).

1.9.1 Permission and informed consent

Approval was obtained from the following entities before the researcher started collecting the data:

- Ethical approval for the research study was obtained from the Health Research Ethics Committee (HREC) at NWU.
- A letter of approval was obtained from the managing council of the PSC, subject to the approval of the study by the HREC.
- Informed consent (see Annexure C) was obtained from the participants who all use the services of the PSC. Informed consent was a form for participants who voluntarily participated in the research study, which contained ethical principles and confirmed protection of participants from any harm (Brink *et al.*, 2012:38). The supervisor provided a written form to participants discussing the information regarding the research study. Participants who voluntarily wanted to partake in the research study had to only sign the informed consent form after reflection of the information in the informed consent (the process of obtaining informed consent was discussed in section 1.6).

1.9.2 Anonymity

To protect participants' anonymity means that the researcher must ensure that their identities are kept secret (Brink *et al.*, 2012:37). No personal information such as name, surname, identification number or address was captured on the questionnaire, ensuring that no patient information can be traced back to a specific participant. Participants were assigned participant numbers.

1.9.3 Confidentiality

To ensure confidentiality means that any information gathered from participants for the purposes of a research study is the responsibility of the researcher and he or she should prevent it from being linked to individual participants, and from being available to other people (Brink *et al.*, 2012:38). Contact sessions held at the PSC were held in a private office that ensured confidentiality. Information gathered from participants remained anonymous and confidential. Data received (both in hard copy form and that captured in an electronic Excel™ sheet) was kept in a secure place (as described in section 1.7).

1.9.4 Justification of research study

The results of the study emphasise the importance of the provision of PC and pharmaceutical services to elderly patients. The study also indicates the elderly population's knowledge, experiences and expectations of PC and pharmaceutical services.

1.9.5 Respect for research participants

Individuals making use of the PSC's services were informed of the research study and they decided themselves whether they would like to take part in it. Participation was thus voluntary and participants had the right to withdraw from the study at any time. The contact details of the researcher were supplied to all the members of the PSC. If the participants had any questions during the study, they could ask the researcher at any time to clarify the problem.

1.9.6 Benefit-risk ratio analysis

In a benefit-risk ratio, it is essential that the benefits of the study exceed the risks that participants face during the research study (Bink *et al.*, 2012:42).

1.9.6.1 Anticipated benefits

The anticipated benefit of this study was, to determine the provision of PC and PHS in an ambulatory elderly population to improve PC outcomes and patients' knowledge of PC and services provided. The study benefited both the researcher and the participants, and therefore the anticipated benefit for the elderly was the increased knowledge they gained on PC, pharmaceutical services and public health. The following benefits were identified for this study:

1.9.6.2 Direct benefits

The one direct benefit that the study held for participants is the gaining of a better understanding of the importance of a pharmacist's role in PC, and of the complexities surrounding multiple drug use. The researcher was furthermore in a position to tell patients to see their doctor if the research findings showed that they were not using their medication as prescribed.

1.9.6.3 Indirect benefits

The indirect benefits for the participants, researcher and PSC were:

- Pharmaceutical care focused on improving quality of life and therefore enhanced participants' insight into how to achieve this and how to receive better care.
- The participants gained insight into how aware or not elderly patients are of PC during the course of completing the questionnaire.
- A significant problem in the elderly population is the use of multiple drugs, and therefore this research study emphasised the important role of PC in reducing DRPs in the elderly.

- The PSC gained better insight into the role that a pharmacist plays in PC and into what the pharmacist can do to improve health outcomes in the elderly population.
- Participants became aware of the role that the pharmacist played in PC which information or knowledge was obtained from their pharmacist.
- During the completion of the questionnaire or at the feedback meeting, the researcher was in a position to inform participants of any possible risks or benefits of the medication that they use.

1.9.7 Anticipated risks and precautions

This was a medium-risk study because there was direct contact with participants who constitute a vulnerable group (The elderly population is defined as “vulnerable” by the Older Persons Act (13 of 2006)). The possible risks and the precautions that were taken to minimise them are listed in Table 1-4. Note that the potential risks did not outweigh the benefits of participation in the study.

Table 1-4: Risk-benefit ratio of the study: Anticipated risks and precautions

Possible risks for participants	Precautions taken by researcher
Invasion of participants' privacy	The questionnaire was conducted at participants' own residences when so preferred. Data were collected confidentially. Data collected from participants was kept in a secure place and only the researcher, supervisors and statistician have access to the data.
Loss of time	The researcher made an appointment with participants for a time that was convenient for them. The questionnaire took no longer than 60 minutes to complete.
Participants may feel uncomfortable, vulnerable or fatigued	Participants were not misled regarding the nature and purpose of the study, as it was explained in the informed consent form. The researcher assured the participants that their personal information was to be kept anonymous and that they had the right to withdraw from the research study at any stage. The information gathered was to be used only for the research study. Participants had regular breaks during the interview to reduce tiredness.

1.9.8 Data management

The PSC stated their willingness to assist in the research study. After obtaining this approval, the supervisor, Dr Joubert, had a meeting with members of the PSC to explain the nature and purpose of the research study. The participants signed the informed consent forms and the researcher collected the informed consent forms from the PSC. The researcher personally obtained the questionnaire data from the participants, either at the PSC or at the relevant participant's residence. The researcher captured the data from the questionnaires electronically. The participants' identities were kept anonymous during the study.

During the study, the hard copy data received by the researcher were locked in a cupboard at the office of the researcher at NWU and data kept electronically were stored on an external password-protected memory stick which has an anti-virus program. The storage of data were explained in section 1.7.

1.9.9 Dissemination of research results

After completion of the study, the participants were contacted and invited to a meeting held on a Tuesday morning at the PSC to provide feedback and share the results. Participants had the right to receive feedback on the outcomes of the study. The researcher contributed to two manuscripts, submitted to accredited journals, on the perceptions of PHS and PC in an elderly population, and also presented the results of the study at a national conference.

1.10 Chapter summary

This chapter served as a brief introduction to the research study. It was established that the elderly population is increasing globally and that healthcare providers must keep in mind the age-related pharmacokinetic and pharmacodynamic changes that occur in the body, especially when prescribing medication. Pharmaceutical care and PHS ensure the safer use of medication and a better quality of life for patients if performed correctly by healthcare professionals, especially pharmacists. This chapter detailed the problem statement, research objectives and research methodology of the study. The next chapter focuses on the literature objectives regarding PC and PHS in an ambulatory elderly population.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In line with the foundation laid by the philosophy of PC, pharmacy practice follows a patient-centred approach (Dupotey & De Oliveira, 2009:609). Pharmaceutical care has been summarised by some authors and authorities as the contribution and responsibility of all healthcare professionals, while others restrict it to contributions from the pharmacy profession alone (Allemann *et al.*, 2014:545). Pharmacists undergo specialised training and possess the required knowledge of medicine to help them to think differently from other healthcare providers (Tumkur *et al.*, 2012:284). According to most of the literature, it is vital that healthcare professionals work together and share the responsibility regarding PC, but the primary responsibility lies with the pharmacist (Van Mil *et al.*, 2004:303). A pharmacist needs to show empathy, concern, and trust to his or her patient (Wiedenmayer *et al.*, 2006:7). The elderly population will benefit from PC because of the role it can play in addressing DRPs such as inappropriate prescribing, noncompliance with prescribed medication, and adverse drug reactions (ADRs), which lead to a lower health status among the elderly (Crealey *et al.*, 2003:455).

“Population ageing” means that the percentage rate of the elderly in a specific community is considered higher than those of the younger population (Joubert & Bradshaw, 2006:204). The WHO (2014) define “the elderly” in first world countries as individuals of 65 years of age or older, but even though this is the general view of the definition, there is still no agreement on when exactly a person is “old”. The Older Persons Act (13 of 2006) of South Africa classifies “the elderly” as males over the age of 65 years and females over the age of 60 years.

Health-related needs change as a population ages, increasing the demand for chronic care (Joubert & Bradshaw, 2006:204). The below list details how certain factors affect the vulnerability of elderly patients (Kirsebom *et al.*, 2016:4; Wierenga, 2013:13-14):

- (i) The use of multiple drugs due to polypharmacy may result in drug-drug and drug-disease interactions, adverse reactions and medication errors.
- (ii) Physiological changes in the elderly, for example pharmacokinetic and pharmacodynamic changes, require adjustment of drug dosages.
- (iii) Elderly patients usually suffer from comorbidities.

- (iv) Elderly patients sometimes see different practitioners. The new practitioner does not necessarily know what the other practitioner has prescribed to the patient, which may lead to the patient taking too much medication.
- (v) The elderly can suffer from cognitive, social and functional problems.

The elderly is known as the most medicated group of people in society (Lau & Baweja, 2016:720). The elderly regularly use medication to lengthen their life-expectancy, increase their well-being and to treat or reduce the probability of developing diseases (Gellad *et al.*, 2011:12). The elderly respond differently to pharmaceuticals than the younger population because of physiological changes such as a high sensitivity to drugs that occur in the body as one ages (Mandavi *et al.*, 2012:404; Nash *et al.*, 2000). According to Hubbard *et al.* (2013:321), “normal” ageing can be related to physiological changes.

In the 1950’s, pharmacists only knew how to dispense and compound medication and did not provide any additional services such as communicating with patients, giving advice on their medication needs, or providing information on dealing with their disease (Abduelkarem, 2014:869). A common perception is that pharmacists are experts on medicine (prescribed and over the counter (OTC)), but not on health, and therefore the community does not make use of all the services provided by the pharmacy (Saramunee *et al.*, 2014:274). The general public instead go to the general practitioner for services that are also available at the community pharmacy (Gidman *et al.*, 2012). In South Africa, the general population does not see the pharmacist as a reliable source to consult regarding health matters, but rather the doctor or nurse since they physically examine the patient (Malangu, 2014:230). According to Saramunee *et al.* (2014:273), community pharmacies regard public health activities as vital to the community and would like to be part of the process of ensuring good public health. It is necessary for pharmacists to embrace their role and apply critical behavioural changes in the delivery of services in public health settings (Eades *et al.*, 2011). It is essential for the future of the pharmacy profession to implement the delivery of PHS and PC (Scott *et al.*, 2016:836).

Chapter 2 presents the literature review of this study. This chapter aims to create a framework for the provision of PC and PHS in an ambulatory elderly population while focusing on the PC needs of elderly patients and the important role of the pharmacist in the provision of PC.

Figure 2-1 details the literature objectives that this chapter aims to meet, as well as the number of the relevant section in which each objective is addressed.

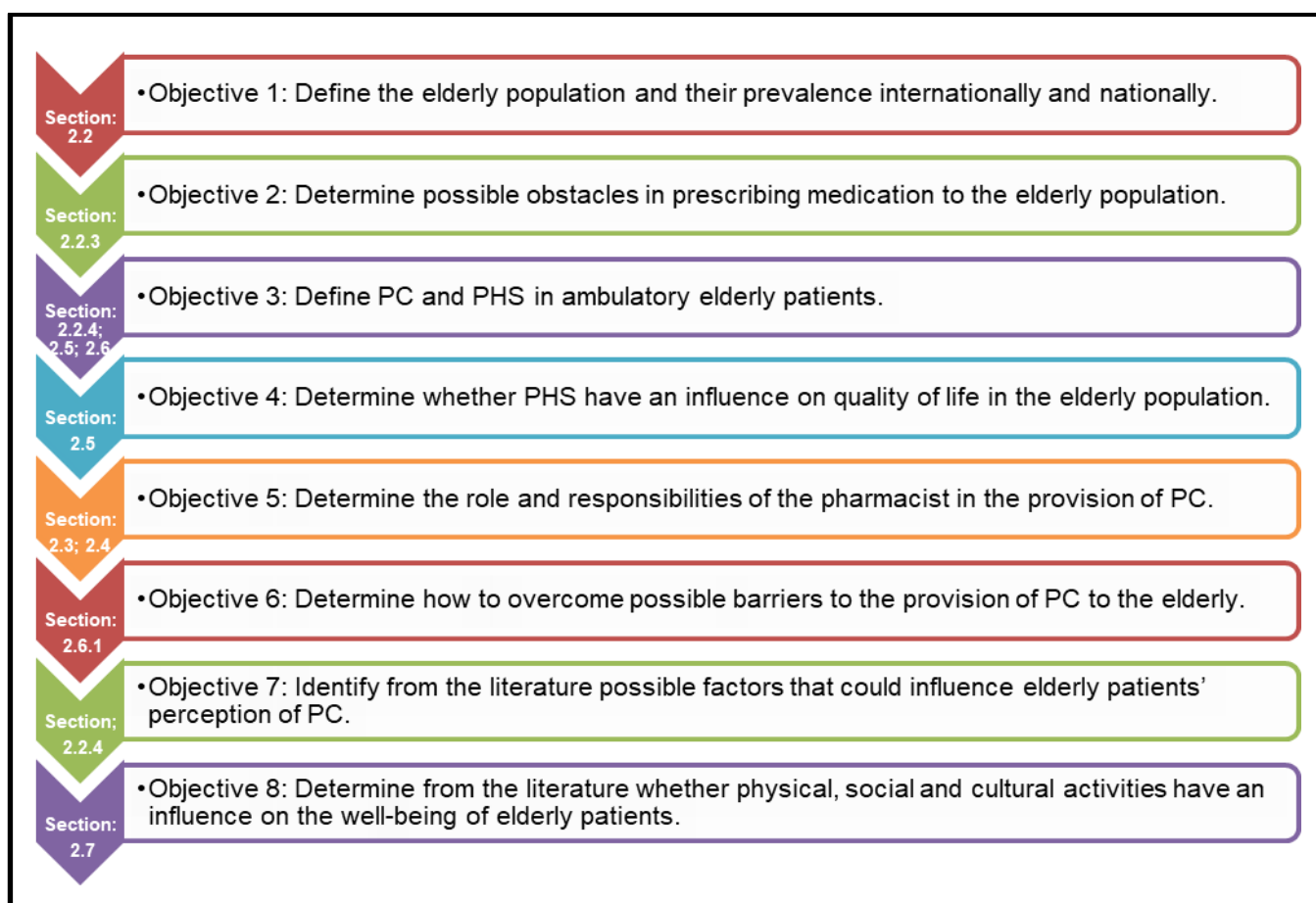


Figure 2-1: Literature objectives

2.2 Elderly population

“Older people are an enormous asset to our societies, not only because a large majority of them continue to work in old age, but also because they convey social values to younger generations” (Noroozian, 2012:1).

2.2.1 Prevalence of elderly populations internationally and nationally

Persons aged 60 years and above constituted 6.96% of the South African population in 1996 (Statistics South Africa, 2001); this number grew to 8% (4.47 million) of the population in 2016 according to Statistics South Africa (2016). In South Africa, the average life expectancy has increased from 52 years in 2005 to 61 years in 2016 (Gray *et al.*, 2016:36). According to Cullinan *et al.* (2015:861), it is expected that there will be almost 1.3 billion people over the age of 65 years in the world by 2040, which also means an increase of 7% in the elderly population to 14% of the world's population. For the first time in history, by 2020, it is estimated that there will be more people aged 60 years and older than there are children under the age of 5 years (Stegemann, 2016:vi).

2.2.2 Ageing

Clegg *et al.* (2013:752) stated that “[a]geing is believed to result from the lifelong accumulation of molecular and cellular damage caused by many mechanisms that are regulated by a complex maintenance and repair network”.

Infectious diseases have been replaced by chronic health complications as the primary healthcare problem in the past century, especially among the ageing population (Marengoni *et al.*, 2011:430). The portion of the South African population aged 50 years and over generally suffers from multiple chronic diseases and according to the study of Global Ageing and Adult Health, hypertension and arthritis were the most prevalent diseases affecting individuals in this age bracket (Phaswana-Mafuya *et al.*, 2013:20936).

Age-related chronic diseases such as cardiovascular, musculoskeletal and cerebrovascular conditions are associated with an increase in the medication prescribed to the elderly for the management of their conditions (Hubbard *et al.*, 2013:319). Therefore, it is essential to have a broader overview of the elderly population's health, primarily because of multiple comorbidities and disease interactions (Kirsebom *et al.*, 2016:3).

“Comorbidity refers to one or more other diseases among people with an index disease (for e.g. cardiovascular disease)” (Gijzen *et al.*, 2001:661). The number of comorbidities increases as the population ages; and this influences patients' response to medication (Huang *et al.*, 2012:362; Karlamangla *et al.*, 2007:296). Comorbidities have furthermore been linked to a higher risk of death, hospitalisation, disability, low quality of life and DRPs among the elderly (Mazzella *et al.*, 2010:323; Salive, 2013:80).

The elderly is especially vulnerable to ADRs, mostly because of the use of multiple types of medication as well as pharmacokinetic changes (i.e. changes relating to absorption, distribution, metabolism and excretion) and pharmacodynamic changes (i.e. changes relating to medicine's effect on the body) in the ageing population (Gallagher *et al.*, 2018:300; Petrovic *et al.*, 2012:453). These two types of changes are discussed in more detail in the following two subsections.

2.2.2.1 Pharmacokinetic changes in the elderly

A “pharmacokinetic interaction” is the interaction that occurs between drugs when two or more are administered together; the first drug is affected by the other(s) as a result of an increase or decrease in the concentration of a specific ingredient, which could lead to unexpected ADRs or to not achieving the desired therapeutic outcome (Son *et al.*, 2014:120).

Changes occur as one ages (refer to Table 2-1), for example one's absorption rate fluctuates because of changes in some organs like the gastrointestinal tract and in drugs taken orally (Nash, 2000). Distribution of drugs can be significantly affected by changes in body composition occurring with advanced age (Corsonello *et al.*, 2010:572). Excretion changes follow if drug regimens are not reduced in size or frequency over time, there is a decrease in renal function which results in the prolonged half-life of the drug and an increase in toxicity levels (Katzung *et al.*, 2012:1053). The metabolism of drugs takes place in the liver but enzymes of the gastrointestinal tract and kidneys can also cause the breakdown of certain moieties (Hutchison & O'Brien, 2007:6).

Pharmacokinetic changes present in the elderly population mostly cause a decrease in the effectiveness of certain drugs such as enalapril, which has a decreased bioavailability after first step metabolism (Guaraldo *et al.*, 2011). Other examples of drugs affected by pharmacokinetic changes due to ageing are water-soluble drugs (for example cimetidine, digoxin and lithium) because of a reduction in distribution volume, lipophilic drugs (for example amiodarone, diazepam and verapamil) because of a rise in distribution volume, drugs affected by a delay in absorption and drugs that reduce metabolic clearance, such as amiodarone, amitriptyline and warfarin (Obreli-Neto *et al.*, 2012:1668).

Table 2-1 presents a summary of studies on age-related changes in all phases of the pharmacokinetic processes associated with ageing. In this table, the different age-related changes affecting pharmacokinetic processes and the effects of these changes are examined as well as examples of drugs affected by the changes. The table was adapted from Corsonello *et al.* (2010:572), Hämmerlein *et al.* (1998:49-64), Hutchison and O'Brien (2007:4-9), Mangoni and Jackson (2004:6-14), and Turnheim (2003:845-850).

Table 2-1: Summary of studies on pharmacokinetic changes in the elderly

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
Corsonello <i>et al.</i> (2010:571-574)	Absorption	Increased gastric pH	Slightly decreased absorption	Transdermal route of administration Vasodilators Opioids Levodopa Acetylcholinesterase inhibitors Nonsteroidal anti-inflammatory drugs (NSAIDs) Oestrogens Pulmonary bronchodilators (β 2-agonist, anticholinergics) Inhaled steroids Anaesthetics Conjunctival route of administration β -blockers Antibiotics Steroids Vitamin D
		Delayed gastric emptying		
		Reduced splanchnic blood flow		
		Decreased gastrointestinal motility		

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
	Distribution	Increased body fat	An increased volume of distribution and half-life for lipophilic drugs	Vitamin D3 (reduced) Haloperidol Theophylline
		Reduced lean body mass		
		Reduced body water content	Increased plasma concentration of water-soluble drugs	
		Reduced serum albumin	Increased free-fraction of highly protein-bound acidic drugs	
		Increased α 1-acid glycoprotein	Decreased free-fraction of basic drugs	
	Metabolism	Reduced hepatic blood flow and overall liver mass	Less effective first-pass metabolism and phase 1 metabolism	Propranolol (reduced) Amitriptyline (reduced)
	Excretion	Reduced renal blood flow	Impaired renal elimination of water-soluble drugs	Not addressed in this study
		Reduced glomerular filtration rate		
Mangoni and Jackson (2004:6-14)	Absorption	Reduced gastric acid secretion	Not addressed in this study	Vitamin B12 (reduced) Iron (reduced) Calcium (reduced) Levodopa (increased)
		Reduced gastric emptying		
		Reduced splanchnic blood flow		
		Reduced absorptive capacity of the small intestine		

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
	Distribution	Water-soluble drugs have smaller volumes of distribution	Higher serum levels	Gentamicin Digoxin Ethanol Theophylline Cimetidine
		Lipid-soluble drugs have an increased volume distribution	Prolongation of half life	Diazepam Thiopentone Lignocaine Chlormethiazole
	Metabolism	Reduction in liver mass and hepatic blood flow	Reduction in first pass metabolism	Propranolol (increased) Labetalol (increased) Enalapril Perindopril
	Excretion	Reduction in glomerular filtration rate	Clearance of water-soluble drugs	Water-soluble antibiotics Diuretics Digoxin Water-soluble β -adrenoreceptor blockers Lithium Non-steroidal anti-inflammatory drugs
		Reduction in liver blood flow	Affect the clearance of drugs with a high extraction ratio	Chlormethiazole Dextropropoxyphene Glyceryl trinitrate

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
				Lignocaine Pethidine Propranolol
Turnheim (2003:845-850)	Absorption	Decreased splanchnic blood flow Decreased gastric acid secretion	Drugs absorbed at lower rates	Indomethacin Prazosin Digoxin
		Intestinal epithelium decrease		Calcium Iron Vitamins
		Decreased gut motor function		Antimuscarinic drugs Antihistamines Tricyclic antidepressants Opioids
	Distribution	Decreased body water content	Higher plasma concentration	Aspirin Tubocurarine Edrophonium Famotidine Lithium Ethanol
		Increased body fat Decreased lean body mass	An increased volume of distribution and increase in half-life	Amiodarone Diazepam Teicoplanin Verapamil

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
		Decreased plasma albumin levels	Not addressed in this study	Acetazolamide Benazepril Clomethiazole Diazepam Diflunisal Enalapril Etomidate Maproxen Salicylic acid Theophylline Valproate
		Increased α 1-acid glycoprotein		
	Metabolism	Reduced in liver size Endoplasmic reticulum is dismissed Increased hepatic extracellular space Reduced bile flow Decreased serum albumin concentration	Drug clearance by CYP enzymes or phase-1 reactions decline	Theophylline Ropinirole Amiodarone Amitriptyline Carbamazepine Triazolam Cyclosporin Diltiazem Fentanyl Lidocaine Nifedipine Felodipine Zolpidem Naproxen

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
				Warfarin Imipramine Antipyrine Clomethiazole Pethidine Verapamil Morphine
		Reduced renal blood flow		Amitriptyline Imipramine Lidocaine Morphine Pethidine Propranolol Verapamil
		Capacity-limited metabolism		Antipyrine Theophylline
	Excretion	Reduced in functioning glomeruli	Increased drug serum levels	Not addressed in this study
		Reduced renal blood flow reduced	Increased angiotensin-II and endothelin levels Decreased prostaglandin concentration	
Hämmerlein <i>et al.</i> (1998:49-64)	Absorption	Reduced gastrointestinal blood flow	Reduced absorption rates	Levodopa

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
	Distribution	Increase gastric pH	Affects ionisation and solubility of drugs	Clorazepate Antibiotics administered by intramuscular injection
		Increased body fat Decreased lean body mass Decreased in total body water content	An increased volume of distribution of lipid-soluble drugs and opposite effect on water-soluble drugs	Not addressed in this study
		Increased in α 1-acid glycoprotein Increased	Increase in free drug fraction	Lidocaine Propranolol
		Reduction in serum albumin		Not addressed in this study
	Metabolism	Decreased liver size Decreased hepatic blood flow	Changes involve the microsomal mixed-function oxidative system which results in phase 1, oxidation and reduction	Alprazolam Antipyrine Barbiturate Carbamazepine Ibuprofen Imipramine Desipramine Nortriptyline Phenytoin Propranolol Quinidine Warfarin

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
				Amitriptyline Chlordiazepoxide Diazepam Flurazepam Diphenhydramine Lidocaine Pethidine Theophylline Tolbutamide Nitrazepam
	Excretion	Decreased glomerular filtration rate Decreased renal plasma flow	Increased filtration fraction	Nonsteroidal anti-inflammatory drugs Diuretics
Hutchison and O'Brien (2007:4-9)	Absorption	Decreased gastric acid secretion Delayed gastric emptying Slowed intestinal transit time Reduced gastrointestinal blood flow	Delayed absorption	Itraconazole Ketoconazole Iron Calcium carbonate Enteric coated tablets Alendronate Fentanyl Testosterone Estradiol Acetylsalicylic acid

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
	Distribution	Increased body fat	Increased volume of distribution	Benzodiazepines such as: Diazepam
		Decreased muscle mass	Extended clearance and prolonged half-life	Chlordiazepoxide
		Decreased body water	Decreased volume of distribution	Digoxin Lithium
	Metabolism	Decreased serum albumin	Increase in free fraction of drugs.	Phenytoin Warfarin
		Decreased liver and kidney mass Decreased hepatic blood flow	Significant increase in first-pass extraction rate leading to higher bioavailability Phase 1 metabolism significantly reduced	Atorvastatin Labetalol Lidocaine Lovastatin Metoprolol Pravastatin Propranolol Quinidine Simvastatin Verapamil Amitriptyline Desipramine Imipramine Levodopa Morphine
	Excretion	Reduced renal mass Reduced renal blood flow	Not addressed in this study	Aminoglycosides Carbapenems

Author(s) of studies	Pharmacokinetic process	Age-related changes	Effect of change	Examples of drugs and supplements affected by the changes
		Reduced filtration fraction and tubular secretion Decreased glomerular filtration		Fluconazole Fluoroquinolones Penicillin Sulphonamides Tetracycline Vancomycin Acyclovir Famciclovir Valacyclovir Angiotensin-converting enzyme inhibitors Atenolol Digoxin Telmisartan Gabapentin Lithium Meperidine Pregabalin Allopurinol Glipizide Histamine-2 antagonist

2.2.2.2 Pharmacodynamic changes in the elderly

The term “pharmacodynamics” has been described as the study of *“the biochemical and physiological effects of drugs at their site of action”*, these effects being *“strictly related to several variables, such as the concentrations of drugs at the receptor, the interaction between the drug and its receptor and the homeostatic regulation”* (Corsonello *et al.*, 2010:575).

Pharmacodynamic drug-drug interactions (DDIs) have an additive or antagonistic pharmacological effect that heightens a patient’s sensitivity to drugs (Alomar, 2014:89; Mangoni & Jackson, 2004:11). With ageing comes a change in organ function and according to Garner (2013:20), the organs that drastically change are the central nervous system and the cardiovascular system, these changes potentially causing confusion, sleepiness and postural hypotension in the elderly (refer to table 2-2). Pharmacodynamic DDIs can be seen in patients exposed to polypharmacy, for example elderly patients who suffer from multiple chronic conditions and who use numerous types of medication (Hinder, 2011:365). Prescribers should specifically be aware of drugs such as benzodiazepines, furosemide, opioids, warfarin and neuroleptic antipsychotics when dealing with the elderly because this group is especially sensitive to the effects of these drugs (refer to table 2-2); prescribers should therefore lower the dosage strengths and slowly titrate these medications (Lavan *et al.*, 2016:860).

Table 2-2 presents a summary of studies on age-related pharmacodynamic changes and the drugs that are affected by these changes. Table 2-3 summarises the age-related pharmacodynamic and pharmacokinetic changes identified in the different studies. Table 2-2 and Table 2-3 were adapted from Cascorbi (2012:549), Corsonello *et al.* (2010:572), Hämmerlein *et al.* (1998:49-64), Hutchison and O’Brien (2007:4-9), Mangoni and Jackson (2004:6-14), Nash *et al.* (2000), Rossiter (2012:4) and Turnheim (2003:845-850).

Table 2-2: Summary of studies on pharmacodynamic changes in the elderly

Author	Alterations in body function with age		Examples of drugs and supplements affected by changes
Hämmerlein <i>et al.</i> (1998:49-64)	Central nervous system	A decrease in blood flow due to atherosclerotic narrowing of vertebral and carotid systems leads to neuronal loss and a change in the sensitivity of centrally acting drugs.	Benzodiazepines β-blockers Central α-agonists Tricyclic antidepressants Barbiturates Opiates
	Reflex response	A decline in baroreceptor reflex sensitivity and responsiveness leads to postural hypotension.	Glyceryl trinitrate Phenothiazines Diuretics Nifedipine Nicardipine Felodipine Prazosin Terazosin Doxazosin
	Renin-angiotensin-aldosterone system	A decrease in plasma renin levels as well as blood and urine aldosterone levels lead to a decline in sympathetic innervation to the juxtaglomerular cells.	Nonsteroidal anti-inflammatory drugs Angiotensin-converting enzyme inhibitors β-blockers Potassium-sparing diuretics

Author	Alterations in body function with age		Examples of drugs and supplements affected by changes
	Fluid and electrolyte balance	Intrinsic and diuretic-induced renal dysfunction, higher levels of vasopressin and, water retention cause hyponatremia.	Not addressed in this study
Hutchison and O'Brien (2007:8)	Cardiovascular system	Reduced response to β_1 -adrenergic agonists.	Isoproterenol
		Higher response rate to β_1 -adrenergic blockers.	Metoprolol
		A decline in arterial compliance and baroreceptor reflex increases risk of orthostatic hypotension.	Tricyclic antidepressants Antipsychotics Diuretic Angiotensin-converting enzyme inhibitor Direct vasodilators Opioids
		Higher hypotensive response.	Calcium-channel blockers
	Fluids and electrolytes	Reduction in fluid homeostatic mechanisms and electrolyte homeostatic mechanisms leads to the following changes: - Decline in glomerular rate - Decline in thirst response - Decline in capacity of kidneys to concentrate urine - Increased in atrial natriuretic peptide - Decline in aldosterone response to hyperkalaemia - Decline in response to antidiuretic hormone	Not addressed in this study

Author	Alterations in body function with age		Examples of drugs and supplements affected by changes
		The above changes may result in hyponatremia, inappropriate secretion of antidiuretic hormones, hyperkalaemia and dehydration.	
	Central nervous system	A decline in reserve or compensatory ability leads to an imbalance in the neurotransmitter system.	Not addressed in this study
		Increase in permeability of blood-brain barrier.	Not addressed in this study
		Increase in sensitivity of γ -aminobutyric acid neurotransmitter system.	Benzodiazepines
		Acetylcholine neurotransmission changes: - Decline in cholinergic neurons - Decline in choline uptake from the periphery - Decline in choline acetyltransferase - Incline in acetylcholinesterase - Decline in nicotinic and muscarinic receptors These changes are the result of an incline in susceptibility to the anticholinergic effects.	Delirium
		A decline in dopaminergic neurons in the substantia nigra causes an increase in extrapyramidal side effects.	Medication with antidopaminergic properties
Corsonello <i>et al.</i> (2010:571-574)	Central nervous system	Incline in risk of incurring balance and gait impairments. Incline in the postural sway at the baseline.	Benzodiazepines for example triazolam,
		Incline in sensitivity to central effects for example increase in drug sensitivity.	Anaesthetics Propofol

Author	Alterations in body function with age		Examples of drugs and supplements affected by changes
			Opioids (alfentanil, fentanyl and remifentanil)
		Adverse drug reaction and an increase in drug sensitivity lead to: - Extrapyrarnidal symptoms - Orthostatic hypotension - Anticholinergic effects	Antipsychotics
	Cardiovascular system	Transiently incline due to alteration in receptors and decreased baroreceptor response leads to antihypertensive effect.	Dihydropyridines calcium channel blockers
		Incline due to a decreased baroreceptor response and age-related alterations of PK causes an antihypertensive effect.	Non-dihydropyridines calcium-channel blockers
		Decline in sensitivity to PR interval on electrocardiography prolongation.	Non-dihydropyridines calcium-channel blockers
		Decline in drug sensitivity because of alterations in signal transduction pathway which causes a pharmacodynamics effect in the antagonism to β -adrenergic stimulation	β -blockers
		Decline in drug sensitivity because of impaired tubular secretion of drugs due to diuretic response	Diuretics
		Increased drug sensitivity that has anticoagulant effect	Warfarin

Table 2-3: Summary of age-related pharmacokinetic and pharmacodynamics changes

Process	Age-related changes	Effect	Examples of drugs and supplements affected by changes
Pharmacokinetics			
Absorption	Increased gastric pH	Slightly decreased absorption.	Absorption from route whereby drugs is administered, for example: Orally Transdermal Pulmonary Conjunctival
	Delayed gastric emptying		
	Reduced splanchnic blood flow		
	Decreased gastrointestinal motility		
Distribution	Increased body fat mass	The increased volume of distribution and half-life of lipophilic drugs affect the dosage of drugs needed to produce the desired therapeutic outcome.	Digoxin Ethanol Theophylline Lithium Diazepam
	Reduced lean body mass		
	Reduced body water content	Increased plasma concentrations of water-soluble drugs.	
	Reduced serum albumin	Increased free-fraction of highly acidic protein-bound drugs.	
	Increased α1-acid glycoprotein	Decreased free-fraction of necessary drugs.	
Metabolism	Reduced hepatic blood flow and hepatic mass	Less efficient first-pass metabolism and phase 1 metabolism.	Propranolol Amitriptyline Isosorbide Lidocaine Diazepam Quinidine Nortriptyline
Excretion	Reduced renal blood flow	Impaired renal elimination of water-soluble drugs.	Digoxin Aminoglycoside antibiotics Lithium Cimetidine Coumadin
	Decline in glomerular filtration rate		
Pharmacodynamics			
End-organ responsiveness	Changes in receptor binding	Increase in receptor response which causes an enhanced drug effect.	Benzodiazepines Opiates Warfarin
	Decline in receptor numbers or altered biochemical reactions	A decrease in sensitivity to β-receptors	

2.2.3 Obstacles in medication for the elderly population

Medicine is useful when treating or preventing illnesses or the symptoms of a disease, but when misused by a patient it may be harmful to the body or even cause adverse effects (Björkman *et*

al., 2002:1675). The elderly consider medication fit when it is affordable, accepted by a majority and appropriately indicated (O'Mahony & Gallagher, 2008:138).

2.2.3.1 Medication prescribing in the elderly

Ahmad *et al.* (2014:155) found that the section of the elderly population in their study who suffered from chronic diseases used three times more drugs than the younger population in their study. A study done in Europe showed that the amount of medication prescribed to patients increased even more between the ages of 75 and 84 years (Cascorbi, 2012:546).

Inappropriate prescribing is defined as “*a range of suboptimal prescribing practices*” (Parsons *et al.*, 2012:143). The following mistakes arise with dispensing in community and hospital pharmacies: dispensing of incorrect medicine, wrong dosage form or amount given out, incorrect strength and guidelines on the label (Ostini *et al.*, 2012:350).

Healthcare professionals are faced with the challenge of balancing the treatment of diseases in a high-intensity environment without causing any medication-related harm (Cooper *et al.*, 2015). Even though the practitioners of elderly patients know which drugs they themselves prescribed, they are not always aware of the full list of medication that the relevant patients are using (Lavan *et al.*, 2016:859). Being unaware of the complete list of drugs used by a patient leads to treatment errors and ADRs, which have a negative influence on patient health outcomes (Nash *et al.*, 2000). This emphasises the importance of medication review, requesting that patients bring all their medication along when consulting the healthcare provider, and remembering to ask about any herbal remedies and OTC medication that the patient may be using (Webber, 2017:97).

The largest problem contributing to ADRs that general practitioners of elderly patients face is choosing the wrong medication (O'Mahony & Gallagher, 2008:138). As it is necessary to regulate dosage regimes, treatment combinations and distribution routes in elderly and ill-health patients, it is sometimes best to avoid some medication (Milton *et al.*, 2008:607). Table 2-4 provides recommendations that should be considered when prescribing medication to the elderly. This table was adapted from Milton *et al.* (2008:607).

Table 2-4: Prescribing recommendations for elderly patients

Recommendations
Assess medication regularly and if changes are necessary, talk it over with the patient.
Discontinue the use of any medication that is not indicated.
Make sure newly prescribed drugs are clearly indicated.
Try not to prescribe drugs that can possibly cause problems in the elderly, such as benzodiazepine. If such drugs cannot be avoided, reduce the dosage strength if possible.
Make use of suggested dosage regimes for the elderly.
Use simplified treatment regimens and be certain that the correct administration route is followed.
If possible, when prescribing, make use of a once-daily or once-weekly prescribed dose by means of using fixed-dose combinations.
Try to make use of non-drug therapy if possible.
Reduce the number of prescribers per patient if possible.
Try not to treat ADRs with other medicine if possible.

The primary goal of appropriate prescribing is to ensure efficient and safe medication use and cost efficiency, whilst respecting patients' preferences (Kaufmann *et al.*, 2014:1). In a study conducted in healthcare clinics in Mexico City, prescriptions for 624 patients aged 50 years of age and older were assessed; the results showed that 80% of the prescriptions posed potential DDIs and 3.8% of the prescribed drugs was contraindicated by one or more of the other prescribed drugs (Doubova *et al.*, 2007:147). Statistics show that in South Africa, 30% of the elderly in a study conducted of the 6410 prescriptions in 2002, were wrongfully prescribed at least one drug (Chetty & Gray, 2004:153). According to Goulding (2004:305), appropriate prescribing will benefit the prevention of morbidity, whereas inappropriate prescribing can harm patients.

2.2.3.2 Medication use in the elderly

"Inappropriate medication use" can be defined as the intake of medication at a higher frequency for a more extended period than clinically indicated, the use of drugs that cause DDI, or the underuse of prescribed drugs (Clyne *et al.*, 2012:301). Roy *et al.* (2017:272) recently conducted a study of 240 elderly patients in which the survey results showed that 90% of the elderly population in the study used one or more prescribed drug per week, 41% used five or more prescribed drugs, and 12% used 10 or more prescribed drugs per week. The use of multiple drugs by an elderly patient with various diseases may sometimes lead to positive health outcomes, but as seen in previous studies it could also lead to a high risk of ADR problems (Gnjidic *et al.*, 2012:238). It happens that patients adjust their prescriptions themselves or have it adjusted by

practitioners in secondary care after receiving the relevant prescription from their physician (Webber, 2017:95).

Appropriate medication use, according to Mehuys *et al.* (2012:721), can be regarded as the essential element needed to increase therapeutic benefits and lessen the risk of ADRs, a problem in the elderly population.

The use of multiple long-term medications by the ambulatory elderly can be the source of DRPs, which have become a significant public health problem that threatens patient safety (Garcia-Caballeros *et al.*, 2010:430; Lau & Dolovich, 2005:165). To improve drug appropriateness, it is the pharmacist's responsibility to provide the patient with the correct drug, appropriate dosage strength, administration route and guidelines for the safe use of the drug (Toklu & Hussain, 2013:39). The greatest risk factor for inappropriate medicine use in the elderly is DRPs (Fu *et al.*, 2007:472).

2.2.3.3 Drug-related problems in the elderly

According to Chan *et al.* (2012:168), a "DRP" can be described as "[a]n event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes". Drug-related problems include ADRs, DDIs, contraindications and the underutilisation of drugs (Vinks *et al.*, 2006:34). Elderly patients are several times more prone to hospitalisation because of ADRs that could have been prevented (Zaveri *et al.*, 2010:95). Different measures are in place to avert ADR problems, for example, looking at the monitoring and prescribing phases of PC (Alomar, 2014:85). The following subsections offer a discussion of factors that lead to ADRs in the elderly (Prybys *et al.*, 2002:145).

2.2.3.3.1 Polypharmacy

Numerous types of medication are usually used to treat or manage comorbidities in old age, but this can also lead to a higher rate of medication misuse, noncompliance, underuse of medication and lastly DDIs (Leporini *et al.*, 2014:S46). Other negative health outcomes that polypharmacy sometimes leads to in elderly individuals include DDIs and ADRs, increased health expenses, undernutrition, admissions to the hospital, falls, disability and death (Nobili *et al.*, 2011:32).

The occurrence of ADRs increases with medication intake, for example, in a study by Davies and O'Mahony (2015:798), ADRs occurred in 13% of patients using two drugs, in 58% of patients taking five drugs and in 82% of patients taking seven or more drugs. Adverse drug reactions caused by polypharmacy are mostly found in people in nursing homes (Lavan & Gallagher, 2016:16). The prevalence of ADRs due to polypharmacy is high among the elderly, mostly

because they are often not sure how to use or keep track of their use of medication (Alomar, 2014:89).

Identifying and assessing possible DDIs is vital to preventing or decreasing the occurrence of adverse reactions caused by certain drug combinations (Chen *et al.*, 2013:727). A study among the elderly, 65 years of age and older, in the Gauteng province of South Africa revealed that 97.6% of the patient population suffered from at least one DDI (Annor *et al.*, 2014:97).

2.2.3.3.2 Multiple physicians and treatment locales

A significant health challenge for healthcare systems is the prescribing of medication to the elderly because older patients usually see more than one physician for several conditions at the same time (Alomar, 2014:89; Hubbard *et al.*, 2013:319; Nash *et al.*, 2000). It is essential for healthcare professionals to communicate with one another to determine the best drug regime that will meet the patient's health needs (Belcher *et al.*, 2006:302).

2.2.3.3.3 Use of over-the-counter medication and herbal products

Herbal remedies and OTC medication could help with patients' adherence to prescribed medication and treatment plans, or be the cause of non-adherence (Olesen, Harbig, Barat *et al.*, 2014:93). When elderly individuals use multiple drugs or use medicine incorrectly, the regular use of OTC medication and herbal remedies will increase the problem (Agbabiaka *et al.*, 2016:65). Pharmacists should regularly ask patients about the simultaneous use of OTC medication or herbal remedies and prescribed medicine, checking whether it is compatible as interactions could arise. For example, the use of Ginkgo biloba (a herbal remedy) increases the anticoagulant effect of warfarin in the elderly (Davies & O'Mahony, 2015:801).

2.2.3.3.4 Physiological changes due to ageing

Adverse drug reactions are more common in the elderly population due to age-related physiological changes that affect pharmacokinetics and pharmacodynamics, as well as to the use of multiple types of medication, and the higher occurrence rate of comorbidities (Chan *et al.*, 2012:168, Chen *et al.*, 2016; Sultana *et al.*, 2013:75). Age-related changes are the reason why drugs stay much longer in the body of an older adult than in that of a younger person, leading to the lengthening of drug effects and an increase in the risk of adverse effects (Alomar, 2014:86). There is also a change in the elderly population with regard to metabolism and the excretion of the amount of prescribed medication taken (Curtis *et al.*, 2004:1621). Some drugs are regarded as unsuitable for the elderly due to the risk of adverse effects, DDIs or drug strengths being too high and prescribed for too long (Nobili *et al.*, 2011:30). Examples of drugs that lead to ADRs due

to pharmacokinetic or pharmacodynamic changes in the elderly are drugs that cause a rise in hepatic-excretion ratios and a decrease in hepatic metabolism, for example nitrates, propranolol, barbiturates and lidocaine (Guaraldo *et al.*, 2011).

2.2.3.3.5 Chronic medical illness

Ageing is often associated with multiple chronic diseases, weakness, impairments and social isolation (Nobili *et al.*, 2011:29). The elderly are known to have many health-related problems, including more than one chronic disease or condition (for example heart, cerebrovascular and musculoskeletal conditions), which increase the likelihood of them taking large amounts of medication and developing ADRs (Alomar, 2014:86; Curtis *et al.*, 2004:1621; Hubbard *et al.*, 2013:319).

2.2.3.3.6 Physical limitations (dementia / hearing impairment / poor vision)

As a population ages, some elderly individuals may stay fit and active, while others may start suffering from chronic diseases and disability and become dependent on other for care (Hubbard *et al.*, 2013:319). The loss of hearing, sight and cognitive function in elderly individuals can complicate medication adherence, whilst those who live by themselves and struggle financially may have difficulty using necessary health services and implementing positive lifestyle changes (Nobili *et al.*, 2011:33). Pharmacists should make sure that the information provided is communicated or written clearly (Davies & O'Mahony, 2015:801).

2.2.3.3.7 Look-alike and sound-alike medication names

Different types of medication that look and sound the same lead to one in four drug problems during the dispensing process (DeHenau *et al.*, 2016:77; Emmerton & Rizk, 2012:4; Schnoor *et al.*, 2015:12). Look- and sound-alike medication with the same packaging, dosage regimes and suffixes (for example tamoxifen and tenoxicam) increases the potential of medication error (Hughes *et al.*, 2016:85; Ostini *et al.*, 2012:350).

2.2.3.3.8 Medication non-adherence

The WHO describes a person's medication adherence as "*the degree to which the person's behaviour corresponds with the agreed recommendations from a healthcare provider*" (Dobbels *et al.*, 2005:381). Therefore, medication non-adherence is defined by Jimmy and Jose (2011:156) as "*non-fulfilment adherence, non-persistence adherence and non-conforming adherence*". Medication non-adherence is the most prominent public health problem in the elderly population (Marcum *et al.*, 2017:192). Non-adherence occurs in the case of 50% to 75% of patients, resulting in hospitalisation and an increase in mortality, lost time, energy, as well as health costs (Leporini

et al., 2014:S47). The following are factors leading to medication non-adherence in the elderly population: insufficient patient education, vague instructions, medical practitioners not consulting with the patient regarding his or her treatment plan, medication side effects, expensive medication, and too high or low dosage regimes (Roy *et al.*, 2017:272). Non-adherence complicates the treatment of chronic illnesses such as cardiovascular disease, cholesterol, diabetes and hypertension (Leporini *et al.*, 2014:S47). The medication adherence rates among the elderly are around 45% or less (Jimmy & Jose, 2011:156). A study done by Roughead *et al.* (2011:696) found that almost 20% of elderly individuals in Australia, Canada, New Zealand, the United Kingdom and the USA did not comply with their treatment plans due to the fact that they did not approve of the treatment plan (12-28%), found it challenging to follow (1-29%), or regarded it as too costly (0-24%).

Table 2-5 (adapted from Cipolle *et al.* (2012:146), Lubbe (2000) and Rossiter (2012:4)) lists the seven categories of DRPs, as defined in 1990 by the research group at the Peters Institute of Pharmaceutical Care at the University of Minnesota (Cipolle *et al.*, 2012:146).

Table 2-5: The seven categories of drug-related problems

Assessment	Category of drug-related problems	Causes
Untreated disease condition	1) Unnecessary drug therapy 2) Needs additional drug therapy	Untreated indications Drug use without indication Sub therapeutic dosage
Effectiveness	3) Ineffective drug 4) Dosage too low	Overdosage Adverse drug reactions Drug interaction Improper drug selection Ineffective drug Dosage too low
Safety	5) Adverse drug reaction 6) Dosage too high	Allergic reactions Drug interaction Frequency inappropriate
Adherence	7) Non-adherence or non-compliance	Failure to receive drugs Drug product not available Patient forgets to take medication Cannot swallow/administer the drug Cannot afford the drug Poor communication with healthcare professionals A decline in cognitive function, hearing or vision Complicated dosing regimes

2.2.4 Provision of pharmaceutical care to the elderly

The elderly population needs particular attention when factors such as pharmacokinetic and pharmacodynamics changes in the body, an increase in comorbidities, and polypharmacy come into play (Milos *et al.*, 2013:236). It is essential to constantly review patients' use of medication and their adherence to treatment plans to have a positive impact on the health of the elderly (Pelicano-Romano *et al.*, 2015:1722).

In the Brighton General Hospital (Brighton, United Kingdom), pharmacists introduced a PC model to minimise polypharmacy, deliver proper treatment plans, and assist the elderly in their understanding of their prescribed medication (Burns & Still, 2011). It is sometimes challenging to improve the efficient use of medication by the elderly, and this is the reason why incentives such as educational and PC programs, as well as medication reviews after hospitalisation, are being tested (Milos *et al.*, 2013:236).

There is also a need among the elderly for the provision of more PC services at home, as some of the elderly are homebound and having such services at home will make it easier for any DRPs to be detected (Olesen, Harbig, Buus, *et al.*, 2014:164). According to Burns and Still (2003:266) PC provided to the elderly will decrease the chances of them developing DRPs. The most significant benefit the elderly have in receiving PC from a pharmacist is that DRPs will be detected, the appropriateness of prescribed medicine will be assessed by the pharmacist's monitoring of the patient, and the patient will be educated with regard to the use of their prescribed medicine (Bernsten *et al.*, 2001:64).

The last study at the PSC about drug usage among its members was conducted by Griesel in 1988 and the results showed the following:

- (i) Physicians are the primary source of information regarding prescription drugs.
- (ii) Pharmacists are the best source of information regarding the use of OTC medication.
- (iii) Pharmacists ought to be more involved in the distribution of drug information to elderly patients.
- (iv) There is a need for more information about the purpose of the medication and its possible side effects to be communicated to patients.

2.3 The pharmacy profession

The pharmacy profession has developed in different stages, from the manufacturing of medication to its compounding and distribution, and finally to clinical and PC pharmacy (Holland & Nimmo, 1990:1758). Clinical pharmacy practice was born in the 1960s and evolved to the responsible provision of medicine-related patient care in the 1980s (Bronkhorst *et al.*, 2014:41).

Saramunee *et al.* (2016:186) state that the general public is uninformed of the PHS that a pharmacist can provide. The pharmacy profession has “*traditionally been an isolated profession*” and its “*ability to break out of its isolation will largely determine the success or otherwise of its public health role in the future*” (Anderson, 2007:847). The general public must agree on the fact that pharmacists are a better source for advice on some health problems than are other sources (Eades *et al.*, 2011). Fortunately, over the past 10 years, the public view of the role of the community pharmacist has slowly changed from one who only compounds or supply medicine to one who provides PHS that lead to better health outcomes (Meyerson *et al.*, 2013:140).

Pharmacy practice aims to be responsible for the provision of medication and other healthcare products as well as services to the public (Toklu & Hussain, 2013:38). The pharmacy profession is based not only on product provision, but also on patient-centred care where the pharmacist plays a crucial role in providing clinical care and in helping to improve the quality of medication use (Salmasi *et al.*, 2016:171). Pharmacists are healthcare professionals with the necessary knowledge and skills to implement PC (Mehralian *et al.*, 2014:1088). It has been said that, over the years, pharmacists have been among the most reliable and approachable healthcare professionals (Truong *et al.*, 2012:12).

Pharmacists play a supportive role in relation to physician-prescribers and focus on patient care to improve the clinical outcomes of pharmacotherapy, thereby reducing risks like DRPs (Ballantyne, 2016; Ung *et al.*, 2016:848). Pharmacists are responsible for the management of medication, and preventing, identifying and resolving DRPs (Acheampong & Anto, 2015:361). Pharmacies are easily accessible in most communities (Montgomery *et al.*, 2010:186). Because they do not need to make appointments beforehand to access PC services, patients see the pharmacy as the first port of call in healthcare (Oakley, 2015).

The pharmacist is seen not only as an educator or adviser on healthcare, but also as a provider of guidelines for the correct use of drugs, especially in an elderly ambulatory setting (Toklu & Hussain, 2013:38). The pharmacist must be able to identify DRPs during the process of PC to make sure that the patient’s related needs are met (Abdel Rahman, 2015:6). The pharmacy profession must recognise new health outcome opportunities in the pharmacy profession,

evaluate and examine them to establish the relevant pharmacy's capability to implement these outcomes effectively (Wiedenmayer *et al.*, 2006:7).

In 2011, the Pharmacy Human Resources in South Africa recorded 25.5 pharmacists per 100 000 people (PSSA, 2011). In 2015 there were 13 416 registered pharmacists in South Africa (Gray *et al.*, 2016:36). The current ratio of pharmacist personnel to patients in WHO Member States is less than 1 to 1 000 (WHO, 2018). After physicians and nurses, pharmacists are seen as the third most important healthcare professional group globally (Mossialos *et al.*, 2013:136). To be a pharmacist in South Africa, an individual must register with the South African Pharmacy Council (SAPC), complete a four-year undergraduate degree, obtain a year's preregistration experience (internship) in either a community, hospital, academia or pharmaceutical setting, and complete a year of community service in a public healthcare facility (Gray *et al.*, 2016:36).

2.3.1 Role and responsibilities of the pharmacist in the provision of pharmaceutical care

The provision of PC is regarded as an essential role of the pharmacist — when implemented correctly, it positively impacts on patients' quality of life (Costa *et al.*, 2017:9). According to the mandate of the SAPC (2015:1), pharmacists in South Africa are obligated *“to protect, promote and maintain the health, safety, and well-being of patients and the public, ensuring quality pharmaceutical services for all South Africans”*. Committing to good PC furthermore means that a pharmacist *“promise[s] to do whatever possible to make sure the patient achieves positive outcomes from drug therapy”* (Farris *et al.*, 2005:1539).

The first step a pharmacist must perform to begin the PC process is to create a therapeutic bond with the patient; therefore, it is the pharmacist's responsibility to form a partnership or alliance with the patient to improve their medication knowledge (Sánchez, 2011:56). The PC relationship is established by the healthcare providers accepting their responsibility to their patients and by the patient relaying information to and trusting the healthcare provider (Elnaem *et al.*, 2017:215).

Pharmacists positively impact on the healthcare of patients by counselling or informing them, managing their medication, proposing other treatment plans and advising them to see other healthcare professionals if needed (Cheng *et al.*, 2013:312). Pharmacists improve treatment plans for chronic conditions such as diabetes, dyslipidaemia, asthma, high blood pressure and coronary illnesses and thereby reduce medication-related problems among the elderly (Berenguer *et al.*, 2004:3932). It is essential that pharmacists remember that providing services such as informing and educating patients on diseases and healthy living (including proper diet) is all part of the PC plan (Cerbin-Koczorowska *et al.*, 2017:160).

In a review by Sreelalitha *et al.* (2012:79), evidence showed that only 5% of the pharmacists in the study had sufficient knowledge of PC. It is the pharmacist's responsibility to provide PC, to improve their knowledge of and skills in PC services, address patients' health needs (for example, patients with busy lifestyles who are not always able to access the services provided), treat chronic diseases, treat comorbidities, and explain and monitor difficult drug treatment regimens (South Africa, 2011). It is also the pharmacist's role to identify and solve possible DRPs, thus contributing to minimising drug-related morbidity and mortality (AbuRuz *et al.*, 2012:71).

The PC process, according to the guidelines of Good Pharmacy Practice (GPP) (SAPC, 2010), is not limited to the processing of prescriptions or issuing of medication to a patient and encompasses other functions, such as those listed in Table 2-6 below.

Table 2-6: Functions of a pharmacist, according to Good Pharmacy Practice

1. It is the responsibility of the pharmacist to make sure that the patient receives the correct pharmacotherapy, for example accurate information on medication dosage.
2. To determine if there are any interactions between the drugs the patients are taking.
3. To consider any adverse effects of prescribed drugs.
4. To monitor whether the patient follows their pharmacotherapy guidelines correctly.
5. To provide the patient with advice on the correct and safe use of their medication.
6. To provide the patient with any dietary advice if needed.
7. To consult with other healthcare practitioners if needed.
8. To evaluate the patients' pharmacotherapy if requested by the patient or if recommended by a healthcare professional. The evaluation consists of: • an assessment phase, • the developing of a care plan, and • follow-up.

2.4 Pharmaceutical services to ambulatory elderly patients

The primary goal in the provision of pharmaceutical services is refining and upholding patients' positive therapeutic outcomes and thereby improving their quality of life by having pharmacists employ their knowledge and skills, manage their attitudes, provide assurance to patients, and perform their duties (Deepalakshmi *et al.*, 2017:844; Mohammed *et al.*, 2016:863).

Pharmaceutical services have been labelled as very important to healthcare professionals, patients, and healthcare programs because of the positive health-related outcomes in patients (Lapão *et al.*, 2017:31). According to Blignault (2010:67), pharmaceutical services can be divided into dispensing, screening and monitoring, preventative services and general care services.

The main responsibility of a pharmacist is still the dispensing of medication prescribed by a general practitioner or dentist (Christensen & Farris, 2006:1402). The role of dispensing has changed over the years from only giving out the medication on the prescription to the assessment of the prescription and ensuring any medication problems are identified beforehand (Shafie & Hassali, 2010:117). When the pharmacist does not dispense properly, it could negatively influence the benefits of healthcare (Wabe *et al.*, 2011:86). Patient counselling can be described as “*providing medication information orally or in written form to the patients or their representatives [... including] directions for use, advice on side effects, precautions, storage, diet, and lifestyle modifications*” (Yang *et al.*, 2016:131). Therefore, providing information or counselling patients is essential in ensuring a positive health outcome with better patient adherence and treatment plans (Soumya *et al.*, 2016:360).

According to the GPP (SAPC, 2010), “*a pharmacy can [additionally] offer services relating to screening and testing a patient’s biochemical and physiological parameters. Pharmacists who are competent to do so may provide such screening and monitoring services.*” Screening services could improve health in communities by decreasing risk factors for the development of chronic diseases (Mossman, 2006:43, Xu & Rojas-Fernandez, 2003:79). A study done in Australia showed that patients who received screening and promotion services from their pharmacist had a more positive view on the provision of such services than did the patients who did not receive the services (Eades *et al.*, 2011). Such services include the promotion of public health, blood pressure monitoring, peak flow testing, human immunodeficiency virus testing, cholesterol monitoring, glucose monitoring, pregnancy testing and urine analysis (SAPC, 2010). Other services provided by the pharmacy include, for example, the administering of injections, complementary and alternative medicines, first aid, home care and wound care, as well as medical aid facilitation (Blignault, 2010:82).

The primary goal of preventative care services specifically, for example diet or weight control programmes, smoking cessation programmes and immunisation, is to improve public health, decrease health problems and help with the long-term treatment of illnesses (George *et al.*, 2010:861; Gidman *et al.*, 2012; Manolakis & Skelton, 2010). Providing preventative care services reduces healthcare costs and ensures that people live healthy lives (Manolakis & Skelton, 2010).

The most important aspect in determining the effectiveness of pharmaceutical services is the evaluation of a patient’s level of satisfaction (Bezuidenhout, 2015:218). “Patient satisfaction” is defined as a patient’s “*personal evaluation of health care services and providers*” (Larson *et al.*, 2002:44). Kassam *et al.* (2012:347) found that patient satisfaction increased after PC was introduced into community pharmacies, especially when this care included face-to-face consultation sessions on the patient’s health treatment. Pharmaceutical care provided by a

pharmacy student, a pharmacist, or a pharmacy team helps to improve patients' satisfaction with pharmaceutical services (Kassam *et al.*, 2012:347). However, one must keep in mind that satisfaction is considered a subjective variable since it entails a review of the patient's experiences, expectations or desires (Berenguer *et al.*, 2004:3941).

2.5 The influence of public health services on quality of life

Recall from chapter 1 that "public health" is defined by Winslow (1920:23) as *"the science and art of preventing disease, prolonging life and promoting health through the organised efforts and informed choices of society, organisation, public and private communities and individuals"*. Sharma *et al.* (2014:4) state that PHS are community services provided by governmental or non-governmental divisions to avert diseases and to encourage the well-being of a community. More specifically, the aim of public health programmes is to improve the physical, social and psychological health of a community (Thivierge, 2014). The health needs of a community and the risks related to illness and premature mortality in that community are established by health professionals who gather to examine data with the aim of providing the necessary services needed to reduce these problems (Thivierge, 2014; Kruger, 2012:2).

With regard to the elderly population, the focus of public health is to improve quality of life and ensure that patients remain healthy and able to function independently for as long as possible (Pahor *et al.*, 2014:2388). The most prominent challenge to the maintenance of public health in a fast-growing elderly population is ensuring that the most effective approach to promoting health and quality of life is followed (Satariano *et al.*, 2012:1508).

For the successful implementation of PHS in a community, it is essential that healthcare professionals from various disciplines work together to meet the health-related needs of individuals or the community (Scott *et al.*, 2016:836). The pharmacist is placed in the unique position to achieve public health aims without increasing expenses by, for example, delivering affordable services, assessing and preventing risk factors in diseases, administering pharmacotherapy, counselling patients, providing advice on treatment plans and advising patients of insurance coverage (Palombi, 2013:478-479; Scott *et al.*, 2016:836).

A pharmacy service can be defined as *"an action organised by a pharmacy and delivered by a pharmacist or other health professional [...] with the aim to improve health outcomes"* (Born, 2016:2). The aim of pharmacy services is furthermore to ensure the best public health levels, decrease any health problems in individuals or communities and to treat longitudinal diseases and assess medication (Gidman *et al.*, 2012). Pharmacists help to improve public health by providing services such as screening for acute and chronic diseases, blood pressure and blood

sugar tests, immunisation, weight control and smoking cessation programmes, and educating people on correct drug use, but they also focus on teaching the population about prevention of medical conditions in a clinical or community setting (Saramunee *et al.*, 2015:706; Strand *et al.*, 2016:247). Pharmacies that provide these services contribute to the role that pharmacists play in the development of public health access (Meyerson, 2013:141).

According to Eades *et al.* (2011), the PHS provided in England, Scotland and Wales include the distribution of information on healthy living and self-care, as well as smoking cessation and sexual health service campaigns. In the United States, Iowa and North Dakota provide services such as the advising of patients on the safe disposal of medication and on smoking cessation, immunisation services, counselling on how to manage pain and handle diseases, medication therapy management and the provision of advice on the changes in care that occur when inpatients become outpatients (Scott *et al.*, 2016:836). Public health services provided in China include the provision of advice on health (especially the health of children between naught and three years), parenting, healthy ageing, infectious diseases and lastly the management of diabetes, hypertension and psychosis (Tian *et al.*, 2015:e0125262). Community pharmacies in South Africa offer services such as family planning, and assessing and providing treatment in mild emergencies (Malangu, 2014:226).

To attain the best public health outcomes, the pharmacy profession needs to offer the “*ten essential services of public health*”, as defined in Table 2-7 (adapted from CDC (2017); Strand *et al.* (2016:248-252); Strand *et al.* (2017:397-398); and Winterbauer & Diduk (2013:46)).

Table 2-7: Ten essential public health services defined

Ten essential public health services	
1) Monitor health outcomes	- Assess the community health status by identifying health risks and resources. - Analyse data by making use of technology and different methods. - Preserve health registries of the population.
2) Diagnose and investigate health issues	- Join other public health providers in the community in identifying and investigating possible health hazards. - Implement plans to respond to big health hazards.
3) Inform, educate and empower people	- Present drug use reports, counsel patients and keep personal records. - Inform patients of services aimed at promoting behavioural changes such as smoking cessation programmes. - Inform the community of how safe drug use can support healthy living. - Educate patients on how to manage their health when they suffer from a chronic disease.
4) Implement community partnerships	- Engage with partnerships inside the community, for example with schools to start platforms to promote vaccinations. - Involve the community in helping to determine and diagnose health problems. - Involve the community by educating them on the safe use of medicine and the promotion of health.
5) Develop policies	- Promote policy change to preserve health. - Adjust resources to ensure profitable planning.
6) Uphold laws and regulations	- Promote health and safety regulations by being informed of and, where possible preventing medicine shortages, adverse reactions and prescription drug misuse. - Make sure that the prescription is according to all the guidelines of the law. - Be informed of laws and regulations.
7) Connect patients with needed services	- Identify barriers to the provision of healthcare services. - Promote access to public health services by uniting people and with the needed health services.
8) Guarantee competent workforce	- Ensure continuous learning and education among healthcare workers, and promote leadership and cultural appropriateness. - Support public health workforce standards.
9) Assess	- Assess and establish health risks in the public. - Determine disease progression and adherence patterns by checking patient records to decrease health risks in the community.
10) Research	- Review the services provided in order to improve future public health actions. - Research is important to observe and establish new ways to solve health problems to improve public health.

Pharmacists are much more involved in public health today compared to a decade ago (Scott *et al.*, 2016:836). Due to the changing roles in the pharmacy profession, pharmacists can be useful in the delivery of public health by identifying the shortcomings of community health (Scott *et al.*, 2016:836).

2.6 From product to patient: The evolution of pharmaceutical care

The definition of PC, as we know it today, evolved from the definition used by Mikeal *et al.* in 1975 as quoted by Martin-Calero *et al.* (2004:3969). In 1980, Brodie *et al.* (1980:227) elaborated on this definition, adding that PC services should be provided in pharmacies to ensure safe and

efficient therapy. According to Cipolle *et al.* (1998:11), Theal's definition of PC by Brodie *et al.* focuses more on the availability and distribution of medication than on patient needs within the identifiable clinical parameters (Cipolle *et al.*, 1998:11). Based on the definition of PC formulated by Hepler and Strand in 1990, the pharmacist is not solely responsible for the implementation of PC as any healthcare professional may provide this type of care (Franklin & Van Mil, 2005:137). PC as a concept was later accepted by Strand, Cipolle and Morley (1998:13) from a more patient-centred view when they defined the term, accentuating that PC “*is not only a theory of practice, but also a philosophical worldview*” (Van Mil *et al.*, 2004:303).

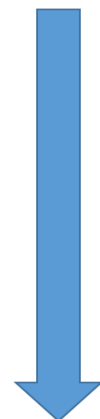
In 1997, the Pharmaceutical Care Management Association of South Africa (PCMA South Africa) was founded. The Association states the following objectives (PCMA South Africa, 2014:1):

- (i) To actively encourage optimal therapeutic outcomes in managed care.
- (ii) To supply a forum to healthcare practitioners who intend to focus on clinical outcomes and pharmacoeconomics.
- (iii) To assist in the provision of continuing professional education (CPE).
- (iv) To ensure that the principles of PC are met by suppliers of pharmaceuticals and upheld in pharmacists' treatment of the patients who use these pharmaceuticals.

Pharmaceutical care can be provided to patients who are hospitalised and to those who make use of the clinic, pharmacy and self-services (Blondal *et al.*, 2017:2). For PC to succeed, the public view and understanding of the pharmacy profession needs to change (Ghazal *et al.*, 2014:68). According to Crealey *et al.* (2003:456), PC can be implemented by the pharmacist or other healthcare professionals by studying the patient, managing a care plan, carrying out a suitable intervention if necessary and monitoring the outcomes. Table 2-8 summarises the changes in the definition of PC over the past 41 years.

Table 2-8: The evolution of pharmaceutical care

Author(s)	Year	Description of Pharmaceutical care
Mikeal <i>et al.</i> (1975:567)	1975	"[Pharmaceutical care is] the care that a given patient requires and receives which assures safe and rational drug usage".
Brodie <i>et al.</i> (1980:227)	1980	"Pharmaceutical care includes the determination of the drug needs of a given individual and the provision not only of the drugs required, but also of the necessary services (before, during or after treatment) to assure optimally safe and effective therapy. It includes a feedback mechanism as a means of facilitating continuity of care by those who provide it."
Hepler (1987:376)	1987	"[Pharmaceutical care is] a covenantal relationship between a patient and a pharmacist in which the pharmacist performs drug use control functions (with appropriate knowledge and skills) governed by the awareness of and commitment to the patient's interests."
Hepler & Strand (1990:539)	1990	"[Pharmaceutical care is] the responsible provision of pharmacotherapy, with the goal of achieving defined therapeutic outcomes in health and the improvement of quality of life."
ASHP (1993:1720)	1993	"Pharmaceutical care is the direct, responsible provision of medication-related care for the purpose of achieving definite outcomes that improve a patient's quality of life."
Hepler & Strand (1996:233)	1996	"[Pharmaceutical care is] an outcome-orientated, cooperative, systematic approach to providing drug therapy directed at the improvement of all dimensions of health-related quality of life."
Strand (1997:474)	1997	"Pharmaceutical care is a practice in which the practitioner takes responsibility for a patient's drug therapy needs and is held accountable for this commitment."
The International Pharmaceutical Federation (1998:138)	1998	"[Pharmaceutical care is] the responsible provision of pharmaco-therapy with the purpose of achieving definite outcomes that improve or maintain a patient's quality of life."
Van Mil <i>et al.</i> (2004:303)	2004	"Pharmaceutical care is a practice philosophy for pharmacy. It is the way of pharmacists to coach the individual patients with their medication. The concept deals with the way a patient should receive and use medication and should receive education on the use of medicines. The concept also deals with responsibilities, medication surveillance, counselling and the evaluation of all the outcomes of care."
Franklin & Van Mil (2005:137)	2005	"[Pharmaceutical care is] the person-focused care relating to medication, which is provided by a pharmacist and the pharmacy team with the aim of improving the outcomes of therapy."
SAPC (2010:2)	2010	"Provide pharmaceutical care by taking responsibility for the therapeutic outcome of therapy and by being actively involved in the design, implementation and monitoring of effective pharmaceutical care services."
Sánchez (2011:55)	2011	"Pharmaceutical care addresses the patient's drug-related needs comprehensively through a scheduled outline of tasks, in which the practitioner makes sure that the drug therapy is appropriately indicated, effective, safe, and convenient."
Blackburn <i>et al.</i> (2012:448)	2012	"[Pharmaceutical care is] a patient-centered practice in which the practitioner would be accountable for the drug-related needs of specific individuals as well as groups of patients within a defined practice setting who are at high risk for drug- or disease-induced morbidity."
Alleman <i>et al.</i> (2014:544)	2013	"Pharmaceutical care is the pharmacist's contribution to the care of individuals in order to optimize medicine use and improve health outcomes."
Mohammed <i>et al.</i> (2016:862)	2016	"Pharmaceutical care refers to the delivery of medicine-related patient health care through cooperation between pharmacists, other health care practitioners (e.g., physicians, nurses), and patients."



2.6.1 The three phases in pharmaceutical care

Pharmaceutical services have evolved from the mere dispensing of medication to the provision of PC in three phases, namely assessment, development of care plans and follow-up (Bernsten *et al.*, 2001:64; Rigolosi & Reed, 2001:461). The general aim of PC is to identify potential and actual DRPs, resolve actual DRPs and prevent future DRPs (Al-Quteimat & Amer, 2016:448). By implementing the three phases in PC, the aforementioned aims of PC may be met (Krska *et al.*, 2001:206).

Phase 1: Assessment

The first step in the provision of PC is an assessment of the patient's medication needs (Al-Shaqha & Zairi, 2001:249). The assessment phase requires the PC practitioner to do a full patient assessment that not only focuses on the medication itself, but also on the advantages that the patient will get from using the medication (Lau & Dolovich, 2005:166).

According to Cipolle *et al.* (1998:125), the assessment phase consists of three different stages, namely:

- (i) Reviewing the patient's drug therapy to consider the appropriateness of prescribed drugs, drug safety as well as the most suitable and useful drug therapy for the patient.
- (ii) Identifying drug therapy problems that hinder the outcome of treatment.
- (iii) Identifying possible problems with drug therapy that influence the future of the treatment.

To establish a relationship with their patients, it is essential for pharmacists to have direct contact with them and personally obtain valuable medication information and have data received from the prescribing practitioners explained (Al-Shaqha & Zairi, 2001:294).

Coherent information on drug use is collected in the assessment phase, whilst the pharmacist educates, counsels and provide dispensing services to patients to improve their quality of life (Janse van Rensburg, 2016:37). In the case of elderly patients, the primary goal of the assessment phase is to make sure that the correct medication is prescribed (O'Conner *et al.*, 2012:448).

Phase 2: Development of a care plan

The goal of a care plan is to involve patients and help them manage their illness or medical condition efficiently with the aid of pharmacotherapy (Cipolle *et al.*, 2012:238). Relevant information regarding the patient's disease, the overall goal to achieve, envisioned health

outcomes and possible interventions are documented during this phase (Burns & Still, 2003:266). More specifically, according to Al-Shaqha and Zairi (2001:294), the purpose of the care plan is:

- (i) To resolve any DRPs identified during the assessment phase.
- (ii) To achieve the patient's therapeutic goals and desired health outcomes.
- (iii) To avoid any future health problems.

The care plan must be drawn up in collaboration with the pharmacist, healthcare practitioner and patient, and requires documenting any PC problems, the aim of the treatment and decisive actions that are needed (Krska *et al.*, 2001:206). When the objective of care is established, the pharmacist must decide upon the best choices to fulfil the individual's drug-related needs (Al-Shaqha & Zairi, 2001:294). Pharmacists have received the needed training to detect and resolve DRPs and educate patients and their families (Tumkur *et al.*, 2012:283).

The elderly population will benefit from care plans because it will help the patients to better understand their diseases and how to talk about their medication therapy needs to their physicians (Nichols-English & Poirier, 2000:479). Developing a care plan will have a positive impact on patients' health, satisfaction levels and drug adherence, whilst decreasing hospitalisation rates (Pelicano-Romano *et al.*, 2015:1722).

Phase 3: Follow-up

During the follow-up phase, pharmacists evaluate the information collected to see if the healthcare needs identified during the assessment phase were met and the problems solved, and whether it had a positive influence on the patient's health (Al-Shaqha & Zairi, 2001:295). It is the pharmacist's responsibility to interact with the patient and monitor the progress of the care plan (Nichols-English & Poirier, 2000:478).

The following steps should be taken during the follow-up phase (Jimmy & Jose, 2011:157):

- (i) plan a follow-up meeting;
- (ii) during the meeting, review the patient's compliance with the care plan;
- (iii) identify possible challenges and difficulties that could have lead to non-compliance;
- (iv) point out any problems; and
- (v) inform the patient of how the problem was treated.

As is evident from above, the care plan phase is considered to employ a clinical approach and the follow-up phase a humanistic approach (Janse van Rensburg, 2016:37).

See Figure 2-1 for a summary of the pharmaceutical stages, as defined by Hepler and Strand (1990:539), Krska *et al.* (2000:659) and Strand *et al.* (2004:3991).

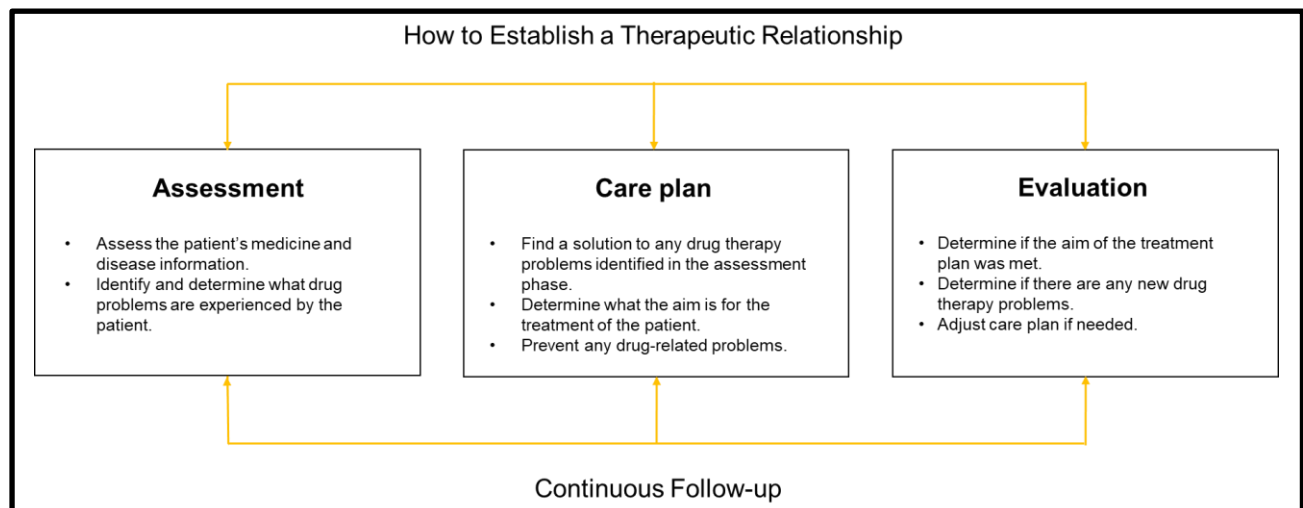


Figure 2-2: Three phases of pharmaceutical care

2.6.2 Barriers to pharmaceutical care

Many barriers limit the successful implementation of PC and may vary between countries (Farris *et al.*, 2005:1539). Al-Shaqha and Zairi (2001:283) identify the following main barriers: system-, pharmacist-, management- and demand-related barriers, all discussed in detail in the following subsections.

2.6.2.1 System-related barriers

Problems in PC must be prioritised and subsequently solved by pharmacists from different backgrounds and environments (Sánchez & de las Mercedes, 2013:1239). Environmental factors, including but not limited to time constraints and the absence of a recognised reimbursement system, are deemed barriers to the implementation of PC (Montgomery *et al.*, 2007:594). The shortage of resources in the pharmacy is another important barrier which explains the lack of separate funding for PC activities (Van Mil *et al.*, 2004:307). Severe resource limitations exist mostly in developing countries (Uema *et al.*, 2008:212). Pharmacies in Jordan furthermore cite a lack of space which makes it difficult to confidentially talk to a patient (AbuRuz *et al.*, 2012:77). Finally, pharmacists do not always have access to clinical information, making it difficult to provide the needed care to ensure drug use safety (Al-Shaqha & Zairi, 2001:296).

2.6.2.2 Pharmacist-related barriers

The primary barrier that pharmacists face is the availability of time to provide PC, probably because of a shortage of pharmacists in the professional setting (Elnaem *et al.*, 2017:216). Patient-care activities are not always considered essential and will only be implemented if there is extra time or staff available (Al-Shaqha & Zairi, 2001:297). In a study by Fang *et al.* (2011:95), one pharmacist stated that it takes too long to dispense medication, which then influences other services such as the provision of PC.

Working together in a team with other healthcare professionals is essential to the pharmacy profession if it is to provide quality PC without invading the domains of general practitioners or other healthcare professionals (Mohamed & Mahmoud, 2016:927). Such communication enables the pharmacist to help develop the best care plan for the patient and to follow-up on whether the expected health outcomes were achieved (Fang *et al.*, 2011:195).

Some of the pharmacist-related barriers to the provision of quality PC identified globally are the attitudes of pharmacists such as not understanding the provision of PC, pharmacists not being paid by their patients, role changes that occur and a lack of motivation among pharmacists (Okonta *et al.*, 2012:295).

2.6.2.3 Management-related barriers

Pharmacy managers lack sufficient time to plan for PC and for an evolving, patient-centred practice (Al-Shaqha & Zairi, 2001:297). South African pharmacists and pharmacy assistants are seen as “*scarce-skill professionals*” (Department of Labour, 2008). According to Moore and McAuliffe (2010:166), there is a high prevalence of errors by healthcare professionals in hospital pharmacies and claims that insufficient management leads to these mistakes not being reported.

2.6.2.4 Professional and administrative barriers

There is a lack of controlled studies emphasising the value of PC in the pharmacy profession and the ability of the pharmacist to play a valuable role in making health costs more affordable (Al-Shaqha & Zairi, 2001:297).

There is concern about the knowledge and views pharmacists have of the philosophy behind PC (Ghazal *et al.*, 2014:68). Individual pharmacists are often not aware of the changes in the roles pharmacists play and still see them in their traditional role of mere dispensers of medicine (Al-Shaqha & Zairi, 2001:297). Another concern is that other healthcare practitioners have not yet received the necessary training in meeting PC needs, and identifying DRPs (Van Mil *et al.*, 2004:306). The lack of education in communication and clinical training are to blame for this

(Mehralian *et al.*, 2014:1088). It is essential for a pharmacist to keep up with the newest public health needs by continuously being educated and by making sure the patients' health needs is supported (Mohamed & Mahmoud, 2016:927).

According to Fang *et al.* (2011:190), in New Zealand, a lack of knowledge and clinical problem-solving skills is a significant barrier to the provision of PC. Another study done in New Zealand identified further obstacles such as a lack of advanced practice skills (Mehralian *et al.*, 2014:1088). Practical communication skills are also lacking, especially in terms of communication with other healthcare professionals such as doctors (Elnaem *et al.*, 2017:216). Communicating information efficiently is vital to pharmacy practice if the required health outcomes are to be achieved and medication is to be used safely, especially by the elderly (Lyra *et al.*, 2007:187).

Pharmacists, especially "*older-generation pharmacist[s]*", can be their own greatest barriers in the development of PC, mostly because of a lack of skills and a continued focus on traditional roles (Berenguer *et al.*, 2004:3942). For PC to overcome some of these barriers, it is the responsibility of pharmacists to keep up with the newest skills and to improve their knowledge of not only drugs, but also of patient-orientated care (Elnaem *et al.*, 2017:216).

As seen in Table 2-9, countries face different kinds of barriers to PC, and some of these countries can provide solutions to the obstacles they face.

Table 2-9: Pharmaceutical care barriers and solutions to barriers gained from previous studies

Authors	Country / Location	Main barriers	Solutions to barriers
Uema <i>et al.</i> (2008:214)	Argentina	- Lack of time - Lack of specific training - Lack of communication skills	- Empowerment of pharmacists through training and continual support in continuing professional development and life-long learning Universities and professional associations should address the need to overcome these issues.
Van Mil <i>et al.</i> (2001:166)	11 European countries: Denmark England Finland Germany Ireland Northern Ireland The Netherlands Norway Spain Sweden Switzerland	In all 11 countries studied: Resources - Lack of time - Lack of money (except in Spain) Attitude and vision - The attitudes / opinions of other professionals In 10 of the 11 countries studied: Education - Lack of education in communication (except in Northern Ireland) - Lack of clinical education (except in Norway)	- Pharmaceutical associations in Europe need resolve the reimbursement issues of pharmacists. - The above associations also need to address pharmacists' attitudes if they are to change. - These countries need to work together to solve some of the barriers.

Author	Country/Location	Main barrier	Solutions to barriers
Sánchez and de las Mercedes (2013:1239-1240)	Cuba	Three domains, namely: Resources - Pharmacists and their patients originate from different backgrounds and live in different environments - Lack of trained staff - Lack of space - Lack of software - Lack of protocol or consensus - Lack of personal resources Attitudes and opinions - Lack of advancement in pharmacy practice - Lack of time in the case of pharmacists, nurses and physicians - Underutilisation of the pharmacist as medication expert - Social barriers regarding the perception of pharmacists, patients and healthcare providers Education and skills - Among pharmacists, a lack of knowledge regarding drugs and diseases, as well as a lack of the ability to identify DRPs	Resources - Pharmacists should determine what the problems are and solve those issues first to overcome the barrier of different backgrounds and environments. Attitudes and opinions - Pharmacists need to accept the culture change that has occurred in the pharmacy profession. Education and skills - Improve current educational programmes for pharmacists by addressing the changes in the roles and responsibilities of a pharmacist. - Provide better activities during university pharmacy degree programmes to develop students' PC skills.
Dunlop and Shaw (2002:229)	New Zealand	- Lack of time - Absence of a recognised reimbursement system	- The issues regarding a proper reimbursement system were addressed by making government funding agencies and health insurance companies more aware of the benefits of PC services, such as clinical and economic advantages.

Author	Country/Location	Main barrier	Solutions to barriers
Mehralian <i>et al.</i> (2014:1091)	Iran	Lack of pharmacist skills - Managerial skills Inappropriate regulation and environment - Inappropriate system for assessment	- To ensure pharmacists have the necessary skills and knowledge, it is essential that both these capacities be established through training and skill labs. - Educating, reimbursing and pharmacy service delivery need to change for the better to overcome these barriers.
Bronkhorst <i>et al.</i> (2014:44); Cassim and Dlodlu (2012:57)	South Africa	- Lack of relationships with other healthcare professionals and staff - Pharmacists lack time - Pharmacists are unsure of their roles and responsibilities in the provision of PC - Pharmacists and their assistants do not experience a desire to develop their knowledge of pharmaceutical and non-pharmaceutical care and the associated skills	Not addressed in the study.
El Hajj <i>et al.</i> (2016:330,341)	Qatar	Top three perceived barriers: - Difficulty in accessing patients' medical information - Lack of staff - Lack of time	- Qatar's solution is to implement an operational and integrated national electronic health system for all the healthcare professionals to participate in.
Jones <i>et al.</i> (2005:1531)	Canada	- Lack of time - Insufficient human resources - Lack of information - Lack of therapeutic knowledge - Lack of funding - Difficulty in communicating with patients' physicians.	Not addressed in the study.

Author	Country/Location	Main barrier	Solutions to barriers
Fang <i>et al.</i> (2011:194); Ung <i>et al.</i> (2016:853)	China and specifically Macao	China - Lack of external conditions for developing or providing PC - Lack of time - Lack of skills - Lack of information and economic incentive - Lack of support from other health professionals	- The pharmacist and physician need to support each other and build a relationship to provide the best care for the patient by, for example, developing a care plan and following up to find out if all the patient's health needs have been met. - Lack of reimbursement for services rendered had a negative outcome on the provision of PC. Thus, to overcome this barrier it is necessary to change the contract and to ensure immediate payment for the delivery of PC services. - The overall conclusion is that these barriers may be overcome by an increase in the number of practicing pharmacists in China.
		Macau - Insufficient communication with physicians - Lack of physical space for PC - Lack of time - Lack of acceptance	- Providing support programmes and keeping record and proof of the benefits of the provision of PC.

Author	Country/Location	Main barrier	Solutions to barriers
Ibrahim and Scott (2013:240)	Sudan	- Lack of support from doctors - Lack of qualified support staff - Lack of professional standards - Lack of specific training - Lack of remuneration	- It is essential to implement a sustainable professional infrastructure to ensure the continued provision of PC. - Healthcare professionals need to realise the importance of the pharmacist's role in providing PC and pharmacists must be able to fulfil the role. - Qualified support staff will help the pharmacist to carry out the services provided by the pharmacy and increase the amount of time the pharmacist can spend with his or her patient.
Costa <i>et al.</i> (2017:3)	International	- Limited time - Lack of reimbursement for the extra time required to deliver services - High workload - Inadequate competency - Lack of commitment	- Establish a good relationship with other healthcare professionals - Ensure that payment is received for the provision of PC services - Make sure there is a private counselling area available - Train staff correctly and suitably

2.6.3 Benefits of pharmaceutical care

Pharmaceutical care focuses on drug therapy to improve a patient's quality of life through the following measures (Berenguer *et al.*, 2004:3931; Crealey *et al.*, 2003:456):

- preventing, decreasing or stopping disease symptoms;
- improving medication prescription;
- minimising physician consultations; and
- improving the cost-effectiveness of a patient's treatment.

Pharmaceutical care programmes have delivered positive clinical results in most case studies (Pelicano-Romano *et al.*, 2015:1722). Pharmaceutical care has moved forward as a result of helping to improve pharmacy practice by making sure that better and professional healthcare services are being provided (Al-Quteimat & Amer, 2016:449). According to Montgomery *et al.* (2007:600), the use of PC services in practice has a positive outcome on the pharmacist's and prescriber's view of their daily work.

The provision of PC will benefit patients with comorbidities, contribute to a decrease in polypharmacy, minimise physician consultations and make medication more cost-effective (Crealey *et al.*, 2003:456). Public health could also improve if people were to make use of more of the PC services on offer (Mehralian *et al.*, 2014:1087).

Pharmaceutical care aims to improve a patient's health-related quality of life and reach a positive clinical, humanistic and economic outcome (Bernsten *et al.*, 2001:63; Tumkur *et al.*, 2012:283). Table 2-10 defines the different desired outcomes of PC, as adapted from Cheng *et al.* (2013:313).

Table 2-10: The desired clinical, economic and humanistic outcomes of pharmaceutical care

Clinical outcomes	Humanistic outcomes	Economic outcomes
- Better disease and symptom control - Improved adherence to treatment plans and use of screening tests and vaccination services - Improved patient knowledge of medication and treatment	- Increased patient satisfaction - Improved quality of life	- Reduction in hospitalisation, need for emergency care and clinic visits - Minimised medication and healthcare costs

Pharmaceutical care now focuses on interventions that affect the welfare and everyday functioning of a patient by regarding his or her emotional, physical and social state (Loh *et al.*, 2016: 621). The community pharmacist can improve the well-being and health outcomes of a patient by making treatment more cost-effective, preventing diseases and stopping any ADRs (Mossialos *et al.*, 2013:136). The goal for a pharmacist is to achieve top humanistic, economic and clinical outcomes for each patient by including the patient and other healthcare professionals in the designing, implementing and monitoring of the treatment plan (Alanazi *et al.*, 2016:10).

It is the pharmacist's responsibility to recommend a generic drug (if not otherwise indicated) and provide additional or alternative medicines in order to guarantee positive clinical and economic treatment outcomes (Mossialos *et al.*, 2013:142). According to a PEER (Pharmaceutical Care of the Elderly in Europe Research) study, the healthcare costs of patients who received PC decreased more than those of patients who only received standard care (Crealey *et al.*, 2003:459).

The four main benefits of providing PC, as defined by a pharmacist who is experienced in PC services, are: positive economic outcomes; the delivery of responsible dispensing services and improvement of drug therapy; positive health outcomes that provide patients with a better quality of life; a sense of professional fulfilment among pharmacists (Mazhar *et al.*, 2017:274).

2.7 The influence of physical-, social- and cultural activities on the well-being of elderly patients

Practical approaches to helping the elderly maintain a healthy and active lifestyle are desperately needed as the elderly have twice as many disabilities and four times as many physical limitations as people who are younger than 60 years of age (Milanović *et al.*, 2013:549).

According to Satariano *et al.* (2012:1508), healthy ageing is *“likely to be achieved when physical environments and communities are safe, and support the adoption and maintenance by individuals of attitudes and behaviours known to promote health and well-being, and by the effective use of health services and community programs to prevent or minimize the impact of acute and chronic disease on functions”*.

Modifiable risk factors such as smoking, high alcohol intake, physical inactivity and unhealthy diet are part of the rising problem of age-related chronic diseases (WHO, 2012b). The WHO

define health as “a state of complete physical, mental and social well-being and not merely the absence of diseases or infirmity” (WHO, 2017).

Physical and social activities are both associated with quality of life and therefore individuals who “do more things” will have a higher quality of life than those individuals who do not participate and isolate themselves from these activities (Herzog *et al.*, 2002:595). The impact of said types of activities on the well-being of the elderly is discussed in more detail in the following three subsections.

2.7.1 Physical activities

More than 30% of the global population struggle to achieve the suggested physical activity levels even though they are aware of the benefits it holds (Franco *et al.*, 2015:1). Maintaining one’s physical activity level will slow the ageing process by, for example, improving motor skills, aiding the circulation of oxygen and nutrients to body cells, and improving the metabolic system (McPhee *et al.*, 2016:570).

A great public health problem is that the elderly population is not physically active enough (Prohaska *et al.*, 2006:S267). Programmes to improve patients’ health such as healthy diet plans and physical activity programmes are required to decrease the chances of chronic diseases developing, especially in the elderly (WHO, 2012b).

Physical activity can be defined as “any bodily movements produced by skeletal muscles that results in energy expenditure” (Santos *et al.*, 2012:908). Physical activity is especially essential for the well-being of the elderly since it helps the patient to function independently for much longer, decreases disability and has a positive influence on the patient’s quality of life (Sun *et al.*, 2013:1471).

Exercise programmes will help to decrease the speed of physiological changes that occur with ageing, and also help with the management of chronic diseases and maintaining of cognitive health (Chou *et al.*, 2012:237). Table 2-11 lists the physical activities that the WHO (2010) recommend for the elderly aged 65 years of age and older, to help with cardiorespiratory and muscular fitness, bone and functional health, and the avoidance of depression and cognitive decrease. This table was adapted from the WHO (2010) and Sparling *et al.* (2015:350).

Table 2-11: The World Health Organization's suggested levels of physical activity for the elderly

Physical activity	Benefits from physical activity
1) The elderly should do moderate-intensity aerobic exercises for 150 minutes a week (for example 30 minutes of brisk walking, five days a week); or 75 minutes of vigorous-intensity aerobic exercises a week; or an equal amount of minutes of moderate- and vigorous-intensity exercises per week.	Elderly persons who are more active have reduced rates of hypertension, type 2 diabetes mellitus, strokes, coronary heart disease, colon cancer and breast cancer, and tend to live longer Physically active older people also have higher ratings of cardiorespiratory and muscular fitness, better body mass, a more positive biomarker profile in terms of the prevention of heart disease and type 2 diabetes mellitus, reduced fall rates and improved cognitive ability.
2) Aerobic exercises must be done in time periods of 10 minutes at most.	
3) To increase the health benefits achieved from physical activity, the elderly can do 300 minutes of moderate-intensity aerobic physical exercises a week, or 150 minutes of vigorous-intensity aerobic physical exercises a week; or an equal amount of minutes of moderate- and vigorous-intensity exercises per week.	
4) Elderly persons who struggle with movement should perform physical exercises at least three days a week to avoid falls and to improve their balance.	
5) Exercises to improve muscle strength relating to the major muscle groups must be done at least two or more days a week.	
6) When the elderly is not able to do all the physical exercises recommended by the WHO due to illness, they should at least try to be as physically active as their abilities allow them to be.	

The elderly population considers mental and physical health as crucial to their overall health (Moschny *et al.*, 2011:121). As such, care of the elderly should focus not only on the physical health of patients, but also on their mental and social well-being (Nicholson, 2012:138).

2.7.2 Social activities

Social isolation can be described as *“a state in which the individual lacks a sense of belonging socially, lacks engagement with others, has a minimal number of social contacts, and is deficient in fulfilling and quality relationships”* (Nicholson, 2012:1346). All definitions of social isolation refer to a decrease in social interaction with friends, family or the community, mostly because of age-related changes in the body, disability, retirement, and the death of loved ones or living by oneself (Chen & Schulz, 2016). Living alone without regularly partaking in social activities or having a small social network increases social isolation and loneliness (Coyle & Dugan, 2012:1347). In turn, social isolation increases the risk of reduced physical and mental health, depression, loss of cognitive function, self-neglect and death (Chen & Schulz, 2016).

Elderly patients who take part in physical activity may feel inspired to do more physical exercises and have a positive feeling toward their own well-being and quality of life (Agahi & Parker, 2005:927). In the elderly population, women generally react more positively to social activities than men, mostly because men rely much more on the social support of their wives and women depend more on the support of other individuals than on that of their husbands (Fu *et al.*, 2018:231). The elderly population is at higher risk of social isolation and loneliness than the younger population (Shapiro, 2016:121).

2.7.3 Cultural activities

Cultural programmes include writing, painting, jewellery-making and music or singing programmes (Cohen *et al.*, 2006:726). No matter the environment or conditions, art programmes have been shown to improve the quality of life and well-being of the elderly (Clift, 2012:121). The positive effects of art programmes on the elderly (in community-based and nursing home-based settings) have been identified in previous descriptive art therapy studies as increased quality of life, increased ability to convey feelings and moods, and an increased capacity to carry out activities (Cohen *et al.*, 2006:727).

Experiencing or participating in cultural activities, for example arts and culture events, will positively affect the health of an individual increase life satisfaction and one's sense of personal importance, and decrease anxiety and depression levels (Clift, 2012:122; Tuisku *et al.*, 2012:273). Health programmes in a community such as social, cultural and physical programmes will not necessarily cure disease, but will help in preventing the causes of illness and disability (Castora-Binkley *et al.*, 2010:355).

In conclusion these types of activities are vital to improve quality of life by creating new roles in the community for the elderly such as not being that depended on others and living a valuable and a purposeful life (Noroozian, 2012:6).

2.8 Chapter summary

This chapter focused on the necessity of providing PC and PHS to the elderly population and the vital role of pharmacists in providing such care and services. The chapter furthermore showed that inappropriate prescribing and DRPs are a problem for the elderly, but that PC can have a positive impact on the elderly population's quality of life. Chapter 3 will focus on the results of the research study.

CHAPTER 3: RESULTS

The previous two chapters provided an introduction and the background to the research study. In this chapter, the results of the empirical study and a discussion thereof are reported in article format. Two manuscripts were submitted for publication. The title of the first manuscript is “*Pharmaceutical care expectations and experiences in an ambulatory elderly population*”. The second manuscript is titled “*Availability and use of pharmaceutical services versus community-based care and support services for the elderly*”. A section was also designated to additional results at the end of this section.

Table 3-1 summarises the two objectives of the empirical study, indicates which manuscript each objective is discussed in and which sections of the questionnaire were relevant to the specific objective.

Table 3-1: Objectives for Manuscript One and Two

Manuscript	Objective	Specific research objectives	Relevant sections of structured questionnaire
One	To examine whether the expectations that the ambulatory elderly population of a CBCSS centre have of pharmaceutical care align with their experience thereof.	Determine the study population’s expectations and experiences of the provision of PC and pharmaceutical services by pharmacists.	Parts A, B, C, D and F
Two	To review the availability and use of pharmaceutical services and CBCSS in an ambulatory elderly population.	To determine the study population’s expectations and experience of pharmaceutical services by pharmacists. To determine whether the secondary services provided by the PSC influence the well-being of participants. To determine the study population’s	Parts A, B, C, D, E, F, G, H, I and J

Manuscript	Objective	Specific research objectives	Relevant sections of structured questionnaire
		public health-related needs and expectations.	
Additional results		Determine possible problems with medication use in the study population. Determine elderly patients' awareness of the indication of their medicine and medication use.	

3.1 Manuscript One

The title of this article is “*Pharmaceutical care expectations and experiences in an ambulatory elderly population*”. The manuscript is formulated according to the specific guidelines of *Drugs & Aging* for an original research study.

Manuscript One addressed the following objective of the empirical study (as stated in paragraph 1.3.2.2 of Chapter 1):

- Determine the study population’s expectations and experiences of the provision of PC and pharmaceutical services by pharmacists.

Guidelines for publication can be viewed by following the below link (also see Annexure E):

<https://www.springer.com/medicine/family/journal/40266>

Pharmaceutical care experience and expectations in the elderly population

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Abstract

Background: The pharmacy professions' role has changed over the past few decades from manufacturing and compounding to a more patient-centred approach, namely pharmaceutical care (PC). We aimed to see whether the elderly patients (≥ 60 years of age) experience or expect PC services according to the three phases: assessment, care plan and follow-up.

Objective: The study objective was to examine whether the expectations collaborated with the experiences in the provision of PC perceived in an ambulatory elderly population of an old aged service centre.

Methods: A structured questionnaire was used while the researcher conducted face-to-face interviews. The questionnaire was developed, based on previous studies. Elderly, ambulatory patients of both genders aged 60 years and older were included in the study ($n = 40$). The data also illustrated a very high-reliability scale Cronbach alpha.

Results: There were 40 participants (response rate = 26.7%) who engaged in the study. All three phases of the questionnaire measuring the expectations and experiences of the PC process had both statistical and practical significant value ($p \leq 0.05$). Most of the participants (40.0%) indicated that the pharmacist neglected to call other health care professionals ($d = 0.89$). Participants disagreed (67.5%) that the pharmacist provided a goal criteria for their treatment ($d = 0.92$).

Conclusion: This study captures the importance of implementing PC to the elderly population. Increasing a patient and the pharmacist's awareness of these PC services provided will be an important step in accomplishing the elderly's health-related needs. The elderly patients expected to receive PC services from the pharmacist.

Keywords: Pharmaceutical care, Elderly, Pharmacist

Key Points

- Pharmacists play an important role in the provision of pharmaceutical care.
- There is a need to promote these services within the pharmacy since elderly individuals are not aware of these services being offered.
- The pharmacist should be integrated as a valuable member of the healthcare team.

1. Introduction

Throughout the last 50 years, the philosophy of the pharmacy profession has drastically changed, from the traditional product-centred approach, for example, dispensing and compounding medication, to the provision of more cognitive and patient-centred services [1-4]. The South African Pharmacy Council [5] defined the role of the pharmacist as someone who “*protect, promote and maintain the health, safety, and well-being of patients and the public, ensuring quality pharmaceutical services for all South Africans*”. Pharmacies can provide services to a large group of people, mainly because they are easily accessible to the public [6]. Therefore, it is the responsibility of pharmacists to expand their role inside the pharmacy to engage in more pharmaceutical activities [7].

Pharmaceutical care (PC) was originally defined in 1975 and has since been defined in multiple ways. The definition used most, however, was from [8] Hepler and Strand [9], which states PC as “*the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient’s quality of life*”. The main focus of PC is to prevent adverse drug events or drug-related problems [10]. Pharmaceutical care services provide patients with the information needed on the use and purpose of medication; observing individuals’ adherence to treatment plans; identify and resolving drug-related problems, assisting with a healthier lifestyle and assisting with any health-related problems or uncertainties [6]. Pharmaceutical care is based on the active involvement of a pharmacist engaging with a patient or caregivers to assess, develop a care plan and evaluate the health therapeutic outcomes that will potentially benefit vulnerable groups of people, like the elderly [11, 12]. Strand and colleagues defined the patient care process as assessment; care plan and follow-up phase, which are all important steps in the PC process [13].

A healthcare practitioner providing PC assesses an individual’s medication list to guarantee that the patient knows how to use the medication, ensures safety and determines whether the right medication is prescribed [14]. This phase focuses on identifying any difficulties with medication adherence and possible drug interactions [15]. Therefore, to attain positive health outcomes, the pharmacist can contribute to direct interventions and by making health recommendations [16]. After assessing possible problems in therapy, pharmacists must implement an individual care plan for the patient to improve the implementation of treatment plans; the patient’s knowledge of the medication he/she is taking and increase medication adherence [17, 18]. In the final phase, it is essential for the pharmacist to evaluate the outcome of the care plan phase to determine whether the necessary healthcare needs were achieved and positively influenced the patient’s health requirements [19].

Individuals, who mainly benefit from pharmacy services such as PC, are often the elderly population who are faced with polypharmacy and suffer from chronic illnesses [6]. The elderly is considered a ‘*special population*’ according to the International Conference on Harmonization because they are different from the younger population due to multiple intakes of medication, comorbidities and physiological changes [20]. Therefore, there is a higher possibility of adverse drug reactions, hospitalisation and a decrease in quality of life [21]. Elderly patients are defined according to gender and age by the Older Persons Act [22]: a male aged 65 years and above, and a female aged 60 years and above in South Africa, are classified as elderly individuals. Global aging is associated with an increase in chronic conditions, a higher intake of medication and an increase in healthcare system expenses [23]. Elderly individuals suffer mainly from chronic conditions such as heart diseases, diabetes mellitus, cancer and dementia, which reduce physical activity, increasing mortality, higher healthcare costs and dependence [24].

From previous studies and literature, we see that PC is effective and contributes to positive patient health outcomes [25]. Pharmaceutical care programs benefit patient outcomes positively such as enhancing affordable healthcare, improving drug safety, appropriate prescribing and adherence, enhancing the quality of life, reducing drug-related problems and fewer consultations at the general practitioner [12, 26]. The main benefit of PC for the elderly is a decrease in hospitalisation and an improved quality of life [12]. Patients who receive PC will live healthier lives and learn how to manage chronic diseases [4].

The elderly will benefit from implementing the three phases of PC since a lot of drug-related problems and prescribing errors can be identified and resolved when successfully implemented [12]. The greatest cause of

drug-related problems is due to pharmacists not properly communicating with patients or other healthcare providers [23].

The successful implementation of PC in the pharmacy profession leads to the pharmacist, practitioners and patients adapting to these services [3, 27]. The improvement in healthcare and medication treatment has a positive effect in treating the elderly with disease [28]. Pharmacists are responsible in identifying and acknowledging current health needs, especially within the elderly population, as the pharmacist is the healthcare professional that patients first turn to [29]. Pharmacists who implement the three phases of PC effectively will play a vital role in the pharmacy profession and not only ensure the best health outcomes but also improve economic and social benefits [30, 31, 12]. The pharmacist's future relies on broadening the pharmacy scope of practice and providing more occasions for the provision of pharmacy services delivered to the public [32].

This study was conducted to establish whether the pharmaceutical services that should be provided by the pharmacist compare accordingly to the expectations and experiences of the elderly regarding PC and public health.

2. Methods

2.1 Study design, setting and participants

This research study was conducted with elderly people who are members of an old aged service centre, to explore their experiences and expectations of PC. A cross-sectional descriptive study was performed by means of a structured questionnaire, supervised by the researcher in face-to-face interviews. All participants gave signed informed consent. To ensure privacy, the researcher conducted the interviews at the participant's own residence, a private area at the service centre or any other place of the participant's choice. The elderly participating in the research study had to be members of the old aged service centre and could be either male or female, aged 60 years and above.

The target population for this research study was the 150 active members of the old aged service centre and 40 (response rate of 26.7%) participants, gave informed consent and participated in this study. The data were collected during July 2017.

The questionnaire consisted of 10 sections, with mainly closed-ended questions related to demographic characteristics. A five-point Likert scale was used to determine their PC expectations and experiences. The options "strongly disagree", "disagree", "uncertain", "agree" and "strongly agree" were offered to determine both the experiences and expectations. The questions were designed to cover all aspects regarding the populations experiences and expectations of the three phases of PC in the last 12 months. The questionnaire was developed as per previous research studies, articles and scholarly books [13, 33, 34, 35, 36]. The questionnaire was refined by including the suggestions of the experts. The questionnaire took approximately 60 minutes to complete. Reliability was assessed using Cronbach's alpha, where, for this study, a reliable coefficient of 0.7 or higher is seen as an acceptable value. The scale reliability was very high for each scale. Cronbach's alpha reliability coefficients based on the assessment, care plan and follow-up phase for PC was more than 0.7, which indicated a good reliability of the three phases of PC. Face and content validity testing confirmed the appropriateness of the questionnaire sections. Reliability was assessed using Cronbach's alpha, where, for this study, a reliable coefficient of 0.70 or higher is seen as an acceptable value.

2.2 Statistical analysis

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) for Windows®, version 25.0. A dependent *t*-test was used to determine the difference between the means of two-paired groups. Statistical significance was indicated using a *p*-value, where $p < 0.05$. Cohen's *d*-value (to evaluate mean differences between groups) for an independent *t*-test was used to determine the practical significance of the results (with $d \geq 0.8$). Data were expressed in mean and standard deviations and frequencies (n, %), as appropriate.

3. Results

3.1 Patient characteristics

The population's demographic profile is shown in Table I. The target population for this study was the 150 active members of an old aged service centre, of which 40 (26.7%) members participated in this study and completed the questionnaire. Most of the elderly patients fell into the age group ≥ 70 to ≤ 79 years (42.5%). Of the 40 participants, there were more female participants (67.5%) than male participants (32.5%). The majority of patients belonged to a medical aid (90.0%). More patients suffered from chronic conditions ($n=36$; 90.0%). Condition of participants' health was measured as "excellent", "very good", "good", "fair" and "poor"; the majority (47.5%) perceived themselves to be in "very good" health. The primary medicine suppliers in this study population was a private pharmacy (67.5%). (See Table I).

There were 36 elderly patients (90.0%) who suffered from chronic conditions. The maximum of five chronic diseases were reported by three participants (7.5%). The most frequent chronic conditions were hypercholesterolemia (52.5%), hypertension (45.0%), depression (20.0%) and diabetes (17.5%). Previous studies have shown that disease-specific PC interventions have improved the health outcomes of patients with asthma, diabetes mellitus, hypertension and hyperlipidaemia [17].

The dependent *t*-test results also showed a statistically significant value between the expectations measured against the experiences of the three stages of pharmaceutical care in the elderly ($p \leq 0.05$). Three sections of the questionnaire were used to monitor the participant's expectations and experiences of the provision of PC, namely the assessment phase, care plan phase, and follow-up phase.

3.2 Participants expectations and experiences of the provision of PC

3.2.1 Outcomes measured in the assessment phase

Table II shows a comparison between the expectations and experiences of the assessment phase in PC. There was an overall high effect according to Cohen's *d*-value ($d = 0.75$) between the expectations and experiences of the assessment phase of PC, which means the results are practically significant. Thus, according to the overall mean and standard deviation (SD) value (4.05 ± 0.72) of the assessment phase, the patients agreed that they expect (4.05 ± 0.72) these services from the pharmacy, but were uncertain/unaware whether they experienced it (3.50 ± 0.73). The following question in the assessment phase had a high effect value of 0.89 and 0.74 according to Cohen's *d*-value. Respondents agreed (4.13 ± 1.09) that they expect the pharmacist to contact other health professionals if it was required but were uncertain/unaware (3.10 ± 1.15) whether they experienced it. Respondents agreed (4.13 ± 1.11) that they expected from the pharmacist to identify incorrect medicine dosage(s), but were uncertain (3.10 ± 1.15) about receiving it. Overall respondents agreed upon expecting (3.90 ± 1.26) and experiencing (3.83 ± 1.24) that the pharmacist discussed the medication they were currently using with them. The mean value of the expectations vs experiences for five of the eight items were significantly different ($p \leq 0.05$) for the expectations and experiences of the respondents. The response rate for the expectations and experiences for the following statements; the "pharmacist analysed my personal, medicine and disease information"; "the pharmacist discussed the medication I am currently using with me" and "the pharmacist asked me if I am using any other medication", did not show any significant difference.

3.2.2 Outcomes measured in the care plan phase

Table III reviews the care plan phase of PC. Cohen's *d*-value had a high effect of 0.76 between the experiences of the elderly in relation to their expectations regarding the care plan phase of PC. Cohen's *d*-value ($d = 0.76$) indicated a large (practically significant) difference between participants' expectations and experiences regarding the care plan phase of PC. Most of the participants agreed to expect services from the care plan phase according to a mean and standard deviation (4.15 ± 0.67) and were uncertain/unaware (3.54 ± 0.80) whether they received these services in the pharmacy. The question regarding "did the pharmacist set a goal criteria for my treatment (e.g. decrease blood pressure to under 140/90mmHg)" had a high effect size of ($d = 0.92$), which meant there was a large difference between the elderly's expectations and disagreed (2.58 ± 1.174) on experiencing it. Participants agreed upon expecting and experiencing from the pharmacist to provided

techniques for self-monitoring medicine therapy, therefore, there was no significant difference ($p = 0.232$). The means for six out of the seven items differed significantly ($p = 0.232$).

3.2.3 Outcomes measured in the follow-up phase

In Table IV the elderly's expectations and experiences regarding the follow-up phase of PC was examined. Cohen's d -value indicated medium effect size ($d = 0.57$) between the expectations and experiences of services provided during the follow-up phase. The respondents were uncertain/unaware of both their expectations (3.71 ± 1.03) and experiences (3.11 ± 1.06) within the follow-up phase.

4 Discussion

Pharmaceutical care focuses more on a patient-centred approach to improve any medication problem, guarantee medication appropriateness or compliance with medication use and related lifestyle factors [37]. Participants were asked to complete a questionnaire form to assess the provision of PC in a pharmacy. The assessment of participant satisfaction rates is a great method to evaluate the quality of health services provided by the pharmacist [38].

This study explored respondents' experiences and expectations in PC affecting the elderly aged 60 years and older. This study showed a statistically significant difference ($p \leq 0.05$) between the respondents' expectations and experiences of PC services provided by the pharmacist. The study population appears to have high expectations of the pharmacists in providing PC. Respondents' expectations and experiences were positive for most parts of PC services. However, respondents expected many of these services provided, but were mostly uncertain/unaware whether they received these services from the pharmacy they attended. In South Africa, the Pharmacy Act (53 of 1974, as amended) provides definite outcomes for all three phases of PC [39]. By implementing PC, the pharmacist will help to prevent or improve any medication-related problems and improve clinical as well as economic outcomes [25].

4.2 Key findings in terms of the assessment phase

In the first phase of PC, namely the assessment phase (Table II), we asked participants about their expectations and experiences in relation to the pharmacist providing these services. Most of the mean values were between three and four, which meant that the participants mostly agreed that these services should be provided by the pharmacist. A tendency of a low provision in PC activities in the assessment phase was noted, for example, contacting other healthcare professionals if necessary, identifying incorrect medicine dosage(s) and asking the patients if they had any concerns relating to the medication they are taking. Among the participants 50.0% strongly agreed that they do expect the pharmacist to contact other healthcare professionals but measured against the experience most (40.0%) disagreed that the pharmacist has contacted the healthcare provider if necessary. Pharmacists' main responsibility is to cooperate with the patient, their families and other healthcare professionals to ensure that the best healthcare is provided to the patient or community [40].

4.3 Key findings of the care plan phase

A vital role of the pharmacist is to educate and inform patients of the correct information on medication safety, chronic illnesses and on upholding a healthy health style [41]. Table III focused on the care plan phase of PC and monitored whether the pharmacist involved the patient with a management plan for his/her illness. In the care plan phase, pharmacists need to identify and resolve any medication-related problems seen in the assessment phase, consult with the patient to determine a treatment goal plan and prevent future treatment problems [13]. Respondents mostly agreed upon expecting these services to be delivered by the pharmacist but were uncertain/unaware as to whether they have experienced these services within the pharmacy. The respondents expected from the pharmacist to help solve drug-related problems and provide counselling for the medication they are currently using. When pharmacists counsel the patient, they need to focus on providing the correct and necessary medication information, for example, the administration route, duration of treatment, storage and refill instructions, possible drug-related problems, indication of medicine and provide advice on how to manage medication for positive health outcomes [42]. According to the results, 50.0% ($n = 20$) of participants forgot to take their medication due to a "busy schedule" or "drinking medication when remembering

again". The greatest cause of medication non-adherence is when patients forget to take their medication [43]. Therefore, it is essential for the pharmacist to implement a management plan to reduce the chances of drug-related problems in the elderly population. We can also see that the pharmacists neglected to provide their patients with *"a goal criteria of treatment"* since 27 participants (67.5%) disagreed with the statement when asked whether they had experienced these services within the pharmacy.

4.4 Key findings of the follow-up phase

In the last stage of the PC process, the pharmacist needs to apply the follow-up phase to determine whether the patient's goal criteria for their treatment plan have been met and if any new drug-related problems developed [13]. Participants were mostly uncertain or unaware whether they expected or experiences the services provided during the follow-up phase. This is an essential phase for pharmacists to invest more time in to ensure that treatment goals are met, drug safety and drug effectiveness are properly evaluated. The results from this study showed that there was a lack of compliance to this phase, therefore it is the pharmacists responsibility to put more energy into achieving the essential steps set in the follow-up phase of PC (see Table IV)

Pharmacists tend to not always listen to the inputs of their patients and rather have their own agenda for the patient's treatment plan during a consultation [44]. The South African mandate for pharmacy practice includes that a pharmacist *"provide pharmaceutical care by taking responsibility for the therapeutic outcomes of therapy and to be actively involved in the design, implementation and monitoring of an effective pharmaceutical care services"* [45].

In South Africa, the pharmacists have evolved within the past few years from a traditional role to a more patient-centred approach, but to successfully implement patient care in South Africa, the pharmacists must be willing to be part of the healthcare team [46].

5 Limitations of the study

The study population was not fully representative of the general population of South Africa as only Afrikaans and English-speaking individuals were included in the study. This study does not represent the general elderly population since only members of the old age service centre were included. The influence of chronic illnesses on the elderly's expectations and experiences of PC should be evaluated for future studies using a bigger study population. Using a bigger population group will enhance the generalizability of the research study. For future studies, the effectiveness of PC provided by a pharmacist could be measured.

6 Conclusion

Pharmacists should make an attitude shift from their traditional roles to a more patient-centred approach. Clear communication during a consultation is a key part of the effectiveness of services. Respondents significantly "agreed" that they see the pharmacist as a reliable source of general drug treatment. This study highlighted the benefits of the provision of PC to the elderly population, but it is possible that the elderly is not necessarily aware of these services provided by the pharmacist. It is clear from the study that the elderly expected these PC services from the pharmacist.

Compliance with ethical standards

Conflict of interest: The authors declare that they have no conflict of interest with the content of this study.

Ethical Approval Permission to conduct the study was obtained from the Potchefstroom service centre and Health Research Ethics Committee, Faculty of Health Science, North-West University, Potchefstroom campus (NWU-00354-16-S1).

Informed consent: Written informed consent was obtained from all individual participants included in this study.

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Table I – Demographics (N=40)		
Variable	Category	n (%)
Gender	Male	13 (32.5)
	Female	27 (67.5)
Age (years)	≥60 to ≤69	12 (30.0)
	≥70 to ≤79	17 (42.5)
	80+	11 (27.5)
Chronic diseases	Yes	36 (90.0)
	No	4 (10.0)
Type of chronic diseases	Alzheimer's disease	0 (0.0)
	Arthritis	5 (12.5)
	Asthma	1 (2.5)
	Heart disease	5 (12.5)
	Cataracts	4 (10.0)
	Hypercholesterolaemia	21 (52.5)
	Dementia	1 (2.5)
	Depression	8 (20.0)
	Diabetes	7 (17.5)
	Epilepsy	1 (2.5)
	Hypertension	18 (45.0)
	Kidney and bladder problems	5 (12.5)
	Osteoporosis	6 (15.0)
	Parkinson's disease	2 (5.0)
	Rheumatoid arthritis	3 (7.5)
	Other:	
	Hypothyroidism/hyperthyroidism	3 (7.5)
	Osteoarthritis	1 (2.5)
	Systemic lupus erythematosus	1 (2.5)
	Rheumatism	1 (2.5)
	Metabolic liver defect and Cancer	1 (2.5)
	Ulcerative colitis	2 (5.0)
Condition of health	Excellent	2 (5.0)
	Very good	19 (47.5)
	Good	14 (35.0)
	Fair	4 (10.0)
	Poor	1 (2.5)
Have you ever received the wrong medication from your pharmacist	Yes	6 (15.0)
	No	34 (85.0)
Have you ever received the wrong dosage strength of medication from your pharmacist?	Yes	2 (5.0)
	No	38 (95.0)
Do you know the purpose of each drug that you use?	Yes	33 (82.5)
	No	7 (17.5)
Have you ever forgotten to take your medication?	Yes	20 (50.0)
	No	20 (50.0)

Question	Expectation			Experience			Dependent <i>t</i> -test	
	Response	n (%)	Mean ±SD ^a	Response	n (%)	Mean ±SD ^a	<i>p</i> - value	Cohen’s <i>d</i> -value
The pharmacists analysed my personal, medicine and disease information.	Strongly disagree	0 (0.0)	3.85±1.10	Strongly disagree	0 (0.0)	3.70±1.14	0.383	0.13
	Disagree	8 (20.0)		Disagree	9 (22.5)			
	Uncertain	3 (7.5)		Uncertain	6 (15.0)			
	Agree	16 (40.0)		Agree	13 (32.5)			
	Strongly agree	13 (32.5)		Strongly agree	12 (30.0)			
The pharmacist asked me if I am allergic to any medication.	Strongly disagree	0 (0.0)	4.35±1.08	Strongly disagree	0 (0.0)	3.95±1.32	≤0.05	0.30
	Disagree	6 (15.0)		Disagree	11 (27.5)			
	Uncertain	0 (0.0)		Uncertain	2 (5.0)			
	Agree	8 (20.0)		Agree	5 (12.5)			
	Strongly agree	26 (65.0)		Strongly agree	22 (55.0)			
The pharmacist discussed the medication I am currently using with me.	Strongly disagree	0 (0.0)	3.90±1.26	Strongly disagree	0 (0.0)	3.83±1.24	0.637	0.06
	Disagree	11 (27.5)		Disagree	10 (25.0)			
	Uncertain	0 (0.0)		Uncertain	4 (10.0)			
	Agree	11 (27.5)		Agree	9 (22.5)			
	Strongly agree	18 (45.0)		Strongly agree	17 (42.5)			
The pharmacist asked me if I am using any other medication.	Strongly disagree	0 (0.0)	3.98±1.23	Strongly disagree	0 (0.0)	3.83±1.28	0.460	0.12
	Disagree	9 (22.5)		Disagree	11 (27.5)			
	Uncertain	3 (7.5)		Uncertain	3 (7.5)			
	Agree	8 (20.0)		Agree	8 (20.0)			
	Strongly agree	20 (50.0)		Strongly agree	18 (45.0)			
The pharmacist identified potential and current drug-related problems.	Strongly disagree	0 (0.0)	4.18±1.13	Strongly disagree	0 (0.0)	3.58±1.26	≤0.05	0.48
	Disagree	7 (17.5)		Disagree	12 (30.0)			
	Uncertain	1 (2.5)		Uncertain	7 (17.5)			
	Agree	10 (25.0)		Agree	7 (17.5)			
	Strongly agree	22 (55.0)		Strongly agree	14 (35.0)			
The pharmacist contacted other health professionals if it was required.	Strongly disagree	1 (2.5)	4.13±1.09	Strongly disagree	0 (0.0)	3.10±1.15	≤0.05	0.89
	Disagree	3 (7.5)		Disagree	16 (40.0)			
	Uncertain	6 (15.0)		Uncertain	12 (30.0)			
	Agree	10 (25.0)		Agree	4 (10.0)			
	Strongly agree	20 (50.0)		Strongly agree	8 (20.0)			
The pharmacist identified incorrect medicine dosage(s).	Strongly disagree	0 (0.0)	4.13±1.11	Strongly disagree	0 (0.0)	3.10±1.15	≤0.05	0.89
	Disagree	7 (17.5)		Disagree	16 (40.0)			
	Uncertain	1 (2.5)		Uncertain	12 (30.0)			
	Agree	12 (30.0)		Agree	4 (10.0)			
	Strongly agree	20 (50.0)		Strongly agree	8 (20.0)			
The pharmacist asked me if I had any concerns about my medicine.	Strongly disagree	0 (0.0)	3.88±1.22	Strongly disagree	0 (0.0)	2.93±1.29	≤0.05	0.74
	Disagree	10 (25.0)		Disagree	25 (62.5)			
	Uncertain	2 (5.0)		Uncertain	2 (5.0)			
	Agree	11 (27.5)		Agree	4 (10.0)			
	Strongly agree	17 (42.5)		Strongly agree	9 (22.5)			
^a SD = Standard deviation								

Table III – Pharmaceutical care: Care plan phase								
Question	Expectation			Experience			Dependent <i>t</i> -test	
	Response	n (%)	Mean ±SD ^a	Response	n (%)	Mean ±SD ^a	<i>p</i> -value	Cohen's <i>d</i> -value
The pharmacist provided me with the information about my illness, for example brochures/written information.	Strongly disagree	0 (0.0)	4.08± 1.16	Strongly disagree	0 (0.0)	3.28±1.38	≤0.05	0.58
	Disagree	7 (17.5)		Disagree	20 (50.0)			
	Uncertain	4 (10.0)		Uncertain	2 (5.0)			
	Agree	8 (20.0)		Agree	5 (12.5)			
	Strongly agree	21 (52.5)		Strongly agree	13 (32.5)			
The pharmacist explained to me how to take my medication appropriately.	Strongly disagree	0 (0.0)	4.70±0.61	Strongly disagree	0 (0.0)	4.38±1.10	≤0.05	0.29
	Disagree	1 (2.5)		Disagree	6 (15.0)			
	Uncertain	0 (0.0)		Uncertain	1 (2.5)			
	Agree	9 (22.5)		Agree	5 (12.5)			
	Strongly agree	30 (75.0)		Strongly agree	28 (70.0)			
The pharmacist provided techniques for self-monitoring medicine therapy.	Strongly disagree	0 (0.0)	4.28±1.09	Strongly disagree	0 (0.0)	4.48±0.91	0.232	0.18
	Disagree	6 (15.0)		Disagree	3 (7.5)			
	Uncertain	1 (2.5)		Uncertain	2 (5.0)			
	Agree	9 (22.5)		Agree	8 (20.0)			
	Strongly agree	24 (60.0)		Strongly agree	27 (67.5)			
The pharmacist set goal criteria for my treatment (e.g. decrease blood pressure to under 140/90 mmHg)	Strongly disagree	1 (2.5)	3.70±1.22	Strongly disagree	2 (5.0)	2.58±1.17	≤0.05	0.92
	Disagree	7 (17.5)		Disagree	27 (67.5)			
	Uncertain	10 (25.0)		Uncertain	3 (7.5)			
	Agree	7 (17.5)		Agree	2 (5.0)			
	Strongly agree	15 (37.5)		Strongly agree	6 (15.0)			
The pharmacist helped me with written care plan to manage my medication usage.	Strongly disagree	0 (0.0)	3.48±1.30	Strongly disagree	1 (2.5)	2.65±1.15	≤0.05	0.63
	Disagree	14 (35.0)		Disagree	26 (65.0)			
	Uncertain	7 (17.5)		Uncertain	5 (12.5)			
	Agree	5 (12.5)		Agree	2 (5.0)			
	Strongly agree	14 (35.0)		Strongly agree	6 (15.0)			
The pharmacist helped me to solve any drug related problems.	Strongly disagree	0 (0.0)	4.40±0.96	Strongly disagree	1 (2.5)	3.68±1.33	≤0.05	0.55
	Disagree	4 (10.0)		Disagree	11 (27.5)			
	Uncertain	1 (2.5)		Uncertain	4 (10.0)			
	Agree	10 (25.0)		Agree	8 (20.0)			
	Strongly agree	25 (62.5)		Strongly agree	16 (40.0)			
The pharmacists provided me with counselling about my medicine.	Strongly disagree	0 (0.0)	4.40±0.98	Strongly disagree	1 (2.5)	3.75±1.39	≤0.05	0.47
	Disagree	4 (10.0)		Disagree	12 (30.0)			
	Uncertain	2 (5.0)		Uncertain	2 (5.0)			
	Agree	8 (20.0)		Agree	6 (15.0)			
	Strongly agree	26 (65.0)		Strongly agree	19 (47.5)			
^a SD = Standard deviation								

Table IV – Pharmaceutical care: Follow-up phase								
Question	Expectation			Experience			Dependent <i>t</i> -test	
	Response	n (%)	Mean ±SD ^a	Response	n (%)	Mean ±SD ^a	<i>p</i> -value	Cohen's <i>d</i> -value
The pharmacist asked me whether my medical conditions are improving.	Strongly disagree	0 (0.0)	3.95±1.176	Strongly disagree	1 (2.5)	3.55±1.431	≤0.05	0.28
	Disagree	8 (20.0)		Disagree	15 (37.5)			
	Uncertain	4 (10.0)		Uncertain	2 (5.0)			
	Agree	10 (25.0)		Agree	5 (12.5)			
	Strongly agree	18 (45.0)		Strongly agree	17 (42.5)			
The pharmacist asked me whether I experienced any side effect when using my medication.	Strongly disagree	0 (0.0)	4.08±0.187	Strongly disagree	1 (2.5)	3.33±1.439	≤0.05	0.52
	Disagree	8 (20.0)		Disagree	18 (45.0)			
	Uncertain	2 (5.0)		Uncertain	3 (7.5)			
	Agree	9 (22.5)		Agree	3 (7.5)			
	Strongly agree	21 (52.5)		Strongly agree	15 (37.5)			
Did the pharmacist arrange a follow-up session with you?	Strongly disagree	2 (5.0)	3.23±1.37	Strongly disagree	2 (5.0)	2.63±1.06	≤0.05	0.44
	Disagree	16 (40.0)		Disagree	22 (55.0)			
	Uncertain	4 (10.0)		Uncertain	9 (22.5)			
	Agree	7 (17.5)		Agree	3 (7.5)			
	Strongly agree	11 (27.5)		Strongly agree	4 (10.0)			
If your goals were not achieved, did the pharmacist repeat the process?	Strongly disagree	0 (0.0)	3.60±1.28	Strongly disagree	1 (2.5)	2.95±1.28	≤0.05	0.51
	Disagree	13 (32.5)		Disagree	21 (52.5)			
	Uncertain	4 (10.0)		Uncertain	6 (15.0)			
	Agree	9 (22.5)		Agree	3 (7.5)			
	Strongly agree	14 (3.5)		Strongly agree	9 (22.5)			
^a SD = Standard deviation								

3.2 Manuscript Two

The title of this original research article is “*Availability and use of pharmaceutical services versus community-based care and support services for the elderly*”. The specific guidelines stipulated by the *International journal of pharmacy practice* were adhered to.

Manuscript Two addressed the following objectives from the empirical study (as stated in paragraph 1.3.2.2 of Chapter 1):

- To determine the study population’s expectations and experience of the provision of PC and pharmaceutical services by pharmacists.
- To determine whether the secondary services provided by the PSC influence the well-being of participants.
- To determine the study population’s public health-related needs and expectations.

Guidelines for publication can be viewed at the following link (also see Annexure F):

<https://onlinelibrary.wiley.com/page/journal/20427174/homepage/forauthors.html>

Availability and use of pharmaceutical services versus community-based care and support services for the elderly

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The contributions of each of the authors is as follow:

Ms J Jaquire:	Planning and designing the study Conducting the literature review Collecting and capturing the data Interpretation of the results Writing of the manuscript
Mrs I Kotze:	Assisted in the concept and design of the manuscript Helped with the interpretation of the results and discussion Overall revision of the manuscript
Dr M Julyan:	Assisted in the concept and design of the manuscript Helped with the interpretation of the results and discussion Overall revision of the manuscript
Dr R Joubert:	Supervised in the concept and design of the research study and manuscript Oversee the execution of the planned study Overall revision of the manuscript

1 Availability and use of pharmaceutical services versus community-based care and support services for the
2 elderly.

3 **Objectives:** The aim of the study was to review the availability and use of pharmaceutical services (PS), and
4 community-based care and support services (CBCSS). To identify opportunities for the improvement of patient
5 satisfaction in the delivery of services.

6 **Methods:** The study was a cross-sectional descriptive empirical study. A structured questionnaire was
7 administered by the researcher through face-to-face interviews. The questionnaire consisted of close-ended
8 questions based on a five-point Likert scale.

9 **Key findings:** Forty members (aged ≥ 60 years) of the 150 active members participated in the research study (a
10 response rate 26.7%). There was no significant difference observed between the expectations and experiences
11 perceived when visiting the pharmacy. Cronbach's alpha had a high value of 0.802, which indicated that the
12 data were reliable. Overall, patients had a high satisfaction rate when visiting the pharmacy. Only a few
13 participants made use of screening and monitoring services provided by both the pharmacy and CBCSS centre.

14 **Conclusion:** Pharmacists play a vital role in the elderly's healthcare since they are medicine experts and provide
15 supportive pharmaceutical services to the elderly population. These findings demonstrated that there was little
16 awareness of the services provided by the pharmacy or CBCSS centre. Therefore, there is a need to promote and
17 market these services for improved healthcare outcomes. The elderly will especially benefit from these services
18 as they could lead to a better quality of life, well-being and see a decrease in chronic diseases.

19 **Keywords:** Pharmaceutical services, Screening and monitoring services, Elderly, Pharmacist, Community-
20 based care and Support services

Introduction

More medication is prescribed to the elderly due to an increase in chronic conditions, and 50% of the national population of the United States of America aged 65 years and older use a minimum of five prescribed drugs, thus it is not always easy for prescribers to determine definitive treatment guidelines.^[1] “Successful aging” does not have a specific definition that has been accepted widely but according to Tiernan et al.^[2] and Lui et al.^[3] it could be defined as an individual without an illness or disability, with great rates of physical and cognitive activity as well as having an active lifestyle.^[2,3] Elderly patients, whose health is perceived as poor, suffer from multiple comorbidities, use more medication and struggle to maintain a healthy nutritional status.^[4] The prevalence of multimorbidity’s in elderly patients could increase healthcare costs and healthcare needs.^[5] Pharmacists are in the ideal position to provide healthcare to the elderly because they are up to date with all the newest treatment plans and with expert medicine knowledge that benefits disease prevention in the elderly.^[6]

The pharmacist’s role in healthcare is globally perceived as important, as their main responsibilities are to guarantee the safe, desired and rational treatment of medication.^[7] The role of the pharmacist has changed over the past 20 years and, therefore, pharmacists have already engaged more actively in public health and pharmaceutical services (PS) within the last decade, by working together with other healthcare providers in addressing individuals’ or the communities’ health needs, and in preventing and monitoring diseases.^[8,9] Merely 25% of healthcare funders in South Africa in 2012, perceived the pharmacist as a valuable member of the healthcare team.^[10] According to a study conducted in South Africa by Gilbert (2016), the pharmacists’ role still needs to change from only dispensing to a more patient-centred approach.^[11] Pharmacists in South Africa’s scope of practice is stipulated in section 35A of the Pharmacy Act, No. 53 of 1974^[12], and include *inter alia* the provision of pharmaceutical care; compounding, manipulation, preparation or packaging of any medicines and distribution of medicine.^[13]

Pharmaceutical services have been defined as the administration of drugs with the goal to promote health needs in the community.^[14] Pharmaceutical services within the pharmacy include the “*acquisition, storage and responsible provision of medication, as well as any medication-related care that will achieve optimal patient outcomes and improve a patient's quality of life*”.^[15] A pharmacist’s day consists mainly of dispensing (50%), counselling patients on medication use (20-29%) and administration or stock control (10-29%).^[16] Services provided by pharmacists include dispensing and counselling of prescribed medication and non-prescribed medication, ensuring the patient, public and other healthcare professionals receive all the necessary information and improve the patient’s knowledge regarding their medication use, monitoring patient’s medication use to provide the best possible care, partaking in health-promotion programs such as leading a healthy lifestyle and prevention of disease through screening and monitoring services, and lastly, working with other healthcare professionals for optimal treatment of the patient.^[17]

Pharmacists are perceived as the main gatekeepers to medicine in the community and, therefore, patients visit the pharmacy more than they would visit other healthcare providers because they are a skilled workforce that is easily accessible and open for long hours.^[18-20] The greatest burden for more than 60% of elderly individuals in low-income countries is the accessibility to healthcare because of high costs and lack of transportation or inability to pay for these services.^[21]

According to the Older Persons Act, Act 13 of 2006, it is essential for elderly individuals to remain in the care of the community and their relatives.^[22] Community-based care and support services (CBCSS) focus on health and social care and, therefore, the aim is to improve the elderly’s (aged 60 years and older) quality of life, for example, physical, social and emotional well-being, and to function independently within the community for as long as possible.^[23] Community-based care and support services are provided by public health sectors, non-profitable or profitable private organisations and social services.^[24] In South Africa, non-governmental organisations struggle to maintain CBCSS since there is no funding available for the organisations.^[25] Community-based care and support services available to the elderly include healthy meal preparations, nutritional education and counselling, clinical and socialisation services, programs to keep elderly individuals active such as physical fitness programs, health-related services, assistance for caregivers, and services that aid

housing, financial and home safety.^[26,27] A study by Greenlee indicated that 20% of the American elderly population aged 60 years and above, mainly used CBCSS.^[28]

Thus, the question of whether the elderly population is aware of PS and CBCSS, and if they make use of these services for a better quality of life, can be asked. The aim of this study was, therefore, to determine the use and availability of pharmaceutical services and CBCSS.

Methods

Study population

Participants included in the study had to be members of the CBCSS centre. To be a member of the CBCSS centre, an individual need to be 60 years or older, thus for the purpose of this study, an elderly person was defined as any individual 60 years and older. Elderly people with mental incapacities were excluded from the research study because they would not be able to understand or answer the questions asked in the structured questionnaire. A target population of 150 active members was identified by the researcher for statistical analysis.

Study design and questionnaire development

A quantitative, cross-sectional descriptive study, with the members of a CBCSS centre, was conducted between July and September 2017. To be a member of the CBCSS centre, an individual need to be 60 years or older, thus for the purpose of this study, an elderly person was defined as any individual 60 years and older.

Questionnaire development

A structured questionnaire was used to collect data from participants. The questionnaire focused on the patients' demographics, medication information, health service information, patient satisfaction, expectations and experiences of PS, delivery of screening and monitoring services and other activities provided by the CBCSS centre. The questionnaire consisted mainly of closed-ended questions and a Likert scale, which can improve the reliability of the research^[29]. This was used to determine the participants' expectations and experiences of PS. The scale was divided into five points, namely "strongly disagree", "disagree", "uncertain", "agree" and "strongly Agree".

Reliability was measured by using Cronbach's alpha (reliable coefficient of 0.70 or higher). Written informed consent was obtained from all the participants in this study.

Questionnaire distribution

Two weeks before the first meeting with the members of the CBCSS centre, the researcher advertised the research study at the CBCSS centre and old aged residences. The CBCSS centre also advertised the research study on their social media page. During three meetings, held every Tuesday at the CBCSS centre, the researcher provided the members of the research study with the necessary information. The researcher explained the main goal of the study and that the study was voluntary. Among the 150 active members (who all complied with the inclusion criteria) at the CBCSS centre, 40 members participated in the study. The researcher conducted a face-to-face interview with each participant when completing the structured questionnaire, in the privacy of their own residences or in a separate room at the CBCSS centre. Participants who wanted to participate in the research study had to sign an informed consent form, and they were informed that they could withdraw from the study at any time before data capturing started. Participant's privacy and confidentiality was secured throughout the entire study. The questionnaire took between 40 to 60 minutes to complete. The overall Cronbach's alpha of the expectations and experiences when visiting the pharmacy was 0.802, indicating a high reliability.

Ethical approval

Permission to conduct the study was obtained from the Health Research Ethics Committee, Faculty of Health Science, North-West University, Potchefstroom campus (NWU-00354-16-S1). A letter of approval was

obtained from the management of the CBCSS centre, subjected to approval from HREC. Written informed consent was obtained from all the participants in this study.

Data analysis and statistics

Data were analysed using SPSS for Windows (Statistical Software for Social Sciences) version 25.0 to reach the study's objectives. The demographic data (age, sex, etc.) for this study was presented, using frequencies and percentages. The researcher compared the participants' expectations and experiences, using means (and standard deviations), and possible differences were analysed, using a dependent *t*-test and Cohen's *d*-value. A value of *d* ≥ 0.8 indicates a large effect with practical significance. Statistical significance was determined when $p \leq 0.05$. Reliability was measured by using Cronbach's alpha (reliable coefficient of 0.70 or higher).

Results

The results include demographic data of participants and the study findings on PS versus CBCSS.

Patient demographics

The target population for this study was ambulatory elderly individuals of a local CBCSS centre for the elderly that had 150 active members of which 40 members participated in the study (a response rate of 26.7%). The participant's demographics are shown in Table 1. More than a third of the participants (42.5%) were not sure what their blood pressure levels were and almost two-thirds of the participants (72.5%) did not know their cholesterol levels. The majority of the participants indicated that they suffer from more than one chronic condition (82.5%). Most of the elderly (95.0%) do not smoke and more than half of the study population (55.0%) indicated that they do not consume alcohol beverages. The most chronic medication prescribed to a participant was 13 medicine items, and three participants reported using 11 different prescription medicines on a chronic basis. Most of the participants also use over-the-counter (70.0%) and herbal medications (47.5%).

Experiences and expectations of pharmaceutical services

Table 2 summarises the results of the participants' experiences and expectations when visiting the pharmacy. Most of the participants obtain their medication at the pharmacy (67.5%) or at their general practitioner (47.5%), mostly monthly (62.5%). The overall Cronbach's alpha of the expectations and experiences when visiting the pharmacy was 0.802, indicating a high reliability. Cohen's *d*-value for the expectations and experiences was 0.38, which indicated a small practical significant difference. According to the overall mean value of the items evaluated, the participants "Agreed" on both expecting and experiencing these pharmaceutical services within the pharmacy. It was observed that the participants "Agreed" and "Strongly agreed" that they perceive the pharmacist as a reliable source of general drug information as well as a reliable source for the clinical use of drugs (see Table 2). The participants (60.0%) asked their physicians when they had any problems concerning medication use, but the majority (75.5%) all agreed on also asking the pharmacist. Participants (27.5%) have not really experienced any side effects when using medication within the last year and most would rather contact the doctor (67.5%) if or when they experience any side effects.

The overall satisfaction rate for participants visiting pharmacies was high (see Table 3). All the participants (100.0%) agreed that pharmacies they visit were tidy and clean, and that the pharmacist was always friendly. However, 60.0% and more of the participants reported that they did not receive advice from the pharmacist on leading a healthier lifestyle, or advice on their current health issues at the time of the study. Only 45.0% of the participants agreed that the pharmacist asked them if they were currently using any other medication. Thirty-three participants (82.5%) said that the pharmacist did not provide any advice on the disposal of medication they were not using anymore.

Table 4 depict the use of screening and monitoring services provided by pharmacies. None of the participants made use of the following services: nutrition advice, peak flow test and advice on smoking cessation. The most frequent services being acquired from pharmacists were yearly immunisation services (47.5%). Overall, few respondents made use of the screening and monitoring services.

Community-based care and support services

In this study, the researcher also evaluated CBCSS delivered by the CBCSS centre for the elderly. In accordance to the screening and monitoring services provided by the pharmacy, the CBCSS centre also provided similar screening and monitoring services (see Table 4). The services mostly used by participants at the CBCSS centre were foot care (47.5%) and blood pressure monitoring (47.5%). These services were mainly used on a monthly basis (i.e. 42.5 % for foot care and 27.5% for blood pressure monitoring).

Table 5 summarises some of the social activities available at the CBCSS centre that participants utilised at the time of the study. For the aim of this study, the services were divided into physical, social and cultural activities. Few participants took part in these activities. Participants mostly participated in Pilates (17.5%) and Trimgym (12.5%) on a weekly basis. A small number of participants took part in weekly social activities such as Bridge (5.0%), Rummikub (5.0%) and Suduko (2.5%). Cultural activities such as art and a singing group were also available at the service centre. Five (12.5%) participants took part in art activities and six (15.0%) participants in the singing group at the CBCSS centre.

Discussion

In this article, the elderly had high expectations for the delivery of PS. Even though the local CBCSS centre provided similar screening services to pharmacies, participants were still not fully aware of these services being provided, either by the pharmacy or service centre. Some limitations were addressed in this study. The first limitation of this study was that the influence of CBCSS (physical, social and cultural) on the well-being of the elderly could not be measured. For future studies, a questionnaire could be developed to measure the effect of these activities on the elderly's well-being. The second limitation was that the study only included ambulatory elderly patients who speak Afrikaans or English; therefore, the study cannot be generalizable to the elderly population of South Africa since some cultures may be excluded. These findings are a strength for identifying possible gaps in the provision of PS and CBCSS in an elderly population. The purpose of the study was to determine the expectations and experiences perceived when visiting the pharmacy, measure satisfaction rates for the delivery of PS, and screening and monitoring services in the pharmacy vs. CBCSS in an ambulatory elderly population.

Provision of pharmaceutical services by the pharmacy

The results of this study's satisfaction level regarding the study populations' pharmacy-related experiences were in agreement with a study in Malaysia, where 82.0% of the study population agreed, with high satisfaction rates.^[30] In the study of Nagasherkara et al., it was indicated that the pharmacist did not ask about the patients' current medication use, neither advised the patients on disposal of medication they were no longer using. In a similar study, it was found that the pharmacist regularly asked the patients about their current medication and also explained the medication usage instructions and storage conditions.^[31] In the same study, the participants indicated a need for a private consultation area^[31], but in our study, 82.5% of the participants indicated that there was a private consultation area available when visiting the pharmacy.

Provision of screening and monitoring services by the pharmacist vs the CBCSS centre

Since the early 1980's, pharmacists have provided screening services.^[32] Screening services help to assess many health-related factors that benefit the elderly, however, they are not really willing to use these services.^[33,34] Screening services provided by the pharmacist are more affordable compared to screenings implemented by a physician, therefore, it may be more accessible to low-income groups.^[32]

Screening and monitoring services for pharmacies and CBCSS centre were compared to each other. Related services provided were blood and haemoglobin control monitoring, blood pressure monitoring, and weight control/nutrition advice. Problems with blood pressure, especially high blood pressure, increases health-related risks of various cardiovascular complications such as strokes and myocardial infarctions.^[35] This study showed that 42.5% of the participants suffered from hypertension, therefore, regular monitoring of blood pressure is necessary. No participant indicated that they used haemoglobin screening services at the CBCSS centre, whilst 20.0% used cholesterol monitoring services at the pharmacy. Only 5.0% of the participants used blood glucose measuring at the pharmacy, compared to 30.0% of the participants who used blood glucose monitoring at the

207 CBCSS centre. According to the US Preventive Services Task Force, monitoring blood glucose levels could
208 improve mortality and cardiovascular morbidity.^[36] None of the patients used the advice on nutrition at the
209 pharmacy and only 7.5% used the services for weight control at the service centre. Nutritional promotion
210 activities could be beneficial to the elderly since it could lead to an increased life expectancy and improved
211 well-being.^[34] A previous study conducted in England showed that only 20.0% of the study population would
212 visit the pharmacy for advice on healthy living, such as limited alcohol use, weight management and smoking
213 cessation.^[33] A study by Krska et al., indicated that patients established that the pharmacist was not the preferred
214 healthcare provider when advising on weight management and they did not prefer the environment of services
215 delivery.^[37] Additional services provided by the CBCSS centre, that are not provided by pharmacies, are ear
216 wax removal, foot care and wound care.

217 It is essential for the pharmacy and CBCSS centre to promote screening and monitoring services, especially
218 since the pharmacy is easily accessible and the most affordable first line of access to the community, and as
219 indicated, the CBCSS centre's mission is to include the delivery of cost-effective, high quality services to the
220 elderly.^[38-40]

221 **Community-based care and social activities delivered by the service centre**

222 With aging, physical and cognitive impairments occur, and a decline in social networks is observed.^[41] Health-
223 related quality of life for an elderly individual is described as the ability to perform basic tasks, function
224 independently and partake in life activities.^[42] According to Farquhar, the elderly defined the following factors
225 as vital in determining a good quality of life, namely: family relationships, living conditions, being part of social
226 activities and living a healthy life.^[43] Socialising services provided by the CBCSS centre included spiritual,
227 cultural, social and enriching activities. These activities did, however, not play a significant role in determining
228 the elderly's health since the majority of the study population did not make use of these services and still
229 perceived their health as "Very good".

230 There is evidence to suggest that pharmacists could play a valuable role in the CBCSS centre's healthcare team,
231 since they can provide health education, for example, supporting the importance of a physically active way of
232 living and good nutritional diets that will not only prevent chronic conditions but also promote an individual's
233 involvement in social activities and an improved quality of life.^[44]

234 **Conclusion and recommendations for the future**

235 The public still view pharmacists in their traditional roles as dispensers of medication and do not acknowledge
236 the changing roles in the pharmacy profession.^[45] According to Krska et al., the pharmacy should "*provide*
237 *services which relate less to medicines and more to health improvement*", therefore, compared to the services
238 delivered at pharmacies and CBCSS centre, a wider engagement and targeted marketing strategy are required.^[37]
239 The main reason why patients are not aware of the provision of pharmaceutical services by the pharmacist is
240 that the pharmacist does not pay any attention to the public's needs or advertise these services.^[46] Elderly
241 individuals do not use CBCSS services because they are unaware of these services being provided, services may
242 be costly, they may be unwilling to participate and unavailability of services.^[27] For future studies, the
243 expectations and experiences for the delivery of public health services and the influence of community-based
244 activities on the well-being of an elderly patient should be measured.

245 **Declarations**

246 **Conflict of interest:** The author(s) declare that they have no conflict of interest with the content relevant to this
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Table 1 Patient demographics

Demographic information		Number of patients, n (%)
Gender	Male	13 (32.5)
	Female	27 (67.5)
Age (years)	≥60 to ≤69	12 (30.0)
	≥70 to ≤79	17 (42.5)
	80+	11 (27.5)
Home language	English	1 (2.5)
	Afrikaans	39 (97.5)
	Other	0 (0.0)
Marital status	Married	23 (57.5)
	Divorced	3 (7.5)
	Widowed	13 (32.5)
	Single	1 (2.5)
Living conditions	House	23 (57.5)
	Apartment	8 (20.0)
	With children	2 (5.0)
	Old age home	7 (17.5)
Highest level of education	Primary school	2 (5.0)
	High school	17 (42.5)
	University	9 (22.5)
	Other	12 (30.0)
Member of medical aid	Yes	36 (90.0)
	No	4 (10.0)
Chronic diseases	Yes	36 (90.0)
	No	4 (10.0)
Type of chronic diseases	Alzheimer's disease	0 (0.0)
	Arthritis	5 (12.5)
	Asthma	1 (2.5)
	Heart disease	5 (12.5)
	Cataracts	4 (10.0)
	Hypercholesterolemia	21 (52.5)
	Dementia	1 (2.5)
	Depression	8 (20.0)
	Diabetes	7 (17.5)
	Epilepsy	1 (2.5)
	Hypertension	18 (45.0)
	Kidney and bladder problems	5 (12.5)
	Osteoporosis	6 (15.0)
	Parkinson's disease	2 (5.0)
	Rheumatoid arthritis	3 (7.5)
	Other:	
	Thyroid	3 (7.5)
	Osteoarthritis	1 (2.5)
	Lupus	1 (2.5)
	Rheumatism	1 (2.5)

	Metabolic liver defect and Cancer	1 (2.5)
	Ulcerative colitis	2 (5.0)
Condition of health	Excellent	2 (5.0)
	Very good	19 (47.5)
	Good	14 (35.0)
	Fair	4 (10.0)
	Poor	1 (2.5)
Blood pressure level	Not sure	17 (42.5)
	High blood pressure	9 (22.5)
	Normal blood pressure	14 (35.0)
Cholesterol level	Not sure	29 (72.5)
	High cholesterol	4 (10.0)
	Normal cholesterol	7 (17.5)
Smoke status	Yes	2 (5.0)
	No	38 (95.0)
Alcohol consumption	Yes	18 (45.0)
	No	22 (55.0)
Obtain medication information	General practitioner	19 (47.5)
	Private specialist	4 (10.0)
	Public hospital's pharmacy	2 (5.0)
	Nurse in public clinic	2 (5.0)
	Private pharmacy	27 (67.5)
	Specialist at pharmacy hospital	1 (2.5)
	Other	3 (7.5)
How often	Every month	25 (62.5)
	Every three months	1 (2.5)
	Every six months	13 (32.5)
	Every nine months	1 (2.5)

Table 2 **Expectations and experience when visiting the pharmacy**

Expectations and experience when visiting the pharmacy								
Question	Expectation			Experience			Dependent <i>t</i> -test	
	Response	n (%)	Mean ± SD ^a	Response	n (%)	Mean ± SD ^a	<i>p</i> -value	Cohen's <i>d</i> -value
The pharmacist was polite and listened to what was asked.	Strongly disagree	0 (0.0)	4.70±0.72	Strongly disagree	0 (0.0)	4.80±0.56	0.210	0.14
	Disagree	2 (5.0)		Disagree	1 (2.5)			
	Uncertain	0 (0.0)		Uncertain	0 (0.0)			
	Agree	6 (15.0)		Agree	5 (12.5)			
	Strongly agree	32 (80.0)		Strongly agree	34 (85.0)			
The pharmacist was able to respond to any queries I had.	Strongly disagree	0 (0.0)	4.65±0.74	Strongly disagree	0 (0.0)	4.65±0.77	1.000	0.00
	Disagree	2 (5.0)		Disagree	2 (5.0)			
	Uncertain	0 (0.0)		Uncertain	1 (2.5)			
	Agree	8 (20.0)		Agree	6 (15.0)			
	Strongly agree	30 (75.0)		Strongly agree	31 (77.5)			
The service I received from the pharmacist was good/efficient.	Strongly disagree	0 (0.0)	4.85±0.36	Strongly disagree	0 (0.0)	4.83±0.39	0.323	0.06
	Disagree	0 (0.0)		Disagree	0 (0.0)			
	Uncertain	0 (0.0)		Uncertain	0 (0.0)			
	Agree	6 (15.0)		Agree	7 (17.5)			
	Strongly agree	34 (85.0)		Strongly agree	33 (82.5)			
The pharmacist is a reliable source of general drug information.	Strongly disagree	0 (0.0)	4.78±0.42	Strongly disagree	0 (0.0)	4.53±0.88	≤0.05	0.29
	Disagree	0 (0.0)		Disagree	3 (7.5)			
	Uncertain	0 (0.0)		Uncertain	1 (2.5)			
	Agree	9 (22.5)		Agree	8 (20.0)			
	Strongly agree	31 (77.5)		Strongly agree	28 (70.0)			
The pharmacist is a reliable source of clinical drug information (information regarding the clinical use of drugs in specific patient situations).	Strongly disagree	0 (0.0)	4.50±0.88	Strongly disagree	0 (0.0)	4.15±1.10	≤0.05	0.32
	Disagree	2 (5.0)		Disagree	5 (12.5)			
	Uncertain	4 (10.0)		Uncertain	6 (15.0)			
	Agree	6 (15.0)		Agree	7 (17.5)			
	Strongly agree	28 (70.0)		Strongly agree	22 (55.0)			
The pharmacist counselled me regarding the safe and appropriate use of medication.	Strongly disagree	0 (0.0)	4.78±0.42	Strongly disagree	0 (0.0)	4.35±1.08	≤0.05	0.40
	Disagree	0 (0.0)		Disagree	6 (15.0)			
	Uncertain	0 (0.0)		Uncertain	0 (0.0)			
	Agree	9 (22.5)		Agree	8 (20.0)			
	Strongly agree	31 (77.5)		Strongly agree	26 (65.0)			
The pharmacist informed me about more cost-effective alternatives to the drugs prescribed.	Strongly disagree	0 (0.0)	4.70±0.61	Strongly disagree	1 (2.5)	4.25±1.08	≤0.05a	0.42
	Disagree	1 (2.5)		Disagree	4 (10.0)			
	Uncertain	0 (0.0)		Uncertain	1 (2.5)			
	Agree	9 (22.5)		Agree	12 (30.0)			
	Strongly agree	30 (75.0)		Strongly agree	22 (55.0)			

^aSD = Standard deviation

Table 3 Patient satisfaction at pharmacy

Patient satisfaction at pharmacy		
Questions	Category	n (%)
Was the name of the person helping you in the pharmacy easily identified on his/her tag?	Yes	37 (92.5)
	No	3 (7.5)
Was the pharmacy clean and tidy?	Yes	40 (100.0)
	No	0 (0.0)
Is there a private area available for consultation?	Yes	33 (82.5)
	No	7 (17.5)
Was the pharmacist friendly when assisting you with the use of your medication?	Yes	40 (100.0)
	No	0 (0.0)
Did the pharmacist provide useful information when explaining to you how to use your medication?	Yes	38 (95.0)
	No	2 (5.0)
Did the pharmacist provide advice on leading a healthier lifestyle?	Yes	15 (37.5)
	No	25 (62.5)
Did the pharmacist provide advice on your current health problem?	Yes	16 (40.0)
	No	24 (60.0)
After talking to your pharmacist, did you want to know more about the medication you are taking?	Yes	12 (30.0)
	No	28 (70.0)
Did the pharmacist explain to you in a way you could understand?	Yes	38 (95.0)
	No	2 (5.0)
Did the pharmacist ask you if you are currently using any other medication?	Yes	18 (45.0)
	No	22 (55.0)
Did the pharmacist provide advice on disposing medicine you no longer need?	Yes	7 (17.5)
	No	33 (82.5)

Table 4 Public health-related needs and experiences

Public health related needs and experiences								
Screening and monitoring services provided at the pharmacy				Primary services provided by CBCSS centre				
Category	n (%)	Category	n (%)	Questions	Category	n (%)	Category	n (%)
Yes	15 (37.5)	Monthly	9 (22.5)	Blood pressure monitoring	Yes	19 (47.5)	Weekly	1 (2.5)
No	25 (62.5)	Yearly	6 (15.0)		No	21 (52.5)	Monthly	11 (27.5)
							Yearly	7 (17.5)
Yes	8 (20.0)	Monthly	3 (7.5)	Cholesterol monitoring	-	-	-	-
No	32 (80.0)	Yearly	5 (12.5)					
Yes	7 (17.5)	Monthly	4 (10.0)	Determine blood sugar levels	-	-	-	-
No	33 (82.5)	Yearly	3 (7.5)					
Yes	2 (5.0)	Monthly	1 (2.5)	Glucose monitoring	Yes	12 (30.0)	Monthly	9 (22.5)
No	38 (95.0)	Yearly	1 (2.5)		No	28 (70.0)	Yearly	3 (7.5)
Yes	19 (47.5)	Yearly	19 (47.5)	Immunisation services	-	-	-	-
No	21 (52.5)							
Yes	3 (7.5)	Monthly	1 (2.5)	Urine analysis	-	-	-	-
No	37 (92.5)	Yearly	2 (5.0)					
-	-	-	-	Ear wax removal	Yes	4 (10.0)	Yearly	4 (10.0)
					No	36 (90.0)		
-	-	-	-	Foot care	Yes	19 (47.5)	Monthly	17 (42.5)
					No	21 (52.5)	Yearly	2 (5.0)
-	-	-	-	Weight control	Yes	3 (7.5)	Weekly	1 (2.5)
					No	37 (92.5)	Yearly	2 (5.0)
-	-	-	-	Wound care	Yes	1 (2.5)	Yearly	1 (2.5)
					No	39 (97.5)		
-	-	-	-	Nutrition advice	-	-	-	-
-	-	-	-	Peak flow test	-	-	-	-
-	-	-	-	Smoking cessation	-	-	-	-
-	-	-	-	Haemoglobin control monitoring	-	-	-	-

Table 5 Socialising services provided by the CBCSS centre

Public health-related needs and experiences (Socialising services provided by the CBCSS centre)				
Questions	Category	n (%)	Category	
Physical activities				
Trimgym	Yes	5 (12.5)	Weekly	4 (10.0)
	No	35 (87.5)	Yearly	1 (2.5)
Line dancing	Yes	0 (0.0)	-	-
	No	40 (100.0)		
Bowling	Yes	3 (7.5)	Daily	1 (2.5)
	No	37 (92.5)	Weekly	1 (2.5)
			Monthly	1 (2.5)
Pilates	Yes	7 (17.5)	Weekly	7 (17.5)
	No	33 (82.5)		
Social activities				
Bridge	Yes	2 (5.0)	Weekly	2 (5.0)
	No	38 (95.0)		
Rummikub	Yes	2 (5.0)	Weekly	1 (2.5)
	No	38 (95.0)	Yearly	1 (2.5)
Suduko	Yes	1 (2.5)	Weekly	1 (2.5)
	No	39 (97.5)		
Cultural activities				
Arts	Yes	5 (12.5)	Weekly	2 (5.0)
	No	35 (87.5)	Monthly	2 (5.0)
			Yearly	1 (2.5)
Singing group	Yes	6 (15.0)	Weekly	6 (15.0)
	No	34 (85.0)		

3.3 Additional results

Additional results pertaining to the demographic background of the participants, as well as elderly patients' awareness of their chronic diseases and the possible problems they may experience with medication use is presented in this section.

3.3.1 Demographic background of the study population

Most of the participants' home language was Afrikaans (97.5%) and only one participant's home language was English (2.5%). The highest level of education achieved by the majority of participants (42.5%) was high school. More than half of the participants (57.5%) were still married, which meant that 42.5% of them were either divorced, widows/widowers or never married. Thirty-six participants (90.0%) were members of a medical aid. Of the participants, 42.5% were not sure of their blood pressure level and 72.5% were unsure of their cholesterol measurement. Eighteen (45.0%) participants indicated they used alcohol mostly once per month. Thirty-eight (95.0%) of the participants indicated that they do not smoke. Overall, the participants perceived their health as "very good" and only one participant indicated that their health status was "poor".

3.3.2 Determine possible problems with medication use in the study population

Patient's drug use was determined by means of prescribed daily dose (PDD), to determine if the participants were aware of the indication of their medicine and medication use. There were five chronic diseases reported by three participants. Of the 40 participants that reported chronic conditions, six (15.0%) had a single chronic condition, 16 (40.0%) had two chronic diseases, 12 (30.0%) had three chronic diseases while two (5.0%) suffered from four chronic conditions. Thirty-three (82.5%) of the participants confirmed that they knew the overall purpose of the medication prescribed to them, but when asked to explain what the medication was indicated for, they struggled to answer the question. The most prevalent chronic conditions found in the study population were hypercholesterolemia (affecting 52.5% of participants), hypertension (42.5%), depression (20.0%) and diabetes mellitus (17.5%). The highest number of chronic conditions reported by individual participants was five (three participants, i.e. 7.5% of the study population, reporting this), followed by four (two participants, i.e. 5.0% of the study population, reporting this). The numbers of chronic illnesses reported are displayed below in Table 3-2.

Table 3-2: Numbers of chronic diseases reported per patient

Number of chronic diseases reported	n (%)
None	1 (2.5%)
One	6 (15.0%)
Two	16 (40.0%)
Three	12 (30.0%)
Four	2 (5.0%)
Five	3 (7.5%)

The most chronic medication prescribed to a participant was 13 medicine items, and three participants reported using 11 different prescription medicines on a chronic basis. Most of the participants also use over-the-counter (70.0%) and herbal medications (47.5%).

A total number of 203 chronic and six acute drugs were prescribed to the patients who suffered from chronic illnesses. The largest number of chronic drugs prescribed to a single patient was 13 and the smallest number was one. Most of the participants also used herbal remedies (47.5%) and OTC medication (70.0%).

In the present study, the researcher identified the classifications of each of the drugs on the list of medication provided by the participants in the structured questionnaire on grounds of the South African medicines formulary (SAMF) (Rossiter, 2012).

Table 3-3: Classification of medication prescribed to participants as chronic and acute, respectively

Drug classification	Chronic medication, N=203 (n%)	Acute medication, N=6 (n%)
HMG CoA reductase inhibitors*	18 (8.9%)	-
Salicylic acid and derivatives	13 (6.4%)	-
Diuretics	11 (5.4%)	-
Calcium channel blockers	11 (5.4%)	-
Thyroid therapy	11 (5.4%)	-
Mineral supplements	9 (4.4%)	-
β -blockers	8 (3.9%)	-
Benzodiazepine-related drugs	7 (3.4%)	2 (33.3%)

Drug classification	Chronic medication, N=203 (n%)	Acute medication, N=6 (n%)
Antiepileptics	7 (3.4%)	-
Selective serotonin re-uptake inhibitors (SSRI's)	7 (3.4%)	-
Biguanides	6 (3.0%)	-
Angiotensin II receptor blockers	5 (2.5%)	-
Tricyclic derivatives	5 (2.5%)	-
Proton pump inhibitors	4 (2.0%)	-
ACE inhibitors**	4 (2.0%)	-
Potassium-sparing agents	4 (2.0%)	-
Anti-inflammatory agents	4 (2.0%)	-
Vitamins	4 (2.0%)	-
Antigout preparations	3 (1.5%)	-
Centrally acting agents	3 (1.5%)	-
Sulphonamides, urea derivatives	3 (1.5%)	-
Peptic ulcer and Gastro-oesophageal reflux disease (GORD)	2 (1.0%)	-
Bisphosphonates	2 (1.0%)	-
Oestrogens	2 (1.0%)	-
Treatment of neuropathic pain	2 (1.0%)	-
Dopaminergic agents	2 (1.0%)	-
Intestinal anti-inflammatory agents	2 (1.0%)	-
Folic acid and derivatives	2 (1.0%)	-
Antithrombotic agents	2 (1.0%)	-
Platelet aggregation inhibitors	1 (0.5%)	-
Glucocorticoids	1 (0.5%)	1 (16.7%)
Dipeptidyl peptidase IV (DPP-IV)	1 (0.5%)	-
Atypical antipsychotics	1 (0.5%)	-
Aminosalic acid	1 (0.5%)	-
Benzamides	1 (0.5%)	-
Urinary antispasmodics	1 (0.5%)	-
Coxibs	1 (0.5%)	-
Vasodilators used in cardiac	1 (0.5%)	-

Drug classification	Chronic medication, N=203 (n%)	Acute medication, N=6 (n%)
Class II ACE inhibitors	1 (0.5%)	-
Drugs affecting bone metabolism	1 (0.5%)	-
Opioids	1 (0.5%)	-
Dopamine re-uptake inhibitor	1 (0.5%)	-
Carbonic anhydrase inhibitors	1 (0.5%)	-
Serotonin and noradrenaline re-uptake inhibitors	1 (0.5%)	-
Urinary antispasmodics	1 (0.5%)	-
Antihistamines for systemic use	-	1 (16.7%)
Xanthines	-	2 (33.3%)
Unsure of medication indication	24 (11.8%)	-
*HMG CoA reductase inhibitors: 3-hydroxy-3-methylglutaryl-coenzyme A reductase inhibitors **ACE inhibitors: angiotensin-converting-enzyme inhibitors		

3.3.3 Elderly patients' awareness of the indication of their medicine and medication use

Elderly individuals in the present study were asked if they observed the following when receiving medication (response rates are indicated in brackets):

- Wrong medication received (n=6; 15.0%)
- Wrong dosage strength received (n=2; 5%)
- Clear labelling of medication (n=36; 90.0%)

They were also asked whether they did the following upon taking their medication:

- Observed the expiry date (n=30; 75.0%)
- Take the medication as prescribed (n=39; 97.5%)
- Occasionally forget to take the medication (n=20; 20.0%)

Participants mostly forgot to take their medication due to a busy schedule (10.0% indicating this option) and 15.0% would drink the skipped dose when remembering again. In the present

study, 97.5% of participants indicated that they took the medication as prescribed, for example with or without meals and administered the medication correctly.

In the present study, 33 participants (82.5%) indicated that they knew the purpose of each drug and only seven (17.5%) participants indicated that they were unsure what the drug was indicated for. Of the 203 prescribed drugs, participants were unsure of 53 of these drugs' (26.1%) prescribed daily dose (PDD). Participants also indicated that they were unsure of the purpose of 24 (11.8%) of the 203 prescribed chronic drugs. Only 27.0% of the participants had experienced any side effects when taking their medication over the last year.

Most participants (77.5%), when they had any questions concerning their medication use, would contact the pharmacist. Overall, the participants were aware of the number of drugs used, what the drugs were indicated for and what the PDD was.

3.4 Chapter summary

In this chapter, the results of the empirical investigation were outlined and discussed in two manuscripts and concluded with additional results obtained from the empirical investigation. The focus was on an elderly population's expectations and experiences of PC and services provided by their pharmacist. Chapter 4 will focus on the conclusions drawn in the study as well as on its limitations and recommendations for future studies.

CHAPTER 4: CONCLUSION AND RECOMMENDATIONS

The general aim reported on in this research study was to evaluate the provision of PC and PHS in an ambulatory elderly population. This chapter summarises the conclusions drawn after the specific objectives of the literature review and empirical investigation, stated in Chapter 1, were met. It furthermore addresses the possible limitations of the study and makes recommendations for possible future studies.

4.1 Conclusions: Literature review

The following objectives were set the literature review, as outlined in Chapter 1 paragraph 1.3.2.1:

- define the elderly population and their prevalence internationally and nationally;
- determine possible obstacles in prescribing medication to the elderly population;
- define PC and PHS in the context of ambulatory elderly patients;
- determine whether PHS influence quality of life in the elderly population;
- determine the role and responsibilities of the pharmacist in the provision of PC;
- determine how to overcome possible barriers to the provision of PC to the elderly;
- identify possible factors that could influence elderly patients' perceptions of PC; and
- determine whether physical-, social- and cultural activities influence the well-being of elderly patients.

The primary conclusions that were drawn upon the meeting of each of these objectives are provided subsequently in paragraphs 4.1.1 to 4.1.6.

4.1.1 Objective 1 and 2

Define the elderly population, their prevalence internationally and nationally, as well as obstacles in the prescribing of medication to the elderly population

These literature objectives were achieved in section 2.2 of Chapter 2. Elderly individuals may be divided into three groups, namely the young-old elderly (between the ages of 60 and 74 years), the old-old elderly (between the ages of 75 and 84 years) and the very-old (85 years and older) (Kalula, 2013:352). For this study, the researcher identified the elderly as individuals aged 60 years or older (refer to paragraph 1.4.2.1), even though in South Africa the elderly is identified as males 65 years and older and females 60 years and older (Older Persons Act 13 of 2006). It is expected that the global elderly population (consisting of persons over the age of 65 years) will increase to almost 1.3 billion people by 2040, whereas Statistics South Africa reported that 4.47 million of South Africans were 60 years or older in 2016 (Cullinan *et al.*, 2015:861; Statistics South Africa, 2016) (refer to paragraph 2.2.1).

The literature revealed that the elderly is vulnerable and that factors such as comorbidities, physiological changes, multiple drug use, inappropriate prescribing and drug-related problems play a role in the ageing process (refer to paragraph 2.2.2 and 2.2.3).

It was concluded that the most significant factors influencing medication use and prescribing in the elderly population are:

- **Comorbidities:** There is an increase in chronic conditions as a population ages, leading to a higher number of comorbidities and the intake of multiple types of prescribed medication (Hubbard *et al.*, 2013:319). Chronic diseases such as cardiovascular, musculoskeletal and cerebrovascular diseases are prevalent in the elderly, but in South Africa, hypertension and arthritis are the most common among older adults (Hubbard *et al.*, 2013:319; Phaswana-Mafuya *et al.*, 2013:20936). The intake of multiple types of medication could lead to an increase in adverse drug reactions and potential drug-drug interactions (Gnjidic *et al.*, 2012:238).
- **Drug-related problems** (refer to paragraph 2.2.3.3): Table 2-2 defined the different DRPs. Factors associated with DRPs are mainly inappropriate prescribing, medication non-adherence and ADRs (Bernsten *et al.*, 2001:64). When prescribing medication to the elderly, healthcare professionals should be educated and implement careful planning while considering the ageing process as the elderly are at increased risk of ADRs (Van Heerden *et al.*, 2016:1010).

- **Physiological changes:** Each elderly individual's pharmacodynamic and pharmacokinetic changes should be evaluated to provide the best patient care plan (Wooten, 2012:437). When prescribing medication, these changes must be kept in mind (Hutchinson & O'Brien, 2007:4-5). **Pharmacokinetic changes** (refer to paragraph 2.2.2.1) include the effect of the body on medication once administered, including changes in absorption, distribution, metabolism and excretion (Garner, 2013:19). **Pharmacodynamic changes** (refer to paragraph 2.2.2.2) in the elderly cause an increase in sensitivity to medication such as warfarin, opioids, furosemide, neuroleptic antipsychotics and benzodiazepines. Therefore, when prescribing such medication to the elderly, special precautions should be taken, for example slow titration of drugs and lowest dosage (Geurts *et al.*, 2016:809). Tables 2-1 to 2-3 summarised the age-related pharmacokinetic and pharmacodynamic changes.
- **Inappropriate prescribing:** Elderly individuals are being prescribed more drugs because of an increase in comorbidities (Ahmad *et al.*, 2014:155; Cascorbi, 2012:546). According to the literature, a major concern in prescribing medication to the elderly is the fact that these patients see different prescribers for several conditions, thus the prescribers are not always aware of the full list of medication that has been prescribed for, or is being used by their patients (Hubbard *et al.*, 2013:319; Lavan *et al.*, 2016:859; Nash *et al.*, 2000). Elderly patients often have many prescriptions from several prescribers and have these prescriptions filled at different pharmacies (Mallet *et al.*, 2007:186) (refer to paragraph 2.2.3.1).

This study highlighted that elderly patients need individual attention from healthcare providers to reduce their chances of medication errors (Fialová & Onder, 2009:645).

4.1.2 Objective 3 and 4

Define PHS and determine whether it has an influence on quality of life in the elderly population

This objective was achieved in Section 2.5 of Chapter 2. "Public health" was first defined in 1920 by Winslow; the WHO (2012a) defined it thereafter as "*the art and science of preventing disease, prolonging life and promoting health through the organized efforts of society*". The future of the pharmacy profession depends on the effective implementation of PC and the provision of PHS (Scott *et al.*, 2016:836). Public health includes "*all public, private, and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction*" (CDC, 2017). Statistics show that, in 2005, 70% of the South African population

used PHS, 23% used private healthcare services and a minor 0.1% used the services of traditional health practitioners (Peltzer & Phaswana-Mafuya, 2012:18545). Pharmacists were confident about the role they played and the responsibilities they had in promoting public health, but still perceived dispensing as their primary role (Morton *et al.*, 2015:e17). Even though pharmacists were positive about the role they played in promoting public health, some patients stated that they had not experienced the provision of PHS by the pharmacy, but also did not expect these services to be provided (Eades *et al.*, 2011). Factors such as having to wait a long time for services to be provided, there not being enough staff available, prescribed medication not being available or in stock and negative attitudes among staff are the main reasons for dissatisfaction with PHS (Peltzer & Phaswana-Mafuya, 2012:18545). Pharmacist-related barriers to the provision of PHS include a need for training, the amount of work being too much, limited time and not being paid for services provided (Morton *et al.*, 2015:e18). However, patients who had received PHS were very satisfied with the services provided (Eades *et al.*, 2011).

The pharmacist, as well as the pharmacy profession, is in a position to encourage and deliver PHS (Strand *et al.*, 2016:251). Pharmacies are easily accessible and available to the community (Bush *et al.*, 2009:306). Public health's main goal is to develop better care and improve the well-being of the community by implementing illness prevention programmes and promoting health (Strand *et al.*, 2016:248). Pharmacist's provision of PHS should be supported by other healthcare professionals and the community to ensure that they deliver the best healthcare, promote their own services, shift their attitudes and improve community health (Eades *et al.*, 2011). Public health services such as screening services, immunisation, and advice on alcohol abuse and weight control should not only be provided to ill patients, but also to healthy individuals (Krska & Morecroft, 2010:37).

Public health is expressed through "*The ten essential services of public health*" and by implementing these services healthcare professionals will improve the elderly's quality of life (refer to Table 2-7).

4.1.3 Objective 3 and 5

Define PC and the role and responsibilities of the pharmacist in the provision of PC

This objective was achieved in Sections 2.3.1 and 2.6 of Chapter 2. The definition of the philosophy of PC that is most often cited was introduced by Hepler and Strand in 1990 (Hepler & Strand, 1990:529). Since then, the concept of PC has been included in the pharmacy profession in South Africa (Pharmacy Act, No 53 of 1974). Pharmaceutical care has been

defined in many different ways; some countries such as the United States focus more on the clinical and economic outcomes of this type of care while neglecting the humanistic outcomes (van Mil, 2000:161). Table 2-8 summarised the evolution of the term “PC” from 1975 to 2016. Today, PC may be summarised as a patient-centred approach to care that is focused on improving a patient’s health outcomes thus the quality of patient care (Paulós *et al.*, 2005:939).

There has been much controversy in the literature around whether the pharmacist should be part of the healthcare team providing PC (Allemann *et al.*, 2014:545). According to van Mill *et al.* (2004:303), providing PC should be the pharmacist’s primary responsibility (Allemann *et al.*, 2014:545). The healthcare team should include every healthcare professional who provides patient care, such as the pharmacist, physician, specialist and nursing staff, as well as the patient (Dupotey *et al.*, 2011:710). Farris *et al.* (2005:1539) state that the pharmacist should “*promise to do whatever possible to make sure the patient achieves positive outcomes from drug therapy*”. The South African pharmacist’s role has changed over the past few years. Therefore, it is important for the pharmacist to accept his or her part in the healthcare team by providing the best possible care for the South African population (Bronkhorst, 2014:11). Pharmacists. Pharmacists need to work together with the patient or other healthcare professionals in implementing the three phases of PC, namely the assessment, care plan and follow-up phases (refer to paragraph 2.6.1 and Figure 2-2.) (Lyra *et al.*, 2007:187; Strand *et al.*, 2004:3991).

4.1.4 Objective 6

Determine how to overcome possible barriers to the provision of PC to the elderly

This objective was achieved in Section 2.6.2 of Chapter 2. The reason why pharmacists are sometimes not able to provide PC is mostly because of professional-, system- and patient-related barriers (Assa-Eley & Kimberlin, 2005:42) (refer to paragraphs 2.6.2.1–2.6.2.4). In Table 2-9, the researcher identified some barriers to, or challenges in the provision of PC from studies conducted in different countries. Overall, it was observed that not all countries have the same barriers to overcome and what one country perceives as a barrier is not necessarily regarded as a barrier in other countries (refer to paragraph 2.6.2). The barriers most commonly identified in the literature were a lack of time, not being sure of the pharmacist’s role in the healthcare team, difficulty building a relationship with other members of the healthcare team and limited workspace; the first three of these were cited as the main barriers to overcome in South Africa (Dunlop & Shaw, 2002:19). Reimbursement is an important problem to overcome in New Zealand, Canada, Europe and Sudan. To overcome some of these barriers, it is

essential that pharmacists change not only their own views of the role they play in the provision of PC, but also the views of the other members of the healthcare team (Van Mil, 2000).

4.1.5 Objective 7

Identify possible factors that could influence elderly patients' perception of PC

Patients who suffer from chronic illnesses and who do not adhere to guidelines for medication use will gain most from PC as the latter will improve patients' health outcomes (Pelicano-Romano *et al.*, 2015:1721). From the literature it was found that the elderly will also benefit from the provision of PC (refer to paragraph 2.6.3). The provision of PC improves the well-being of patients, improves satisfaction rates for services delivered, decreases hospitalisation rates and ensures better medication compliance (Pelicano-Romano *et al.*, 2015:1722). Improved satisfaction rates with the PC services provided by healthcare practitioners will reflect positively on better clinical outcomes and perceptions of healthcare (Fitzpatrick *et al.*, 2004:1788). The implementation of PC will benefit the care of elderly individuals by minimising healthcare expenses and improving quality of life (Mallet *et al.*, 2007:190). A study showed that many individuals are not aware of the full spectrum of services provided by the pharmacist and that they have access to these services (Assa-Eley & Kimberlin, 2005:43). It is essential to note patients' views and to evaluate their attitudes toward the services provided by the pharmacist to improve the services presently on offer, implement new services if needed and improve communication between the healthcare provider and patient (Al-Arifi, 2012:324).

4.1.6 Objective 8

Determine whether physical, social and cultural activities have an influence on the well-being of elderly patients

This objective was achieved in Section 2.7 of Chapter 2. The definition of "healthy ageing" was reformulated by the WHO and now highlights the fact that the well-being of the elderly depends on the maintenance of an adequate quality of life to ensure their continued participation in the community (WHO, 2015a). According to the Swedish National Institute of Public Health (SNIPH, 2007), healthy ageing may be defined as "*the process of optimizing opportunities for physical, social and mental health to enable older people to take an active part in society without discrimination and to enjoy an independent and good quality of life*". Chronic conditions and other factors intensify as individuals' activity levels decline with the ageing process, therefore **physical activity** is necessary to improve quality of life in the elderly and to prevent or decrease the prevalence of chronic illnesses (Schutzer & Graves, 2004:1056; Zaleski *et al.*,

2016:98). It is essential to promote and explain the health benefits of physical activity to the elderly population, especially since there is mostly a decline in physical activity as an individual age (ODPHP, 2018). Table 2-11 (refer to paragraph 2.7.1) summarised the WHO's suggested guidelines for levels of activity among the elderly. Overall, the guidelines include doing more or less 150 minutes of moderate-intensity aerobic exercises a week or 75 minutes of vigorous-intensity aerobic physical exercises. An equal number of minutes' moderate- and vigorous-intensity exercise in the course of a week is another option for the improvement of the elderly's physical activity levels. Physical activity may reduce the risks of heart disease, osteoporosis, diabetes mellitus and cancer (Majnemer, 2010:200).

According to the literature, 50% of the elderly population (60 years and above) are at risk of **social isolation** (refer to paragraph 2.7.2), which can negatively influence physical and mental health (Landeiro *et al.*, 2017; Chen & Schulz, 2016). Determinants of social isolation include living by oneself and having no social relationships or contact with others (Holt-Lunstad *et al.*, 2015:237). Risk factors associated with social isolation or loneliness include depression, an increase in blood pressure and cholesterol levels, weight gain and smoking (Dury, 2014:126; Hawkey *et al.*, 2010:786; Klinenberg, 2016:786). Elderly individuals are more prone to experiencing social isolation because of a decrease in physical activity and limited social networks resulting from the passing away of family members and friends (Klinenberg, 2016:786). Older people who are more socially active will positively influence their own well-being (Price & Tinker, 2014:282).

One's physical, mental and cognitive health status will increase when participating in **leisure** activities such as painting, drawing, dance, poetry, journaling and art (Flood & Phillips, 2007:390-391; Majnemer, 2010:200; Price & Tinker, 2014:284) (refer to paragraph 2.7.3). Leisure activities will furthermore have a positive influence on health since an individual can rest, re-energize, manage stress and anxiety and their emotional well-being whilst performing such activities (Majnemer, 2010:200; Flood & Phillips, 2007:391). Creative activities will help the elderly to develop new skills and to improve their cognitive stimulation (Price & Tinker, 2014:284). The activities described in the literature are important in ensuring good social relationships, a positive impact on emotions and the ability to function independently in society (Sun *et al.*, 2013:1471; Shapiro 2016:121; Nicholson 2012:1347; Cohen *et al.*, 2006:727). Therefore, an improvement in the quality of life and well-being of elderly persons who engage in leisure activities is visible.

To summarise, the aim of the literature review was to report on the provision of PC and on PHS needs in an ambulatory elderly population. The term "elderly" was defined and

medication-related problems in this population group were identified in the literature study. The essential role of the pharmacist within the healthcare team that provide these services was also highlighted. For the elderly, it is ultimately essential to partake in social, physical and leisure activities to achieve the best health results (Flood & Phillips, 2007:391).

4.2 Conclusions: Empirical study

The following objectives were set for the empirical investigation, as outlined in Chapter 1 paragraph 1.3.2.2, table1-2:

- to examine whether the expectations that the ambulatory elderly population of a CBCSS centre have of pharmaceutical care align with their experience thereof; and
- to review the availability and use of pharmaceutical services and CBCSS in an ambulatory elderly population.

The above objectives were met by conducting an empirical review. The conclusions and key findings of this review are provided subsequently in paragraphs 4.2.1 to 4.2.3.

4.2.1 Objective 1

To examine whether the expectations that the ambulatory elderly population of a CBCSS centre have of pharmaceutical care align with their experience thereof

4.2.1.1 To determine the study population's expectations and experience of the provision of PC and pharmaceutical services by the pharmacist

This empirical objective was met in Manuscript One and Two (Chapter 3). All three phases of PC, namely the assessment, care plan and follow-up phases were examined (refer to Tables II to IV in Manuscript One).

The findings of the present study suggest that the elderly patients mostly expected PC services to be delivered by the pharmacist, but did not experience the delivery of these services in the pharmacy. Improved patient satisfaction rates depend on the implementation of PC services – to guide this, it is necessary to measure the patients' experiences (Koster *et al.*, 2016:363; Volume *et al.*, 2001:415). On grounds of the literature, a few benefits of the provision of PC were identified (refer to paragraph 2.5.3). As indicated by Nash *et al.* (2000), the main benefit to elderly patients is a reduction in the prevalence of ADRs and DDIs. This study highlighted possible shortcomings in the provision of PC to the elderly and clearly established that the elderly expected these services to be provided by the pharmacist.

Participants were mostly satisfied when visiting the pharmacy and strongly agreed that the pharmacist is a reliable source of general drug information as well as clinical drug information. There was no significant difference between the expectations and experiences of any patient visiting the pharmacy. Participants generally perceived the pharmacist as polite and able to respond to any queries and agreed that they were counselled on the safe and appropriate use of medication and provided cost-effective alternatives for medication. According to Melton and Lai (2017:87), patients mostly have low expectations of the pharmacy and are satisfied with the pharmaceutical services provided at first, but when exposed to more advanced services, their expectations of services increase.

In conclusion, there is still a need to promote services such as PC and the pharmaceutical services offered by pharmacy. Further efforts are needed to highlight the importance of a patient-centred approach to PC and to educate elderly individuals on the importance of the provision of PC.

4.2.2 Objective 2

To review the availability and use of pharmaceutical services and CBCSS in an ambulatory elderly population

4.2.2.1 To determine whether secondary services provided by the PSC influence the well-being of participants

This empirical objective was met in Manuscript Two (Chapter 3). The participation of members in social activities presented by the CBCSS centre was examined. The mission of the service centre was clearly defined in Manuscript Two; the overall goal of the activities presented was to enable the elderly to function independently in the community for as long as possible. Services at the CBCSS centre are of high quality as well as affordable to ensure cost-effectiveness (PSC, 2016). This study indicated that only a few participants made use of the services provided by the CBCSS centre. Previous studies have confirmed that community-based programs for the elderly reduce the stigma associated with ageing, motivate social relationships, and enhance physical fitness, confidence levels and quality of life (Price & Tinker, 2014:284).

At the time of the research study, only a few services were available to the elderly, but since then the CBCSS centre has added a few more activities. For the purposes of this research study, the activities provided by the CBCSS centre were categorised as physical, social or cultural in nature (see Table 4 of Manuscript Two). Even though only a few participants took

part in the activities presented by the CBCSS centre, their self-reported overall health status was still “very good”. However, the study could not indicate whether participation in these activities had an influence on the members’ well-being since no measurement scale was used to determine an improvement in health outcomes. The study did, however highlight the importance of social relationships and physical activity in an elderly population. Elderly patients at risk of social isolation and loneliness are mostly individuals who live by themselves, whose spouse or other relatives have passed away, who suffer from physical impairments and who only have a few social relationships (Gardiner *et al.*, 2018:148). In this study, 7.5% of the elderly participants were divorced, 32.5% widowed and 2.5% single, therefore the possibility of social isolation could have been measured if a measurement scale was used to evaluate this phenomenon. Previous studies have indicated that elderly individuals (60 years or older) who are socially isolated and who perceive their health status as poor often do not want to participate in social activities anymore, even though they may benefit most from these activities (Price & Tinker, 2014:284; Richard *et al.*, 2008:47). The present study did not use a measurement scale to determine quality of life, but it was noted that a minimum of participants smoked (5.0%) and a few consumed alcohol beverages (45,0%). It was furthermore noted that pharmacists reportedly did not provide 62.5% of the participants with advice on how to lead a healthier lifestyle, even though pharmacists in a study done in England viewed the provision of lifestyle advice as important (Morton *et al.*, 2015:e26).

4.2.2.2 To determine the study population’s public health-related needs and expectations

This empirical objective was met in Manuscript Two (Chapter 3). The researcher aimed to explore whether the participants used PHS and if so, how regularly. According to Saramunee *et al.* (2015:708) public health services provided by pharmacies include screening for and monitoring of non-communicable illnesses, counselling patients on weight control and smoking cessation and monitoring blood pressure and blood sugar levels, also as seen in Table 3 of Manuscript Two of the research study. Similar PHS were provided by the CBCSS centre, including screening tests, nutrition advice and weight management advice. The researcher established that participants did not use the PHS provided by the pharmacy on a regular basis. The services most used in the pharmacy by patients were immunisation services (47.5%) and blood pressure monitoring (37.5%). The services most used at the CBCSS centre were foot care (47.5%), blood pressure monitoring (47.5%) and blood glucose measurement (30.0%). Participants had little knowledge of these services also being provided by the pharmacist. Similar results were reported in a study conducted in England, a minimum of participants (10.0%) reportedly making use of PHS and the most often utilised service being

blood pressure monitoring (12.7% of participants reportedly using this service) (Saramunee *et al.*, 2015:708). Public health services offered by pharmacies can improve cholesterol, blood pressure and blood glucose levels which indicates higher patient satisfaction rates (Melton & Lai, 2017:85). The need to promote these services was clearly highlighted by the present study, since most of the participants were not aware of these services being offered by the pharmacy. The public needs to be aware of the services provided by the pharmacy; thus, there is a need to promote these services through marketing, especially to reach patients who do not visit the pharmacy or perceive themselves as “ill” (Krska & Morecroft, 2010:33). Further studies should assess the effect of screening tests and health education on the well-being of the elderly. Finally, training programs must also be implemented in the pharmacy profession to expand PHS and especially because it will boost the confidence levels of pharmacists (Scott *et al.*, 2016:836).

4.2.3 Additional results

4.2.3.1 To determine possible problems with medication use in the study population

This empirical objective was met in Manuscript One, Two and paragraph 3.3 (Chapter 3). The Inappropriate medication use increases the chances of unwanted visits to the hospital, the amount of medication prescribed, medical expenses, ADRs, the chance of using too high or too low dosage strengths and unsuccessful treatment outcomes (Tarn *et al.*, 2006:1855). In this study, the majority of participants (65.0%) obtained their medication from a private pharmacy. Most participants (62.5%) collected their medication every month. It was found that 90,0% of participants suffered from chronic conditions. The most prevalent chronic conditions found in the study population were hypercholesterolemia (affecting 52.5% of participants), hypertension (42.5%), depression (20.0%) and diabetes mellitus (17.5%). The highest number of chronic conditions reported by individual participants was five (three participants, i.e. 7.5% of the study population, reporting this), followed by four (two participants, i.e. 5.0% of the study population, reporting this) (See Table 3-2 of Chapter 3).

A higher number of chronic illnesses leads to an increased amount of medication prescribed (Davies & O'Mahony, 2015:797). New medicine with a wider range of indications is frequently being developed (Craftman *et al.*, 2016:28). A study by Van Heerden *et al.* (2016:1010) indicated that the drugs most often inappropriately prescribed to patients according to the Beers criteria are amitriptyline, benzodiazepines, doxazosin, proton-pump inhibitors, NSAIDs, digoxin, antihistamines and oestrogen. The results of the present study showed that the top five drugs most prescribed to this elderly population were 3-hydroxy-3-methylglutaryl–

coenzyme A (HMG CoA) reductase inhibitors, salicylic acid and derivatives, diuretics, calcium-channel blockers and thyroid therapy (see Table 3-3 of Chapter 3).

Seventy percent of participants used OTC medication and 47.5% used herbal remedies as seen in paragraph 3.3.2 of Chapter 3. Davies and O'Mahony (2015:801) state that healthcare professionals should regularly confirm with their patients which OTC medication and herbal remedies they are using, especially since these products may lead to ADRs.

Factors relating to patient non-adherence in an elderly population include, *inter alia*, vague instructions on medication use, patients not participating in treatment plans, lack of patient education, high medication expenses, side effects and difficult-to-follow drug regimens (Roy *et al.*, 2017:272). Results from the present study indicated that participants expected the pharmacist to explain how to use the medication appropriately and agreed that the pharmacist did provide the necessary information needed for appropriate medication use. Ninety-five percent of the participants further indicated that the pharmacist provided useful information when explaining how to use the medication. Most of the participants (65.0%) also strongly agreed that the pharmacist provided counselling on safe and appropriate medication use. Most participants (55.0%) also strongly agreed that the pharmacist provided cost-effective alternatives for prescribed medication. Forty percent of participants did not agree with the statement that the pharmacist had identified incorrect medicine dosages even though most (50.0%) strongly agreed that they expect this of the pharmacist. Forty percent of the participants strongly agreed that the pharmacist helped solve any drug-related problems. The conclusion is that patients were mostly satisfied with the services provided by the pharmacist and received all the information needed to decrease the chances of medication non-adherence. According to Davies and O'Mahony (2015:803), successful management of medication use depends on effective communication between the patient, pharmacist and other healthcare providers. In the research study only 30.0% of participants (agreed/strongly agreed) that "the pharmacist contacted other health professionals if it was required" in comparison to the 75.0% of participants who expected this from the pharmacist. The pharmacist should expand his or her role as a healthcare provider and step away from the mere dispensing of medication to impact positively on patients' health-related quality of life (Volume *et al.*, 2001:421).

4.2.3.2 To determine elderly patients' awareness of the indication of their medicine and medication use

This empirical objective was met in Manuscript One, Two and paragraph 3.3 (Chapter 3). The elderly population differs from the younger population in that they suffer from a larger number of chronic conditions, are at greater risk of polypharmacy and ADRs, and experience more physiological changes (Davies & O'Mahony, 2015:801).

The majority of the participants noticed the expiry date on the medication (see paragraph 3.3.3), which indicates a good reflection on drug use in the elderly because according to Vlieland *et al.* (2018:234), the excessive use of medication may increase the risk that patients do not use the medication as indicated or store medication that has already expired. A previous study indicated that 16.2% of patients forgot to take their medication and 13.3% blamed a busy schedule for this (Roy *et al.*, 2017:276). The majority of the participants in the present study (60.0%) furthermore strongly agreed that they expected the pharmacist to provide techniques for self-monitoring medicine therapy and most (67.5%) also strongly agreed that they had experienced this in the pharmacy (see Table 3 of Manuscript One). Elderly patients often find it difficult to follow the directions indicated for medication use, such as taking the medication at the correct time and using the correct dosage strength (Chan *et al.*, 2013:59). In the present study, 97.5% of participants indicated that they took the medication as prescribed, for example with or without meals and administered the medication correctly. In a study in Hong Kong, 30.0% of the patients who suffered from chronic diseases did not use their medication as indicated by their physician (Chan *et al.*, 2013:59). 'Medication knowledge' was defined by Chan *et al.* (2013:56) as "*the awareness of the drug name, purpose, administration schedule, adverse effects or side-effects, or special administration instructions*". In a study by Chan *et al.* (2013:59) in Hong Kong, 73.0% of the patients had not received any advice on medication side effects or the prescribing and dispensing process during their consultation. In the present study, 67.5% of the participants who experienced side effects when taking their medication would contact their doctor, whilst 45.0% would contact their pharmacist. The majority of the participants (n=42, 67.5%) received their medication from a private pharmacy. Providing safe and correct medication information is very important when a pharmacist counsels a patient to make sure that he or she knows exactly what the medication is indicated for and how to use the medication, especially in case of the elderly.

4.3 Limitations and strengths

The study reported on in this research study is subject to certain limitations, noted below:

- The generalisability of the results to the elderly South African population is limited by the fact that the study population consisted only of first language speakers of Afrikaans and English who represent a single cultural group and who live in a specific area where they have access to one specific CBCSS centre.
- The response rate in this study was relatively low, only 40 members (26.7%) having participated. This could increase the chance of a bias in the data collected. A possible reason for the low response rate is the fact that many respondents did not complete the informed consent form correctly or changed their minds about partaking in the study during the data-gathering period.
- This study did not include an established measurement scale to determine whether participation in social activities or community-based activities improve the overall well-being of elderly individuals.

Despite its limitations, this study helped to improve awareness of the provision of PC and PHS among the elderly who participated in the study at the CBCSS centre. The study also highlighted the important role that the pharmacist plays in checking the accuracy of prescriptions dispensed to the elderly as well as their adherence to the guidelines for medicine use. Possible medication errors were highlighted in the study to help increase the elderly's understanding of the benefits of PC. The study also rendered insight into why marketing and health promotion interventions are important to both the community and pharmacy.

4.4 Recommendations

Based on the empirical and literature findings of the present study, the researcher makes the following recommendations for future studies.

- The current study focused only on the members of the CBCSS centre. It is recommended that research on elderly persons from other old aged homes be undertaken to better determine the general population's expectations and experiences. The response rate in this research study was not very high, therefore it would also be beneficial to approach a larger population group for participation in future studies.

- Elderly individuals from a wider array of cultural backgrounds should also be included in future research in order for the study population to serve as a more accurate representation of the general elderly population in North West Province.
- Future research is needed to explore the ways in which PC benefits the elderly in general and improves their quality of life. It is becoming more and more difficult to provide PC services to the elderly; therefore, researchers could also determine the barriers experienced when providing PC services to an elderly population.
- Future research is needed to determine whether CBCSS can play a role in preventing disability and promoting an independent lifestyle among the elderly.
- Future research can increase public awareness of PC and the PHS delivered by pharmacies to the elderly, through interventions and the wide marketing of these services.
- The pharmacist could play a vital role as part of the healthcare team at the CBCSS centre since one of the roles of the pharmacist is to promote health education programmes such as those focusing on the benefits of physical fitness.

4.5 Chapter summary

The aim of this study was to focus on the provision of PC and PHS in an ambulatory elderly population. The final chapter focused on summarising the conclusions that were drawn on grounds of the literature review as well as the empirical study. Looking from the literature study, it can be concluded that pharmacists play a vital role as part of a healthcare team in the provision of PC and PHS. A patient group that benefits significantly from these services is the elderly population. The researcher established that the elderly participants in the study expected most of these services to be delivered by the pharmacist. All the objectives of this research study were met, and recommendations were made for future studies. The final chapter of this dissertation is hereby concluded.

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ANNEXURE A: RECRUITMENT MATERIAL



Die doel van die navorsingstudie is om die lewering van farmaseutiese sorg en publieke gesondheidsdienste in 'n ambulante bejaarde populasie te evalueer.

'n Vergadering sal gehou word by die Potchefstroom Dienssentrum

Wanneer: Dinsdae, 10 a.m.
2 Mei en 9 Mei

Deelnemers moet:

- 01** Lede van die Potchefstroom Dienssentrum wees
- 02** Bejaarde pasiënte van die ouderdom 60 jaar en ouer
- 03** Moet Afrikaans of Engels verstaan



UITNODIGING OM DEEL TE NEEM AAN 'N NWU-NAVORSINGS-PROJEK

Lewering van farmaseutiese sorg en openbare gesondheidsdienste in 'n ambulante bejaardebevolking



'n Groot probleem in die bejaarde bevolking is die gebruik van 'n oormaat medikasie wat lei tot onnodige medikasiegebruik en daarom sal die navorsingstudie die belangrikheid van farmaseutiese sorg in die vermindering van medikasie-verwante probleme beklemtoon.

Dr. Rianda Joubert

(018) 299 4290

Rianda.Joubert@nwu.ac.za



The purpose of the research study is to evaluate the provision of pharmaceutical care and public health services in an ambulatory elderly population.

A meeting will be held at the Potchefstroom Service Centre

When: Tuesdays at 10 a.m.
2 May and 9 May

Participants should be:

01 Members of the Potchefstroom Service Centre

02 Elderly patients 60 years and above

03 Must be able to understand Afrikaans or English



INVITATION TO PARTICIPATE IN A NWU RESEARCH PROJECT

Provision of pharmaceutical care and public health services in an ambulatory elderly population.



A major problem in the elderly population is the multiple use of medication and therefore will this research study emphasise the importance of pharmaceutical care in reducing drug-related problems.

Dr. Rianda Joubert

(018) 299 4290

Rianda.Joubert@nwu.ac.za

Uitnodiging om deel te neem aan 'n NWU- navorsingsprojek



Private Bag 20001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: <http://www.nwu.ac.za>

Medicine Usage in South Africa
Tel: 018 018 299-2288
Fax: 018 087 2314105
Email: marie.lubbe@nwu.ac.za

U word uitgenooi om deel te neem aan 'n navorsingsprojek wat deel vorm van my verhandeling vir my MPharm-graad by die Potchefstroomkampus van die Noordwes-Universiteit (NWU).

Die doel van die navorsingstudie is om die lewering van farmaseutiese sorg en publieke gesondheidsdienste in 'n ambulante bejaarde populasie te evalueer.

Lokaal: 'n Vergadering sal gehou word by die Potchefstroom Dienssentrum

Wanneer: Dinsdae 10:00 AM.
2 Mei en 9 Mei

'n Groot probleem in die bejaarde bevolking is die gebruik van 'n oormaat medikasie wat lei tot onnodige medikasiegebruik en daarom sal die navorsingstudie die belangrikheid van farmaseutiese sorg in die vermindering van medikasie-verwante probleme beklemtoon.

Deelnemers moet:

- Lede van die Potchefstroom Dienssentrum wees.
- Bejaarde pasiënte van die ouderdom 60 jaar en ouer.
- Moet Afrikaans of Engels verstaan.

U kan **dr Rianda Joubert** kontak by (018) 299 4290 vir enige navrae

Ons is opgewonde om na u uit te reik

Invitation to participate in a NWU Research Project



NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
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Medicine Usage in South Africa
Tel: 018 018 299-2288
Fax: 018 0872314105
Email: marie.jubbe@nwu.ac.za

You are being invited to take part in a research project that forms part of my dissertation for an MPharm degree at the North-West University (NWU) Potchefstroom Campus.

The purpose of the research study is to evaluate the provision of pharmaceutical care and public health services in an ambulatory elderly population.

Venue: A meeting will be held at the Potchefstroom Service Centre

When: Tuesdays at 10 a.m.
2 May and 9 May

A major problem in the elderly population is the multiple use of medication and therefore will this research study emphasise the importance of pharmaceutical care in reducing drug-related problems.

Participants should be:

- Members of the Potchefstroom Service Centre
- Elderly patients 60 years and above
- Must be able to understand Afrikaans or English

You can contact **Dr Rianda Joubert** at **(018) 299 4290** if you have any queries

We are excited to reach out to you.

ANNEXURE B: AGENDA FOR CONTACT INFORMATION SESSION WITH MEMBERS OF THE POTCHEFSTROOM SERVICE CENTRE



**Agenda for initial contact meeting with member of the Potchefstroom Service Centre on Tuesday,
06 Sept. 2016 at 10 a.m. in the Potchefstroom Service Centre Community Hall.**

1. Opening and Introduction:

- 1.1. Introduction of research team

2. Study announcement

- 2.1. Give a brief background of the research study
- 2.2. Explain the purpose of the study'
- 2.3. Study population
- 2.4. Explain inclusion and exclusion criteria
- 2.5. Explain possible risks
- 2.6. Explain benefits to research study
- 2.7. Participants' responsibilities
- 2.8. Assure that participants' identity stays confidential

3. Data collection information

- 3.1. Explain the informed consent forms
- 3.2. Explain the structured questionnaire and administration of questionnaire
- 3.3. Sampling procedure

4. Ethics committee

- 4.1. Explain the role of the Ethics Committee and study leaders

5. Questions

Ms Jo-Ancobé Jaquire

Agenda vir aanvanklike kontak- en inligtingssessie met lede van die Potchefstroom Dienssentrum



NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOMKAMPUS

op Dinsdag 06 Sept. 2016 om 10 vm. by die Potchefstroom Dienssentrum se saal.

1. Opening en bekendstelling:

- 1.1. Bekendstelling van die navorser span

2. Vasstelling van sakelys

- 2.1. Gee kortliks agtergrond van die navorsings projek
- 2.2. Verduidelik die doel van die studie'
- 2.3. Studiepopulasie
- 2.4. Verduidelik die insluitings- en uitsluitingskriteria
- 2.5. Verduidelik moontlike risiko's
- 2.6. Verduidelik die voordele van die studie
- 2.7. Verantwoordelikhede van deelnemers van die studie
- 2.8. Verseker dat die identiteit van deelnemers vertroulik en anoniem sal bly.

3. Data kolleksie

- 3.1. Verduidelik aan lede die ingeligting- en toestemmingsbrosjyre
- 3.2. Verduidelik die struktuur van die vraelys en prosedure vir die afneem van die vraelyste
- 3.3. Verduidelik steekproefprosedure

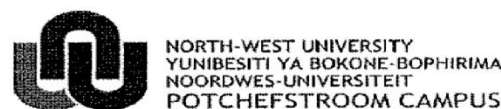
3.4. Etiekkomitee

- 3.5. Verduidelik die rol van die etiekkomitee en studieleiers

4. Vrae

Me Jo-Ancobé Jaquire

ANNEXURE C: INFORMED CONSENT



INFORMED CONSENT DOCUMENTATION FOR MEMBERS OF THE POTCHEFSTROOM SERVICE CENTRE

TITLE OF THE RESEARCH STUDY: Provision of pharmaceutical care and public health services in an ambulatory elderly population

ETHICS REFERENCE NUMBERS: To follow

PRINCIPAL INVESTIGATOR: Dr Rianda Joubert

POST-GRADUATE STUDENT: Miss Jo-Ancobé Jaquire

ADDRESS: North-West University (NWU)
Potchefstroom Campus
11 Hoffmann Street
Potchefstroom
2520

CONTACT NUMBER: (018) 299 4290

I hereby invite you to take part in a **research study** that forms part of my dissertation for an MPharm degree at the North-West University (NWU) Potchefstroom Campus. Please take a moment to read the information presented below, which explains the details of this study. You may ask the researcher or person explaining the research to you, any questions about this study that you do not fully understand. It is very important that you be fully satisfied that you clearly understand what this research is about and how you might be involved. Furthermore, your participation is **voluntary** and you are free to decline, which will not affect you negatively in any way. You are also free to withdraw from the study at any point, even if you do agree to take part at present.

This study has been approved by the **Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU – 00354–16–S1)** and will be conducted according to the ethical guidelines and principles of Ethics in Health Research: Principles, Processes and Structures (DoH, 2015), and other international ethical guidelines applicable to this study. It might be necessary for the Research Ethics Committee members or other relevant people to inspect the research records.

What is this research study about?

- *This study will be conducted at the Potchefstroom Service Centre (PSC), at a time convenient for the participant, and will involve a face-to-face interview between researcher and participant, using a structured (pre-set) questionnaire, at the PSC, the participant's residence or other place of choice, with experienced health researchers. A minimum of 150 participants will be included in this study.*
- *We plan to evaluate the provision of medication to the elderly population to improve health, also known as pharmaceutical care and public health services:*
 - *To determine possible problems in medication usage of the study population.*
 - *To determine elderly patients' awareness about public health information regarding their medicine and medication use.*
 - *To determine their view and understanding regarding the provision of medication, usage and pharmaceutical services provided by the pharmacist.*
 - *To determine whether secondary services, for example, social activities, cultural activities and fitness activities provided by the PSC, have an influence on the well-being of participants.*
 - *To determine their related needs and expectations for health improvement, also known as public health.*

Why have you been invited to participate?

- *You have been invited to participate in this research because you are a member of the PSC.*
- *You also match the criteria of the research because:*
 - *You are a male or female over 60 years of age.*
 - *You are using the services of the Potchefstroom Service Centre.*
 - *You are able to communicate in English or Afrikaans.*
 - *You are responsible for collection and administration of your medication.*
- *You will not be able to take part in this research if:*
 - *You are not able to make your own decisions after the necessary information, advice and support has been given to assist you.*
 - *You do not sign the informed consent form.*

What will be expected of you?

- *To be available for an appointment at your residence or at the PSC to complete a structured questionnaire consisting of 10 sections. The interview will take an estimated 60 minutes to complete. Your identity will remain anonymous. The researcher will conduct the interview..*

Will you benefit anything from taking part in this research?

- *Your benefit will be in the researcher being in the position to inform you that you need to see your doctor, should the research findings reveal that your medication is not being used as prescribed. The members of the PSC will gain a better understanding of the importance of a pharmacist's role in improving medication use, also known as pharmaceutical care, and multiple disease/drug use (more than one).*
- *The other benefits of the study will be:*
 - *Pharmaceutical care (medication-related care with the aim to improve a positive outcome and quality of life) focuses on improving a patient's wellbeing and will therefore help participants' achieve this, and to receive better care.*
 - *The participants will gain insight into the management of medication (pharmaceutical care) in elderly patients during the course of completing the questionnaire.*
 - *A major problem in the elderly population is the multiple use of medication (use of more clinically prescribed medication than what is necessary); this research study will therefore emphasise the importance of pharmaceutical care in reducing drug-related problems.*
 - *The PSC will have a better insight into the role a pharmacist can play in pharmaceutical care and to what the pharmacist can provide to improve health outcomes in the elderly population.*
 - *Participants will only become aware of the role that the pharmacist can play in pharmaceutical care – which information or knowledge can be obtained from their pharmacist.*
 - *The researcher will be in the position to inform participants of any possible problems or advantages of medicine use during the completion of the questionnaire or at the feedback meeting.*

Are there risks involved in you taking part in this research and what will be done to prevent them?

- *The risks you take in this study are moderate but will be limited if precautions are adhered to.*

You may feel that the research study is an invasion of your privacy, but the researcher will ensure that the collected data contains no information that could identify you and that the data will be kept in a secure place to which only the researcher and study leader have access. The study will take place at your residence or the PSC

You may feel that the research study will be time-consuming, but the questionnaires will take no longer than approximately 60 minutes to complete. If you feel vulnerable or uncomfortable, the researcher will assure you that your personal information will remain anonymous and that you have the right to withdraw from the research study at any stage. There will also be intervals between the interviews to prevent weariness. Information received will only be used for the research study.

- *There are more benefits than risks in joining this study.*

How will we protect your confidentiality and who will see your findings?

- *Anonymity of your findings will be protected by ensuring that no patient information, for example personal information, such as name, surname, identification number or address can be tracked back to you. Your privacy will be respected by the researcher, study leaders and statistician. Your results will be kept confidential by the researcher, who will prevent any of your personal information from being linked to you or your information being available to other people. Contact sessions held at the PSC will be in a private office to ensure confidentiality. Only the researchers, study leaders and statistician will be able to look at the findings. Findings will be kept safe by storing hard copies in locked cupboards in the researcher's office and electronic data will be password protected. Data will be stored for seven years, after which all the data (hard copies as well as electronic) will be destroyed under the supervision of the research assistant of the research entity MUSA.*

What will happen with the findings or samples?

- *The findings of this study will only be used for this study and no other future studies.*

How will you find out about the results of this research?

- *We will give you the results of this research as soon as the study is completed by the researcher.*
- *You will be informed of any new relevant findings at a feedback meeting.*

Will you be paid to take part in this study and are there any costs for you?

No, you will not be paid to take part in the study, but refreshments will be served at the initial contact meeting, as well as at the feedback meeting, once the study is completed. There will therefore be no costs involved for you, if you do take part in this study.

Is there anything else that you should know or do?

- *You can contact Dr Rianda Joubert at (018) 299 4290 if you have any further questions or problems.*
- *You can also contact the Health Research Ethics Committee via Mrs Carolien van Zyl at (018) 299 1206 or carolien.vanzyl@nwu.ac.za if you have any concerns that were not answered or if you have complaints about the research.*
- *You will receive a copy of this information and the consent form for your own purposes.*

Declaration by participant

By signing below, I agree to take part in the research study titled: Provision of pharmaceutical care and public health services in an ambulatory elderly population.

I declare that:

- I have read this information/it was explained to me by a trusted person in a language with which I am fluent and comfortable.
- The research was clearly explained to me.
- I have had a chance to ask questions to both the person getting the consent from me, as well as the researcher and all my questions have been answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be handled in a negative way if I do so.
- I may be asked to leave the study before it is finished, if the researcher feels it is in the best interest, or if I do not follow the study plan, as agreed to.

Signed at (place) on (date) 20....

.....
Signature of participant

.....
Signature of witness

I would like to participate in the structured questionnaire at: (Tick the relevant option please)

My residence(Tick if YES)	At the Potchefstroom Service Centre(Tick if YES)
------------------------------------	---

Contact information:

Declaration by person obtaining consent

I (name) declare that:

- I clearly and in detail explained the information in this document to

- I did not use an interpreter.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I gave him/her time to discuss it with others if he/she wished to do so.

Signed at (*place*) on (*date*) 20....

.....
Signature of person obtaining consent

.....
Signature of witness

Declaration by researcher

I (*name*) declare that:

- I explained the information in this document to
- I did not use an interpreter
- I encouraged him/her to ask questions and took adequate time to answer them
or I was available should he/she want to ask any further questions.
- The informed consent was obtained by an independent person.
- I am satisfied that he/she adequately understands all aspects of the research, as described above.
- I am satisfied that he/she had time to discuss it with others if he/she wished to do so.

Signed at (*place*) on (*date*) 20....

.....
Signature of researcher

.....
Signature of witness



NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Health Research Ethics Committee

Faculty of Health Sciences
NORTH-WEST University
(Potchefstroom Campus)

2017 -04- 03

HREC Stamp

INFORMED CONSENT DOCUMENTATION FOR MEMBERS OF THE POTCHEFSTROOM SERVICE CENTRE

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 - *You do not sign the informed consent form.*

What will be expected of you?

- *To be available for an appointment at your residence or at the PSC to complete a structured questionnaire consisting of 10 sections. The interview will take an estimated 60 minutes to complete. Your identity will remain anonymous. The researcher will conduct the interview..*

Will you benefit anything from taking part in this research?

- *Your benefit will be in the researcher being in the position to inform you that you need to see your doctor, should the research findings reveal that your medication is not being used as prescribed. The members of the PSC will gain a better understanding of the importance of a pharmacist's role in improving medication use, also known as pharmaceutical care, and multiple disease/drug use (more than one).*
- *The other benefits of the study will be:*
 - *Pharmaceutical care (medication-related care with the aim to improve a positive outcome and quality of life) focuses on improving a patient's wellbeing and will therefore help participants' achieve this, and to receive better care.*
 - *The participants will gain insight into the management of medication (pharmaceutical care) in elderly patients during the course of completing the questionnaire.*
 - *A major problem in the elderly population is the multiple use of medication (use of more clinically prescribed medication than what is necessary); this research study will therefore emphasise the importance of pharmaceutical care in reducing drug-related problems.*
 - *The PSC will have a better insight into the role a pharmacist can play in pharmaceutical care and to what the pharmacist can provide to improve health outcomes in the elderly population.*
 - *Participants will only become aware of the role that the pharmacist can play in pharmaceutical care – which information or knowledge can be obtained from their pharmacist.*
 - *The researcher will be in the position to inform participants of any possible problems or advantages of medicine use during the completion of the questionnaire or at the feedback meeting.*

Are there risks involved in you taking part in this research and what will be done to prevent them?

- *The risks you take in this study are moderate but will be limited if precautions are adhered to.*

You may feel that the research study is an invasion of your privacy, but the researcher will ensure that the collected data contains no information that could identify you and that the data will be kept in a secure place to which only the researcher and study leader have access. The study will take place at your residence or the PSC

You may feel that the research study will be time-consuming, but the questionnaires will take no longer than approximately 60 minutes to complete. If you feel vulnerable or uncomfortable, the researcher will assure you that your personal information will remain anonymous and that you have the right to withdraw from the research study at any stage. There will also be intervals between the interviews to prevent weariness. Information received will only be used for the research study.

- *There are more benefits than risks in joining this study.*

How will we protect your confidentiality and who will see your findings?

- *Anonymity of your findings will be protected by ensuring that no patient information, for example personal information, such as name, surname, identification number or address can be tracked back to you. Your privacy will be respected by the researcher, study leaders and statistician. Your results will be kept confidential by the researcher, who will prevent any of your personal information from being linked to you or your information being available to other people. Contact sessions held at the PSC will be in a private office to ensure confidentiality. Only the researchers, study leaders and statistician will be able to look at the findings. Findings will be kept safe by storing hard copies in locked cupboards in the researcher's office and electronic data will be password protected. Data will be stored for seven years, after which all the data (hard copies as well as electronic) will be destroyed under the supervision of the research assistant of the research entity MUSA.*

What will happen with the findings or samples?

- *The findings of this study will only be used for this study and no other future studies.*

How will you find out about the results of this research?

- *We will give you the results of this research as soon as the study is completed by the researcher.*
- *You will be informed of any new relevant findings at a feedback meeting.*

Will you be paid to take part in this study and are there any costs for you?

No, you will not be paid to take part in the study, but refreshments will be served at the initial contact meeting, as well as at the feedback meeting, once the study is completed. There will therefore be no costs involved for you, if you do take part in this study.

Is there anything else that you should know or do?

- *You can contact Dr Rianda Joubert at (018) 299 4290 if you have any further questions or problems.*
- *You can also contact the Health Research Ethics Committee via Mrs Carolien van Zyl at (018) 299 1206 or carolien.vanzyl@nwu.ac.za if you have any concerns that were not answered or if you have complaints about the research.*
- *You will receive a copy of this information and the consent form for your own purposes.*

Declaration by participant

By signing below, I agree to take part in the research study titled: Provision of pharmaceutical care and public health services in an ambulatory elderly population.

I declare that:

- I have read this information/it was explained to me by a trusted person in a language with which I am fluent and comfortable.
- The research was clearly explained to me.
- I have had a chance to ask questions to both the person getting the consent from me, as well as the researcher and all my questions have been answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be handled in a negative way if I do so.
- I may be asked to leave the study before it is finished, if the researcher feels it is in the best interest, or if I do not follow the study plan, as agreed to.

Signed at (place) on (date) 20....

.....
Signature of participant

.....
Signature of witness

I would like to participate in the structured questionnaire at: (Tick the relevant option please)

My residence(Tick if YES)	At the Potchefstroom Service Centre(Tick if YES)
------------------------------------	---

Contact information:

Declaration by person obtaining consent

I (name) declare that:

-
- I clearly and in detail explained the information in this document to

- I did not use an interpreter.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I gave him/her time to discuss it with others if he/she wished to do so.

Signed at (*place*) on (*date*) 20....

.....
Signature of person obtaining consent

.....
Signature of witness

Declaration by researcher

I (*name*) declare that:

- I explained the information in this document to
- I did not use an interpreter
- I encouraged him/her to ask questions and took adequate time to answer them
or I was available should he/she want to ask any further questions.
- The informed consent was obtained by an independent person.
- I am satisfied that he/she adequately understands all aspects of the research, as described above.
- I am satisfied that he/she had time to discuss it with others if he/she wished to do so.

Signed at (*place*) on (*date*) 20....

.....
Signature of researcher

.....
Signature of witness

ANNEXURE D: STRUCTURED QUESTIONNAIRE



NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: <http://www.nwu.ac.za>

Medicine Usage in South Africa
Tel: 018 018 299-2288
Fax: 018 0872314105
Email: marie.lubbe@nwu.ac.za

Provision of pharmaceutical care and public health services in an ambulatory elderly population

A: Personal information

1. Gender:	1. Male		2. Female	
2. Age (years):	1. ≥ 60 to ≤ 69		2. ≥ 70 to ≤ 79	3. 80+
3. Home language:	1. English		2. Afrikaans	3. Other
4. Marital status:	1. Married	2. Divorced	3. Widowed	4. Single
5. Living conditions:	1. House	2. Apartment	3. With children	4. Old age home
6. Highest level of education:	1. Primary school	2. High school	3. University	4. Other
7. Member of medical aid:	1. Yes		2. No	

B: General health

1. Do you suffer from any chronic diseases?	1. Yes	2. No														
2. If yes, which chronic conditions do you have? (More than one may apply)	<table border="1"> <tr><td>1. Alzheimer's disease</td><td></td></tr> <tr><td>2. Arthritis</td><td></td></tr> <tr><td>3. Asthma</td><td></td></tr> <tr><td>4. Heart disease</td><td></td></tr> <tr><td>5. Cataracts</td><td></td></tr> <tr><td>6. Hypercholesterolaemia</td><td></td></tr> <tr><td>7. Dementia</td><td></td></tr> </table>		1. Alzheimer's disease		2. Arthritis		3. Asthma		4. Heart disease		5. Cataracts		6. Hypercholesterolaemia		7. Dementia	
1. Alzheimer's disease																
2. Arthritis																
3. Asthma																
4. Heart disease																
5. Cataracts																
6. Hypercholesterolaemia																
7. Dementia																

8. Depression	
9. Diabetes Mellitus	
10. Epilepsy	
11. Hypertension	
12. Kidney and bladder problems	
13. Osteoporosis	
14. Parkinson's disease	
15. Rheumatoid arthritis	
Other:	
1.	
2.	

3. What is your blood pressure?

1. Systolic:	2. Diastolic:	3. Not sure:

4. What is your cholesterol level?

1. Cholesterol level:	2. Not sure:

5. Currently smoking:

1. Yes	2. No
--------	-------

6. Alcohol user:

1. Yes	2. No
--------	-------

7. If you answered yes to the above question, please state how often you drink alcohol.

1. Daily	2. 1 to 3 times per week	3. 1 to 4 times per month	4. Less than once per month
----------	--------------------------	---------------------------	-----------------------------

8. How much caffeine (coffee / tea / energy boosters / energy drinks) do you drink in a week?

1. I do not drink caffeinated beverages	2. Less than 1 a week	3. 1 a week	4. Every other day	5. 1 to 2 a day	6. 3 or more a day
---	-----------------------	-------------	--------------------	-----------------	--------------------

9. Condition of your health:

1. Excellent	2. Very good	3. Good	4. Fair	5. Poor
--------------	--------------	---------	---------	---------

C: Medication information

1. How many chronic and acute types of medication are you currently using?

	Chronic	Acute
Number of prescribed medications		
Number of over-the-counter medications		
Number of herbal remedies used		

2. List of current medication being used:

Medication (acute or chronic)	Dosage strength	What is the medication used for?	Where do you store the medication?
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

3. Do you know the purpose of each drug that you use?

1. Yes	2. No
--------	-------

4. When you have any questions concerning medication usage, who do you ask?

(Please tick if relevant, more than one may apply)

1. Doctor	2. Nurse	3. Pharmacist	4. Friend / family member	5. Potchefstroom Service Centre	6. Other
-----------	----------	---------------	---------------------------	---------------------------------	----------

5. Have you ever experienced any side effects when using medication?

1. Yes	2. No
--------	-------

6. Who did you contact when you experienced a side-effect?

(Please tick if relevant, more than one may apply)

1. Doctor	2. Nurse	3. Pharmacist	4. Friend / family member	5. Potchefstroom Service Centre	6. Other
-----------	----------	---------------	---------------------------	---------------------------------	----------

7. Do you have any medicine allergies?

1. Yes	2. No
--------	-------

8. If you answered "Yes" to question 7 above, please specify the medicine:

9. Observations when taking medication:

1. Have you ever received the wrong medication from your pharmacist?	1. Yes	2. No
2. Have you ever received the wrong dosage strength of medication from your pharmacist?	1. Yes	2. No
3. Labelling on the medication was clear, for example the administration route, number of tablets, etc.	1. Yes	2. No
4. Do you look at the expiry date on your medication?	1. Yes	2. No
5. Do you take your medication as prescribed in terms of whether it should be taken before, after or with food?	1. Yes	2. No
6. Have you ever forgotten to take your medication? (If "Yes" go to point 10 of section C)	1. Yes	2. No

-
10. If you answered "Yes" to 9.6 above, please state your reason for forgetting to take your medication.
-
-

D: Health service information

1. Where do you obtain your medication? (More than 1 may apply)

1. General practitioner	2. Private specialist	3. Public hospital's pharmacy (i.e. MediRite)	4. Nurse in public clinic
5. Private pharmacy	6. Specialist at public hospital		
7. Other			
7.1.....			
7.2.....			
7.3.....			

2. How often do you make use of pharmaceutical services (i.e. services provided by the pharmacy) as indicated above?

1. Every month	2. Every 3 months	3. Every 6 months	4. Every 9 month	5. Never
----------------	-------------------	-------------------	------------------	----------

E: Patient satisfaction at pharmacy

1. Was the name of the person helping you in the pharmacy easily identified on his/her tag?	1. Yes	2. No
2. Was the pharmacy clean and tidy?	1. Yes	2. No
3. Is there a private area available for consultation?	1. Yes	2. No
4. Was the pharmacist friendly when assisting you?	1. Yes	2. No
5. Did the pharmacist provide useful information when explaining to you how to use your medication?	1. Yes	2. No
6. Did the pharmacist provide advice on leading a healthier lifestyle?	1. Yes	2. No
7. Did the pharmacist provide advice on your current health problem?	1. Yes	2. No
8. After talking to your pharmacist, did you want to know more about the medication you are taking?	1. Yes	2. No
9. Did the pharmacist explain to you your treatment plan in a way that you could understand?	1. Yes	2. No
10. Did the pharmacist ask you if you are currently using any other medication?	1. Yes	2. No
11. Did the pharmacist provide advice on disposing of medicine you no longer need?	1. Yes	2. No

F: Pharmaceutical care: Assessment

Strongly disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly agree 5		Strongly disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly agree 5
What do you expect from the pharmacist when visiting the pharmacy?						What was your experience of the pharmacist's care when visiting the pharmacy?				
					1. The pharmacist analysed my personal, medication and disease information.					
					2. The pharmacist asked me if I am allergic to any medication.					
					3. The pharmacist discussed with me the medication I am currently using.					
					4. The pharmacist asked me if I am using any other medication.					
					5. The pharmacist identified potential and current drug-related problems.					
					6. The pharmacist contacted other health professionals if it was required.					
					7. The pharmacist identified incorrect medicine dosage(s).					
					8. The pharmacist asked me if I had any concerns about my medication.					

Pharmaceutical care: Care plan

Strongly disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly agree 5		Strongly disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly agree 5
What is expected when visiting the pharmacy?						What was your experience when visiting the pharmacy?				
					1. The pharmacist provided me with information about my illness, for example brochures or other forms of written information.					
					2. The pharmacist explained to me how to take my medication properly.					
					3. The pharmacist provided techniques for self-monitoring medicine therapy.					
					4. The pharmacist set goals for my treatment (e.g. decrease blood pressure to under 140/90 mmHg)					
					5. The pharmacist provided me with a written care plan to manage my medication usage.					
					6. The pharmacist helped me to solve any drug related problems.					
					7. The pharmacist provided me with counselling about my medicine.					

Pharmaceutical care: Follow-up

Strongly disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly agree 5		Strongly disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly agree 5
What is expected when visiting the pharmacy?						What was your experience when visiting the pharmacy?				
					1. The pharmacist asked me whether my medical conditions are improving.					
					2. The pharmacist asked me whether I experienced any side effects when using my medication.					
					3. The pharmacist arranged a follow-up session with you.					
					4. The pharmacist repeated the process if your goals were not achieved.					

G: Expectations and experiences when visiting the pharmacy

Strongly disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly agree 5		Strongly disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly agree 5
What is expected when visiting the pharmacy?						What was your experience when visiting the pharmacy?				
					1. The pharmacist was polite and listened to what was asked.					
					2. The pharmacist was able to respond to any queries I had.					
					3. The service I received from the pharmacist was good/efficient.					
					4. The pharmacist is a reliable source of general drug information.					
					5. The pharmacist is a reliable source of clinical drug information (i.e. information regarding the clinical use of drugs in specific patient situations).					
					6. The pharmacist counselled me regarding the safe and appropriate use of medication.					
					7. The pharmacist informed me about more cost-effective alternatives to the drugs prescribed.					

H: Primary services provided by the PSC

1. Do you use any of the following services rendered by the clinic? (If "Yes", please state how often.)

			How often do you use the service?			
YES	NO	Primary services	Daily	Weekly	Monthly	Yearly
Yes	No	1. Blood glucose measurement				
Yes	No	2. Blood pressure measurement				
Yes	No	3. Ear wax removal				
Yes	No	4. Foot care, including treatment of toenails, calluses, corns and other minor foot problems.				
Yes	No	5. Haemoglobin control				
Yes	No	6. Weight control				
Yes	No	7. Wound care				

I: Secondary services provided by the PSC

1. Do you use any of the following secondary services? (If "Yes", please state how often.)

			How often do you use the services?			
YES	NO	Secondary services	Daily	Weekly	Monthly	Yearly
Physical activities						
Yes	No	1. Trimgym				
Yes	No	2. Line dancing				
Yes	No	3. Bowling				
Social activities						
Yes	No	1. Bridge				
Yes	No	2. Rummikub				
Yes	No	3. Suduko				
Cultural activities						
Yes	No	1. Arts				
Yes	No	2. Mooirivier Singing Group				

J: Pharmaceutical services provided by the pharmacy

1. Do you use any of the following pharmacy services? (If "Yes ", please state how often.)

			How often do you use the services?			
YES	NO	Primary services	Daily	Weekly	Monthly	Yearly
Yes	No	1. Blood pressure monitoring				
Yes	No	2. Cholesterol monitoring				
Yes	No	3. Measuring of blood sugar levels				
Yes	No	4. Glucose monitoring				
Yes	No	5. Immunisation services				
Yes	No	6. Nutrition advice				
Yes	No	7. Peak flow test				
Yes	No	8. Advice on smoking cessation				
Yes	No	9. Urine analysis				

Die lewering van farmaseutiese sorg en openbare gesondheidsorgdienste in 'n steeds beweeglike bejaarde populasie

A: Persoonlike inligting

1. Geslag:
2. Ouderdom (jaar):
3. Huistaal:
4. Huwelikstatus:
5. Woon-omstandighede:
6. Hoogste vlak van opleiding:
7. Lid van mediese fonds:

1. Manlik		2. Vroulik	
1. ≥60 tot ≤69		2. ≥70 tot ≤79	
3. 80+			
1. Engels		2. Afrikaans	
3. Ander			
1. Getroud	2. Geskei	3. Weduwee / Wewenaar	3. Enkellop end
1. Huis	2. Woonstel	3. By kinders	4. Ouetehuis
1. Primêre skool	2. Hoër skool	3. Universiteit	4. Ander
1. Ja		2. Nee	

B: Algemene gesondheid

1. Lei u aan enige kroniese siekte?

1. Ja	2. Nee
-------	--------

2. Indien ja, dui asseblief aan watter siekte. (Meer as een kan van toepassing wees)

1. Alzheimer se siekte	
2. Artritis	
3. Asma	
4. Cholesterol	
5. Hartsiekte	
6. Katarakte	
7. Demensie	
8. Depressie	

9. Diabetes	
10. Epilepsie	
11. Hipertensie	
12. Nier en blaas probleme	
13. Osteoporose	
14. Parkinson se siekte	
15. Rumatoïede artritis	
Ander:	
1.	
2.	

3. Wat is u bloeddrukvlak?

1. Sistolies:	2. Diastolies:	3. Nie seker nie:

4. Wat is u cholesterol vlak?

1. Cholesterol vlak	2. Nie seker nie:

5. Huidige roker:

1. Ja	2. Nee
-------	--------

6. Alkoholgebruiker:

1. Ja	2. Nee
-------	--------

7. Indien u "ja"geantwoord het op die vorige vraag, hoe gereeld is u alkohol-inname?

1. Daaglik	2. 1 tot 3 keer per week	3. 1 tot 4 keer per week	4. Minder as 1 keer per maand
------------	--------------------------	--------------------------	-------------------------------

8. Hoeveel kafeïen (koffie / tee / energie-versterkers/opkikkers / energie-drinkies) drink u per week?

1. Ek drink nie enige gekafeïeneerde verversings nie.	2. Minder as 1 per week	3. 1 per week	4. 1 tot 2 per dag	5. 3 of meer per dag
---	-------------------------	---------------	--------------------	----------------------

9. Hoe sou u, u eie gesondheid beskryf?

1. Uitstekend	2. Baie goed	3. Goed	4. Redelik	5. Swak
---------------	--------------	---------	------------	---------

C: Medikasie-inligting

1. Hoeveel soorte kroniese en akute medikasie gebruik u?

	Kronies	Akuut
Aantal soorte voorgeskryfde medikasie		
Aantal soorte oor-die-toonbank medikasie		
Aantal kruiemiddels gebruik		

2. Lys die medikasie wat u tans gebruik.

Medikasie (akuut of kronies)	Doseringsterkte	Rede vir gebruik van medikasie	Waar stoor u, u medikasie?
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

3. Weet u wat die doel is van elke soort medikasie wat u gebruik?

1. Ja	2. Nee
-------	--------

4. As u enige vrae het met betrekking tot medikasie gebruik, wie vra u? (Merk asb. indien relevant, meer as een opsie)

1. Dokter	2. Verpleegster	3. Apteker	4. Vriende / familielede	5. Potchefstroom Dienssentrum	6. Ander
-----------	-----------------	------------	-----------------------------	----------------------------------	----------

5. Het u al enige newe-effekte ervaar met die gebruik van medikasie?

1. Ja	2. Nee
-------	--------

6. Wie het u gekontak toe u newe-effekte ervaar het? (Merk asb. indien relevant, meer as een opsie)

1. Dokter	2. Verpleegster	3. Apteker	4. Vriende / Familielede	5. Potchefstroom Dienssentrum	6. Ander
-----------	-----------------	------------	-----------------------------	----------------------------------	----------

7. Het u enige medikasieverwante allergieë?

1. Ja	2. Nee
-------	--------

8. Indien u "Ja" geantwoord het op vraag 7 hierbo, verduidelik asseblief watter medikasie u voor allergies is:

9. Waarneming by die neem van medikasie:

1. Het u al ooit die verkeerde medikasie ontvang van u apteker?	1. Ja	2. Nee
2. Het u al ooit die verkeerde sterkte dosering ontvang van u apteker?	1. Ja	2. Nee
3. Etikettering op die medikasie was duidelik, bv. Inligting oor die toedieningsroete, aantal tablette ens.	1. Ja	2. Nee
4. Kyk u ooit na die vervaldatum wat aangedui is op u medikasie?	1. Ja	2. Nee

5. Neem u, u medikasie soos aangedui in terme van of dit voor, na of met kos geneem moet word?	1. Ja	2. Nee
6. Het u al ooit vergeet om u medikasie te neem? (Indien "Ja" beantwoord ook asb punt 10 van afdeling C)	1. Ja	2. Nee

10. Indien u "Ja" geantwoord het by punt 9.6 hierbo, verduidelik asb. waarom u al vergeet het om u medikasie te neem.

D: Gesondheidsdiensinligting

1. Waar verkry u, u medisyne? (Meer as een opsie kan van toepassing wees)

1. Algemene praktisyn	2. Privaat spesialis	3. Publieke hospitaal se apteek (d.i. MediRite)	4. Verpleegster in publieke kliniek
5. Privaat-apteek	6. Spesialis by publieke hospitaal		
7. Ander			
7.1.....			
7.2.....			
7.3.....			

2. Hoe gereeld maak u gebruik van die dienste soos aangedui hier bo?

1. Elke maand	2. Elke 3 maande	3. Elke 6 maande	4. Elke 9 maande	5. Nooit
---------------	------------------	------------------	------------------	----------

E: Pasiënt-tevredenheid by apteek

1. Was die persoon wat u in die apteek gehelp het se naam maklik identifiseerbaar op sy/haar naamplaatjie?	1. Ja	2. Nee
2. Was die apteek skoon en netjies?	1. Ja	2. Nee
3. Was daar 'n private kamer beskikbaar vir konsultasies?	1. Ja	2. Nee
4. Was die apteker vriendelik toe hy/sy u gehelp het?	1. Ja	2. Nee
5. Het die apteker die nodige inligting voorsien oor u medikasiegebruik?	1. Ja	2. Nee
6. Het die apteker advies verskaf oor hoe om 'n gesonder leefstyl te volg?	1. Ja	2. Nee
7. Het die apteker advies verskaf aangaande u huidige gesondheidsprobleem?	1. Ja	2. Nee
8. Nadat u met die apteker gepraat het, wou u meer weet oor die medikasie wat u neem?	1. Ja	2. Nee
9. Het die apteker dinge vir u verduidelik op 'n manier wat u maklik kon verstaan?	1. Ja	2. Nee
10. Het die apteker vir u gevra of u tans enige ander medikasie gebruik?	1. Ja	2. Nee
11. Het die apteker advies verskaf oor hoe om ontslae te raak van medikasie wat u nie meer gebruik nie?	1. Ja	2. Nee

F: Farmaseutiese sorg: Assessering

Stem glad nie saam nie 1	Stem nie saam nie 2	Onseker 3	Stem saam 4	Stem heeltem al saam 5		Stem glad nie saam nie 1	Stem nie saam nie 2	Onseker 3	Stem saam 4	Stem heeltem al saam 5
Wat was u verwagtinge voor u besoek aan die apteek?						Wat was u ervaring toe u die apteek besoek het?				
					1. Die apteker het my persoonlike, medikasie en siekte-inligting geanaliseer.					
					2. Die apteker het my gevra of ek allergies is vir enige van my medikasie.					
					3. Die apteker het die medikasie wat ek tans gebruik met my bespreek.					
					4. Die apteker het vir my gevra of ek enige ander medikasie gebruik.					
					5. Die apteker het potensiële en huidige medikasieverwante probleme geïdentifiseer.					
					6. Die apteker het die verkeerde voorgeskryfde dosis(se) medikasie geïdentifiseer.					
					7. Die apteker het ander gesondheidswerkers gekontak waar nodig.					
					8. Die apteker het my gevra of ek enige bekommernisse het aangaande my medikasie					

Farmaseutiese sorg: Sorg plan

Stem glad nie saam nie 1	Stem nie saam nie 2	Onseker 3	Stem saam 4	Stem heeltem al saam 5		Stem glad nie saam nie 1	Stem nie saam nie 2	Onseker 3	Stem saam 4	Stem heeltem al saam 5
Wat was u verwagtinge voor u besoek aan die apteek?						Wat was u ervaring toe u die apteek besoek het?				
					1. Die apteker het vir my inligting verskaf aangaande my siekte, byvoorbeeld brosjures of ander geskrewe inligting.					
					2. Die apteker het aan my verduidelik hoe om my medikasie reg te gebruik.					
					3. Die apteker het vir my generiese medikasie aangebied.					
					4. Die apteker het 'n doelwit vir my behandeling gestel (bv. verlaag bloeddruk tot onder 140/90 mmHg)					
					5. Die apteker het my 'n skriftelike sorg plan verskaf om my medikasie gebruik te help bestuur.					
					6. Die apteker het my gehelp om enige medikasie-verwante probleme op te los.					
					7. Die apteker het voorligting verskaf aangaande medikasie-gebruik.					

Farmaseutiese sorg: Evaluering

Stem glad nie saam nie 1	Stem nie saam nie 2	Onseker 3	Stem saam 4	Stem heeltem al saam 5		Stem glad nie saam nie 1	Stem nie saam nie 2	Onseker 3	Stem saam 4	Stem heeltem al saam 5
Wat was u verwagtinge voor u besoek aan die apteek?						Wat was u ervaring toe u die apteek besoek het?				
					1. Die apteker het my gevra of my mediese toestand verbeter het.					
					2. Die apteker het my gevra of ek enige nuwe-effekte ervaar het met die gebruik van my medikasie.					
					3. Die apteker het 'n opvolg-sessie gereël.					
					4. Indien die doelwitte nie bereik is nie, het die apteker die proses herhaal.					

G: Verwagtinge en ervaring tydens u besoek aan die apteek.

Stem glad nie saam nie 1	Stem nie saam nie 2	Onseker 3	Stem saam 4	Stem heeltem al saam 5		Stem glad nie saam nie 1	Stem nie saam nie 2	Onseker 3	Stem saam 4	Stem heeltem al saam 5
Wat was u verwagtinge voor u besoek aan die apteek?						Wat was u ervaring toe u die apteek besoek het?				
					1. Die apteker was beleefd en het geluister na wat gesê is.					
					2. Die apteker was in staat om te reageer op enige navrae wat ek gehad het.					
					3. Die diens wat ek ontvang het van die apteker was goed.					
					4. Die apteker is 'n betroubare bron van algemene inligting rakende medikasie-gebruik.					
					5. Die apteker is 'n betroubare bron van kliniese inligting rakende medikasie (d.i. inligting met betrekking tot die kliniese gebruik van medikasie in spesifieke pasiënt-situasies).					
					6. Die apteker het raad verskaf aangaande die veilige en korrekte gebruik van medikasie.					
					7. Die apteker het my ingelig oor meer koste-effektiewe alternatiewe vir die medikasie wat ek gebruik.					

H: Primêre dienste gelewe deur die PDS

1. Het u van enige van die volgende dienste gebruik gemaak by die kliniek? (Indien "Ja" sê ook asb, hoe gereeld u die diens gebruik)

			Hoe gereeld maak u gebruik van die dienste?			
JA	NEE	Primêre dienste	Daaglik	Weeklik	Maandelik	Jaarlik
Ja	Nee	1. Meet van bloedglukosevlakke				
Ja	Nee	2. Meet van bloeddrukvlakke				
Ja	Nee	3. Oor-uitspoelings				
Ja	Nee	4. Voetsorg (insluitend die behandeling van ingroei-toonnaels, eelte, liddorings en ander klein voetprobleme)				
Ja	Nee	5. Hemoglobienkontrole				
Ja	Nee	6. Gewigkontrole				
Ja	Nee	7. Wondorg				

I: Sekondêre dienste wat deur die PDS aangebied word

1. Maak u gebruik van die volgende sekondêre dienste? (Indien "Ja" sê ook asb hoe gereeld u die diens gebruik.)

			Hoe gereeld maak u gebruik van die dienste?			
JA	NEE	Sekondêre dienste	Daaglik	Weeklik	Maandelik	Jaarlik
Fisiese aktiwiteite						
Ja	Nee	1. Trimgim				
Ja	Nee	2. Lyndans				
Ja	Nee	3. Rolbal				
Sosiale aktiwiteite						
Ja	Nee	1. Brug				
Ja	Nee	2. Rummikub				
Ja	Nee	3. Suduko				
Kulturele aktiwiteite						
Ja	Nee	1. Kuns				
Ja	Nee	2. Mooirivier Sanggroep				

J: Farmaseutiese dienste wat gelewer word deur die apteek

1. Maak u gebruik van enige van die volgende dienste wat deur die apteek verskaf word? (Indien "Ja" sê ook asb, hoe gereeld u die diens gebruik.)

			Hoe gereeld maak u gebruik van die dienste?			
JA	NEE	Primêre dienste	Daagliks	Weekliks	Maandeliks	Jaarliks
Ja	Nee	1. Bloeddrukmonitering				
Ja	Nee	2. Cholesterolmonitering				
Ja	Nee	3. Bloedsuikertoetse				
Ja	Nee	4. Glukose-monitering				
Ja	Nee	5. Immuniseringsdienste				
Ja	Nee	6. Voedingsadvies				
Ja	Nee	7. Piekvloei-metings				
Ja	Nee	8. Advies rakende hoe om op te hou rook				
Ja	Nee	9. Uriene-analise				

ANNEXURE E: AUTHOR GUIDELINES: DRUGS & AGING

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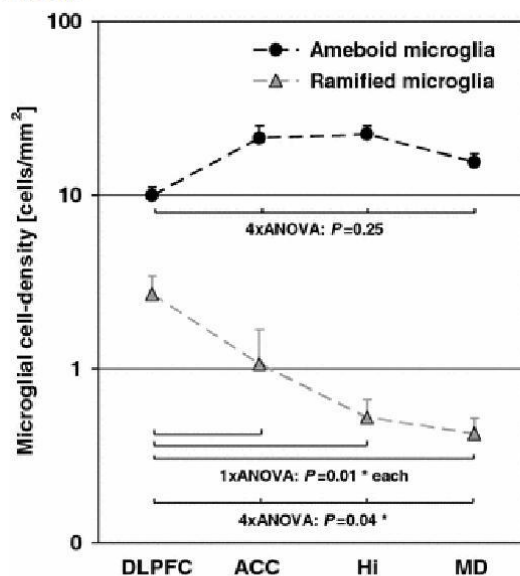
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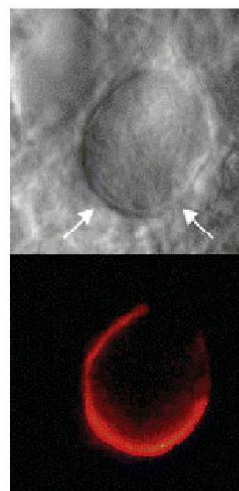
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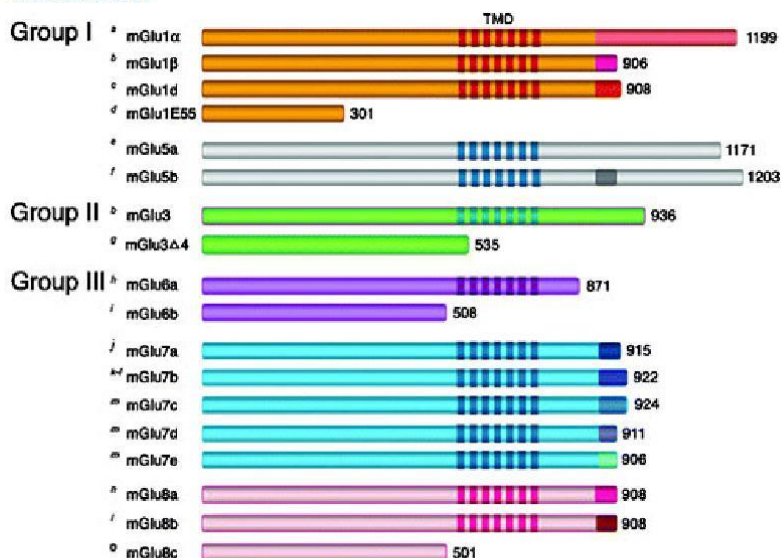
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Informed consent

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- The full results should then be discussed in the context of international published literature and the contribution made to the field.
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Conclusions

- A brief conclusions section should summarise the salient findings of the study. Authors are strongly advised to emphasise the contribution made to the field by their study in this section.
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One author:

Szeto HH. Simultaneous determination of meperidine and normeperidine in biofluids. *J Chromatogr* 1976; 125: 503–510.

Two authors:

Vu-Duc T, Vernay A. Simultaneous detection and quantitation of O6-monoacetylmorphine, morphine and codeine in urine by gas chromatography with nitrogen specific and/or flame ionization detection. *Biomed Chromatogr* 1990; 4(2): 65–69.

Three or more authors: Huestis MA et al. Monitoring opiate use in substance abuse treatment patients with sweat and urine drug testing. *J Anal Toxicol* 2000; 4(Suppl.3): 509–521.

Article in press:

Ladines CA et al. Impaired renal D1-like and D2-like dopamine receptor interaction in the spontaneously hypertensive rat. *Am J Physiol Regul Integr Comp Physiol* 2008 (in press).

Electronic publication ahead of print:

Teeuwen PHE. Doppler-guided intra-operative fluid management during major abdominal surgery: a systematic review and meta-analysis. *Int J Clin Pract* (accessed 21 November 2007, epub ahead of print).

Online serial:

Margolis PA et al. From concept to application: the impact of a community-wide intervention to improve the delivery of preventive services to children. *Pediatrics* [online] 2001; 108:e42. www.pediatrics.org/cgi/content/full/108/3/e42 (accessed 20 September 2001).

Corporate author:

The Cardiac Society of Australia and New Zealand. Clinical exercise stress testing. Safety and performance guidelines. *Med J Aust* 1996; 164: 282–284.

Anonymous author:

Anon. Coffee drinking and cancer of the pancreas. *BMJ* 1981; 283: 628.

Author with prefix and/or suffix in their name:

Humphreys Jnr, Sir Robert and Adams T. Reference style in the modern age. *J Bib Cit* 2008; 1: 1–10.

Article not in English:

Sokolov S et al. [Studies of neurotropic activity of new compounds isolated from *Rhodiola rosea* L.] *Khim Farm Zh* 1985; 19: 1367–1371 [in Russian].

Book references

Book by a single author or group of authors working together as a single author:

Cole MD, Caddy B. *The Analysis of Drugs of Abuse: An instruction manual*, 2nd edn. New York : Ellis Horwood, 1995.

An edited book:

Hoepfner E et al. eds. *Fiedler Encyclopedia of Excipients for Pharmaceuticals, Cosmetics and Related Areas*, 5th edn. Aulendorf: Editio Cantor Verlag, 2002.

An article in an edited book:

Sanders PA. Aerosol packaging of pharmaceuticals. In: Banker GS, Rhodes CT, eds. *Modern Pharmaceutics*. New York : Marcel Dekker, 1979: 591–626.

A book in a series:

Scott RPW. *Chromatographic Detectors – Design, Function, and Operation*. Chromatographic Science Series, 73, Cazes J, ed. New York : Mercel Dekker, 1966.

Other references

Article in conference proceedings:

Dumasia MC et al. LC/MS analysis of intact steroid conjugates: a preliminary study on the quantification of testosterone sulphate in equine urine. In: Auer DE, Houghton E, eds. *Proceedings of the 11th International Conference of Racing Analysts and Veterinarians*. Newmarket : R & W Publications (Newmarket), 1966: 188–194.

Standard:

ISO 9002. *Quality Systems – Model for Quality Assurance in Production, Installation and Servicing Quality Management System*. Geneva : ISO, 1994.

Offline database or publication:

Dictionary of Natural Products. CD-ROM. London : Chapman & Hall/CRC, 2003.

Milazzo S et al. Laetrile treatment for cancer. *Cochrane Database of Systematic Reviews*, issue 2. London : Macmillan, 2006.

Dissertation:

Youssef NM. School adjustment of children with congenital heart disease. Pittsburgh , Pennsylvania : University of Pittsburgh , 1988 (dissertation).

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ANNEXURE G: PROOF OF SUBMISSION MANUSCRIPT ONE

Drugs & Aging <em@editorialmanager.com>

Apr
25

to me

"Pharmaceutical care experience and expectations in the elderly population"

Full author list: Jo-Ancobe Jaquire, BPharm; Irma Kotzé, BPharm, MBA; Marlene Julyan, BSc, BPharm, BA Honns, MA, PhD, PCDT; Rianda Joubert, BPharm, MPharm, PhD

Dear Ms Jo-Ancobe Jaquire,

We have just received the submission entitled: "Pharmaceutical care experience and expectations in the elderly population" for possible publication in Drugs & Aging, and you are listed as one of the co-authors.

The manuscript has been submitted to the journal by Dr. Dr Rianda Joubert who will be able to track the status of the paper through his/her login.

If you have any objections, please contact the editorial office as soon as possible. If we do not hear back from you, we will assume you agree with your co-authorship.

Thank you very much.

With kind regards,

Adis Journals, Editorial Office

Drugs & Aging

ANNEXURE H: PROOF OF SUBMISSION MANUSCRIPT TWO

Dear Miss Jaquire:

A manuscript titled Availability and use of pharmaceutical services versus community based care and support services for the elderly (IJPP-18-0092) has been submitted by Miss Jo-Ancobe Jaquire to International Journal of Pharmacy Practice.

You are listed as an author for this manuscript and so the online peer-review system, ScholarOne Manuscripts, has automatically created a user account for you. Your International Journal of Pharmacy Practice - ScholarOne Manuscripts account information is as follows:

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Sincerely,
International Journal of Pharmacy Practice Editorial Office

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ANNEXURE I: PERMISSION LETTER



NORTH-WEST UNIVERSITY
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POTCHEFSTROOM CAMPUS

To the Ethics Committee

The deputy director of the Potchefstroom Service Centre agrees to allow Jo-Ancobé Jaquire, a student at the North-West University, Potchefstroom Campus, to issue invites to the members of the Potchefstroom Service Centre to partake in her study regarding the provision of pharmaceutical care and public health services in an ambulatory elderly population.

We understand that the project can only start once approval is obtained from the Ethics Committee.

Signed at (place) Potchefstroom on (date) 8 September 2016

Sanet Jansen van Rensburg

Name of deputy director

Signature of deputy director