

**IDENTIFICATION OF DRUG THERAPY PROBLEMS BY
COMMUNITY PHARMACISTS AND THEIR
INTERVENTIONS**

BY

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF CLINICAL
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BENIN, BENIN-CITY, EDO STATE.**

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CERTIFICATION

This is to certified that this project was carried out by ENORUWA, HANSON OMO with matriculation Number PHA170703 8 in the Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin City, in partial fulfillment of the requirement for the award of Doctor of Pharmacy (Pharm. D) degree.

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DEDICATION

This project is dedicated to the Almighty God, my creator my master.my great teacher who taught me the purpose of life and to my family, they never fail to give me the needed support and to all the people who have worked hard to help me complete this project.

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Thank you to my supervisor Dr Joshua Idiake, for patience, guidance and support.

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ABSTRACT

Study background: Drug therapy problem is one of the public health problems worldwide (Nivya *et al.*, 2015). Drug therapy problems are classified into seven classes (Cipolle *et al.*, 2012; Tomechko *et al.*, 1995). Drug therapy problems can occur at any step of the treatment process (Dahal *et al.*, 2013). Pharmaceutical outcomes can be slowed by a drug therapy problem (Oparah *et al.*, 2020). The contribution offered by pharmaceutical care practitioners is shown by the accurate identification of drug therapy difficulties (Cipolle *et al.*, 1998). Community pharmacists are also pharmaceutical care providers.

Objective: To assess the rate at which community pharmacists encounter DTPs, and actions taken to resolve them.

Method: The study was a descriptive cross-sectional study conducted in 74 selected community pharmacies within Benin City, Nigeria. Data was collected using a standardised questionnaire to assess the nature and degree of DTPs encountered and steps taken to resolve them. A convenient sampling technique was used for the study. The data was organised and analysed with Statistical Package for Social Science (SPSS) for Windows version 16.0.1.

Result: All the classes of drug therapy problems were encountered by community pharmacists in Benin City. The rate at which these drug therapy were encountered varied with unnecessary drug therapy (88.0%, n=66) and non-compliance (85.3%, n=64) being the most encountered and dosage too high (66.3%, n=49) and dosage too low (53.3%, n=49) being the least. Other forms of encountered drug therapy problems included need for additional therapy (77.3%, n=58), wrong drug (74.7%, n=56), and adverse drug reaction (73.3%, n=55). All the pharmacists indicated that they provided a form of intervention following the detection of drug therapy problems. Among the various means to resolve encountered drug therapy problems, 82.2% (n=62) preferred to refer the patient back to the prescriber, 74.7% (n=56) adjusted the prescription, 65.3% (n=49) contacted the prescriber and only 4.0% (n=3) dispensed as prescribed. This data indicated good pharmaceutical care practice in drug therapy problems intervention by community pharmacists in Benin City, Nigeria.

Conclusion: The finding from this study highlights the high prevalence drug therapy problems encountered by community pharmacists in Benin City, Nigeria. This study reinforces the active involvements of community pharmacists to resolve encountered drug therapy problems.

Keywords: Drug therapy problems (DTPs), Community pharmacists, Pharmaceutical care, Pharmaceutical outcomes, Intervention, pharmaceutical care intervention.

CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

1.1 Introduction

Drug therapy problems (DTP) refers to any unwanted incident related to medication therapy that actually or potentially affect the desired goals of treatment (PCNE 2010). DTP can occur at any step of the treatment process, mainly during prescribing, dispensing, and patient's use of medication (Dahal *et al.*, 2013). DTP are classified into seven major classes. These classes include; unnecessary drug therapy, need for additional therapy, ineffective drug therapy, dosage too low, dosage too high, adverse drug reaction (ADR), and non-compliance. (Cipolle *et al.*, 2012).

Drug therapy problem is one of the public health problems worldwide and has been significantly increased over the past decade (Nivya *et al.*, 2015). It was estimated that around 5-10% of hospital admission were due to DTPs in which more than half of all medicines are prescribed and dispensed inappropriately, and half of the patients fail to take their medications correctly (Lu *et al.*, 2011). The benefits of drugs prescribed to patients may be compromised due to occurrence of DTPs.

Pharmacists in a community care setting are in a unique position to reduce drug related morbidity and to optimize patient outcome by identifying, resolving, and preventing drug therapy problems. This particular approach to pharmacy practice expands traditional pharmacists' responsibility of dispensing pharmaceuticals and providing drugs information to optimizing patients' drug therapy outcomes.

There have been numerous studies on drug therapy problems conducted in Nigeria and the word at large.

Drug therapy problems affect health outcomes. Therapeutic outcomes, humanistic outcomes and economic outcomes can be negatively impacted by the occurrence of drug therapy problems.

The pharmaceutical care model of pharmacy practice establishes that pharmacist do not only carry out their duties, but take responsibility for them. Drug therapy problems are the responsibility of the pharmacist. Pharmacist are not only involved in dispensing of prescribed and over the counter medications, but are charged with the responsibility of actively seeking for and resolving DTPs. Drug therapy problem is the heart and soul of pharmaceutical care. Hepler and Strand (1990) defined pharmaceutical care as the responsible provision of drug therapy for the purpose of achieving definite outcomes that improves the patient's quality of life. As an evolving model of pharmacy practice in developing countries like Nigeria, it is not strange that it comes with numerous challenges (Knapp 197).

1.2 Literature Review

1.2.1 Drug Therapy Problems

Drug therapy problems are unfavourable incidents that patients encounter during medication therapy that interfere with their intended course of treatment or are suspected of doing so. This phrase refers to drug-related incidents that can interfere with expected results that are detectable, treatable, or preventable (Reddenna *et al.*, 2014). The identification of drug therapy problems helps patients reach their therapeutic goals and comprehend the best potential outcomes from drug therapy. Drug therapy issues are under the clinical purview of pharmaceutical care practitioners. The correct sole contribution offered by pharmaceutical care practitioners is shown by the accurate identification of drug therapy difficulties, which is precisely a component of the evaluation process (Cipolle *et al.*, 1998). A clinical problem involving medication therapy must be recognised and dealt with like to other clinical problems. Inappropriate medication usage can increase patient morbidity and possibly death.

Stating the problem and identifying the cause with consequent resolution or prevention requires clinical judgment by the practitioner. Since there is only the practitioner's clinical judgement and justification for the choice, no other practitioner is able to recognise and address drug therapy problems as often and methodically as the pharmaceutical care practitioner (Van *et al.*, 2007).

1.2.2 Epidemiology of Drug Therapy Problems

Finding and fixing any drug therapy problems is one of the key goals when examining a patient's drug therapy (Parthasarathi 2005). Drug therapy problems occur in both hospital and ambulatory patient. DTPs are a widespread problem that affects individuals in a variety of healthcare settings worldwide. According to studies, a major fraction of hospital admissions are thought to be caused by medication-related issues, with a prevalence of between 5% and 15% (WHO, 2017). According to the World Health Organisation (WHO), medication mistakes alone are projected to cause harm to millions of patients each year (Bates *et al.*, 1995). ADRs, a different type of DTPs, are accountable for up to 5% of hospital admissions and cause significant morbidity and death (Davies *et al.*, 2009). Although DTPs are a worldwide problem, there are differences in their occurrence and makeup throughout the continents. Pharmacovigilance procedures that have been in place for a long time in North America and Europe enable thorough monitoring and reporting of ADRs which is a form of DTP. On the other hand, some sections of Asia and Africa do not have the necessary infrastructure or resources to successfully detect and control DTPs. These differences underline the necessity of international cooperation to address DTPs and make sure that all people benefit from the safe and effective use of medicines. In the United States, community pharmacies filled 3.3 billion prescriptions in 2002, yet each year, more than 44,000 hospitalised patients pass away as a result of medical mistakes (Kohn *et al.*, 2000). Drug therapy problems are encountered in all disease conditions, ranging from conditions requiring

intensive care to chronic and acute disease conditions which may or may not require hospitalization. There are different types of drug therapy problems, and the type experienced in part depend on the type of care the patient is receiving. Intensive care patients for example are more likely to encounter drug therapy problems than ambulatory patients, and the type of drug therapy problems encountered may also vary in weight and proportion.

DTPs are common in Nigeria's healthcare settings. Nearly 20% of hospitalised patients had issues with their medications, according to research done in a few hospitals in Lagos (Oshikoya *et al.*, 2010). Mistakes with medications, including prescription, administration, and dispensing mistakes, were often reported. Over 60% of paediatric patients at a tertiary hospital in Northern Nigeria had medication inconsistencies upon admission (Jatau *et al.*, 2018). These results highlight the enormous impact that DTPs have on the Nigerian healthcare system. Nigeria has a high prevalence of DTPs due to a number of causes. Medication mistakes and poor adherence may be caused by restricted access to healthcare services, low patient health literacy, and disjointed communication among healthcare professionals. By raising the possibility of unpleasant reactions and treatment failures, the availability of fake and substandard pharmaceuticals worsens the issue. In Nigeria, socioeconomic variables have a significant impact on the prevalence of DTPs. Poor infrastructure, limited access to high-quality healthcare, and poverty make it difficult to handle drugs effectively. Cultural values and customs may affect how people take their medications and how often they use them, which might result in less than ideal therapeutic results.

1.2.3 Drug Therapy Problems in Various Healthcare Settings

Drug treatment problems often known as medication-related challenges, are common in a variety of healthcare settings. These settings include:

1.2.3.1 Hospital and Healthcare Facilities

Hospitals frequently experience DTPs as a result of the complexity of patient situations, the hurried nature of the work environment, and the possibility of mistakes in prescription, dispensing, and administration (Bates *et al.*, 1995).

1.2.3.2 Long-Term care facility

Polypharmacy, complicated prescription regimens, and age-related changes in drug metabolism all put residents of long-term care institutions at risk for DTPs (Zimmerman *et al.*, 2014).

1.2.3.3 Home Healthcare

Patients receiving care at home are vulnerable to DTPs, including medication errors and non-adherence due to limited oversight and education (Hughes & Lapane, 2005).

1.2.3.4 Community Pharmacies

Community pharmacists play a pivotal role in identifying and addressing DTPs, contributing to improved patient outcomes.

1.2.3.5 Low Income and Underserving Areas

The lack of a strong healthcare infrastructure and difficulties obtaining high-quality drugs frequently result in DTPs in resource-constrained areas.

1.2.3.6 Miscellaneous

Paediatric and Geriatric Populations

Vulnerability to drug therapy problem is higher among paediatric and geriatric patients for obvious physiological reasons. At these stages of life, the body is not performing at maximum capacity hence increasing the likelihood of the occurrence of DTPs. Dosage calculations for children can be challenging, and elderly patients often face polypharmacy issues and age-related changes in drug absorption, distribution, metabolism, and elimination. The incidence of adverse drug reaction is also higher in these groups of patients.

Patient with Chronic Diseases

Cardiovascular and metabolic diseases such as hypertension and diabetes are chronic diseases that require long and use of multiple medications. The management of these medication can be complex leading to potentials of DTPs if not properly coordinated.

Transitions of Care

Transitions between care setting such as hospital to home, or primary to specialty care can introduce opportunities for DTPs due to incomplete transfer of information and medication reconciliation issues.

Emergency Departments

Rapid decision making, which is the leading peculiarity of emergency departments can lead to medication errors and interactions that contribute to DTPs.

Cultural and Language Barriers

DTPs can arise due to diversity in language and culture of a given population.

1.2.4 Causes of Drug Therapy Problems

The causes of drug related problems are multi-factorial and their assessment has been based on factors such as inappropriate prescribing, inappropriate delivery, inappropriate patient

behaviour, patient idiosyncrasy, and inappropriate monitoring. The causes of drug therapy problems are associated with five drug-related needs of a patient, as pointed by Tomechko *et al.*, (1995). These five patient drug needs are untreated indication, Indication, effectiveness, safety, and adherence. The contributing factors to incidence of drug therapy problems include transition of care, poly-pharmacy, health literacy and communication. These drug-related needs offer the foundation in which the seven classes of drug therapy problems originated.

Untreated condition, synergistic therapy, prophylactic therapy are the causes for need for additional therapy as a DTP. Unnecessary drug therapy problems originate from absence of medical indication, additional/recreational drug use, non-drug therapy more appropriate, duplicate therapy, and treating avoidable adverse drug reaction. Wrong drug can be caused by inappropriate dosage form, present of contraindication, refractory conditions, availability of more effective drugs and drug not indicated for the condition (Oparah *et al.*, 2020).

The problem of dosage whether too high or too low, may be caused by any of wrong dosage, inappropriate dosage frequency, inappropriate duration of drug therapy, incorrect storage, incorrect administration, and drug interaction (Oparah *et al.*, 2020). It is also worthy to mention that in developing countries such as Nigeria who operate partly on open drug market may further increase the probability of the occurrence of these form of DTP since drug storage is poor, and minimally regulated coupled with the challenge of substandard drug products. While these classes of drug therapy problems may be unrelated to the patient, inappropriate adherence by the patient also identified as a class of DTP may be caused by unavailability of drug product, inability of patient to afford medication, inability to swallow/administer the medication, lack of understanding of the instructions, and patient absence of willingness to take the medication (Oparah *et al.*, 2020). Adverse drug reaction (ADR) can occur due to many reasons. Reasons of hypersensitivity reaction, drug interactions, dosage regimen, and disease state are a few.

1.2.5 Classes of Drug Therapy Problems

There are seven classes of drug therapy problems based on the drug related needs of the patient (Tomechko *et al.*, 1995).

1.2.5.1 Need for additional therapy

When initial medication therapy fails to produce the anticipated results or when therapeutic objectives change over time, additional therapy may be necessary. This could happen as a result of things like a poor response, the advancement of the illness, the appearance of new symptoms, or modifications in the patient's circumstances. It is essential to acknowledge the need for more therapy to avoid treatment stagnation and to keep the therapeutic process moving. Various medical specialties and patient demographics experience the need for further treatment. Chronic conditions including diabetes, hypertension, and several malignancies are especially prone to it. To maintain best disease management, avoid complications, or deal with new comorbidities, patients might need additional medications. If this requirement is not met, illness management may not be as effective, life quality may suffer, and healthcare use may rise. Several factors contribute to the emergence of the need for additional therapy. Patient variability in drug response, genetic factors, and environmental influences can impact the effectiveness of initial treatments. Additionally, disease progression, medication interactions, and evolving treatment guidelines can necessitate modifications to therapy regimens. Inadequate patient monitoring and limited communication between patients and healthcare providers can also hinder the timely identification of this DTP. Neglecting the need for additional therapy can lead to treatment inertia, where patients remain on ineffective or outdated regimens. This may result in disease exacerbation, complications, and avoidable healthcare utilization. Furthermore, patient dissatisfaction and reduced adherence can ensue when therapeutic expectations are not met. Timely recognition and intervention, on the other hand, can enhance treatment outcomes and patient satisfaction.

1.2.5.2 Unnecessary drug therapy

Unnecessary drug therapy pertains to the prescription or continuation of medications without clear clinical indications or benefit to the patient. This DTP can manifest in various scenarios, including overdiagnosis, polypharmacy, and the perpetuation of outdated treatment regimens. Recognizing and addressing unnecessary drug therapy is pivotal to safeguard patient health and prevent adverse outcomes. Patients from a variety of medical specialisations and demographic groups are impacted by unnecessary drugs. The severity of this problem has been exacerbated by the growth in overdiagnosis, which is being driven by improvements in medical technology and more illness screening. The risk of inappropriate medication therapy and its related problems is further increased by polypharmacy, which is frequently observed in older patients with numerous comorbidities. The continuation of unneeded pharmacological therapy is influenced by a variety of circumstances. These include clinical inertia, in which medical professionals hesitate to stop prescribing drugs even when the patient's situation calls for it. Unnecessary drugs may also be influenced by patient requests, pharmaceutical marketing, and a lack of time during sessions for consultations. Unnecessary drug therapy carries notable consequences for patient safety and healthcare resources. Patients may experience adverse drug reactions, increased healthcare costs, and reduced quality of life due to medication burden. Inappropriate drug use can further strain healthcare systems by diverting attention and resources from necessary treatments. Healthcare providers must adopt evidence-based practices, engage in shared decision-making with patients, and regularly review medication regimens to ensure clinical relevance. Patient education plays a crucial role in fostering understanding and collaboration, allowing patients to make informed decisions about their treatment.

1.2.5.3 Wrong drug

Wrong drug therapy involves the administration of drugs that are not appropriate for the patient's condition, either due to misdiagnosis, inaccurate prescriptions, or medication errors. This class of DTP puts patients at risk of adverse effects, therapeutic failure, and poor health outcomes. The impact of wrong drug can be profound, leading to worsened symptoms, prolonged illness, and even life-threatening complications. Vulnerable populations such as children, the elderly, and those with complex medical histories are at greater risk. Wrong drug therapy can occur for a variety of reasons. The erroneous medicine may be administered as a consequence of healthcare professional miscommunication, unclear prescriptions, drugs with similar names, and insufficient medication reconciliation procedures. Errors in medicine selection might be particularly common in high-stress settings like emergency rooms. The administration of wrong drug can worsen existing health condition, trigger allergic reactions, or interact with other medications. Delayed diagnosis and treatment of underlying conditions due to wrong drug therapy can lead to preventable complications.

1.2.5.4 Dosage too low

Dosage too low refers to the administration of drugs at levels that fall short of the desired therapeutic outcome. This category of DTP may be caused by a number of things, including as incorrect dosage estimations, cautious dosing, and insufficient patient monitoring. Several factors contribute to the occurrence of dosage too low. Inaccurate assessment of patient needs, concerns about potential adverse effects, and a lack of familiarity with dosing guidelines can all lead to conservative dosing. Failure to monitor patient response and adjust dosages as needed can perpetuate this class of DTP. Patients may not experience the desired relief in symptoms, disease control, or therapeutic response, leading to prolonged illness, delayed recovery, and reduced quality of life. In cases of antibiotics, there can be emergence of

antibiotics resistance. Pharmacists play a pivotal role in dose adjustments and patient education, fostering adherence and positive treatment outcomes.

1.2.5.5 Dosage too high

When medications are administered at dosages that are higher than what is required for therapeutic benefit, it may have unfavourable effects. This kind of DTP may be brought about by a number of factors, including incorrect calculations, insufficient monitoring, and a failure to modify doses in response to patient reaction. Several factors contribute to the occurrence of excessive dosing. Calculation errors, misunderstanding of dosing guidelines, and lack of familiarity with drug interactions can lead to overprescribing. Moreover, inadequate patient assessment, absence of proper monitoring, and failure to adjust dosages based on patient characteristics can precipitate excessive dosing. Pharmacists' expertise in medication management and dosage adjustments is invaluable in avoiding this class of DTP.

1.2.5.6 Adverse drug reaction

Adverse drug reaction (ADR) is a class of drug therapy problem. According to the WHO, ADR is a response to a drug that is noxious and unintended, and which occur at doses normally used in man for prophylaxis, diagnosis, or therapy of disease, or for the modification of physiological function (WHO 2020). Adverse drug reactions may occur for reasons of drug not being safe for the patient, allergic reactions, incorrect administration, drug interactions, and drug increase or decrease too quickly (Oparah *et al.*, 2020). Adverse drug reactions are mostly due to extended pharmacological response or immunological involvement. This can be prevented by proper medication history taking and the pharmacist's active involvement in the patient's drug therapy.

1.2.5.7 Inappropriate Adherence

Inappropriate adherence refers to deviations from prescribed medication regimens that compromise therapeutic effectiveness. This class of DTP encompasses scenarios where patients either underuse, overuse, or irregularly use medications, leading to suboptimal treatment outcomes. Several reasons may underscore this incidence of medication non-adherence some of which include drug product not being available, patient not being able to afford the drug, patient's inability to administer the drug, patient not understanding the prescriber's instructions, and patient unwillingness to take the medication (Oparah *et al.*, 2020). Inappropriate adherence may also be due to discomfort felt by the patients while taking the medication. It could also be as a result of perceived adverse effect thought to be associated with the medication. Inappropriate adherence can prolong period of therapy, lead to complication and even therapeutic failure. Inappropriate adherence may also lead to negative economic outcomes. Patient education, counselling, follow-up, and drug availability are ways in which medication non-adherence can be managed.

1.2.6 Consequences of Drug Therapy Problems

Drug therapy problems affect pharmaceutical care outcomes in negative fashions. Clinical outcomes, economic outcomes, and humanistic outcomes are measurable outcomes that can be impeded in the presence of a drug therapy problem (Oparah *et al.*, 2020). Adverse drug reactions, therapeutic failure, drug-drug interaction, drug-disease interaction, development of drug resistance, polypharmacy, delay in diagnosis, cognitive impairment, organ damage, medication non adherence, and financial burden are a few consequences that may result from the incidence of drug therapy problem.

1.2.7 Identification and Resolution of DTPs

Like any medical condition, drug therapy problems rest within the domain of a pharmaceutical care provider and relies on his/her expertise for detection. Pharmacists have the skills to identify potential and actual drug problems better than anyone else. Identification of drug therapy problems require either or both subjective and objective data. It is not however an uncommon practice to identify more than one drug therapy problem, the pharmacist is also able to prioritize the identified DTPs in order to resolve them by order of importance. The pharmacist work in harmony with other members of the clinical team, other care givers and patients in order to resolve the identified drug therapy problems.

1.2.8 The Community Pharmacist and Drug Therapy Problems

The pharmacist is a university-trained health care professional with an important role in the health care system. A direct definition of a pharmacist is very rarely outlined in national legislation or regulations (WHO 2019). A pharmacist is a scientifically trained graduate health care professional who is an expert in all aspects of the supply and use of medicines FIP (2016). The role is often defined indirectly, through education or a list of activities only pharmacists can or are allowed to perform. Community pharmacists are the health professionals most accessible to the public. They supply medicines in accordance with a prescription or, when legally permitted, sell them without a prescription. In addition to ensuring an accurate supply of appropriate products, their professional activities also cover counselling of patients at the time of dispensing of prescription and non-prescription drugs, drug information to health professionals, patients and the general public, and participation in health-promotion programmes (WHO 2019). Pharmacists take responsibility for the storage, preservation, compounding, and dispensing of medicinal products. They also counsel on the proper use and adverse effects of drugs and medicines. They also contribute to medicine through research, testing, preparing, prescribing and monitoring medicinal therapies with the primary aim of optimizing the health of humanity. Community pharmacist receive prescriptions, assess prescriptions, provide drug information services, collaborate with other health care providers, maintain prescription files, store and preserve vaccines, evaluate dispensed medications, and develop information and risk of particular drugs.

Activities and services provided in a community pharmacy focusing on expertise in medicine are dispensing, compounding, medication management, and emergency care. The medication management component captures unit dose packaging, new medicine service, and medicine use review. During medicine use review, drug therapy problems can be identified. When community pharmacists receive prescriptions, potential drug therapy problems such as drug-

drug interaction possibly due to polypharmacy can be identified. Because community pharmacists interact with patients and usually may have the need to involve medications in therapy, pharmaceutical care is inevitable.

1.2.9 Common Drug Therapy Problems Encountered by Community Pharmacists

Drug therapy problems are not peculiar to only hospital settings. Any setting that involves the use of drugs is predisposed to drug therapy problems. Adverse drug events are a frequent and costly consequence of medical errors (Kohn *et al.*, 2000). Polypharmacy among ambulatory patients has been shown to dramatically increase the risk of experiencing an adverse drug event. In particular, older patients (aged >65 years) may be more susceptible to polypharmacy because they are more likely to have several chronic medical conditions requiring multiple pharmacological treatments. Older patients are often frequent in community pharmacy and need the expert opinion of the pharmacist concerning their medications. In order to explore the drug therapy problems encountered, retrospective observational research was conducted in 2005 in a community pharmacy in Iowa City, Nebraska, reviewing a total of 150 patients over the course of two years. A total of 886 medication-related problems were found and grouped into 7 categories, including inappropriate adherence (25.9%), the need for extra therapy (22.0%), the use of wrong drug (13.2%), unnecessary drug therapy (12.9%), adverse drug reactions (11.1%), doses that were too low or high (9.7%), and inappropriate drug choice (5.3%). Overall, 313 (47.4%) of the 659 suggestions made by pharmacist to change drug therapy were approved by doctors, with the lowest rates of acceptance (41.7%) and the greatest rates of agreement to cease or change a prescription (50.3% and 50.0%, respectively) (William *et al.*, 2005).

The State of Pharmacy Practice in Nigeria

A health care delivery system's effectiveness depends on successful pharmacy practise and education in general, as well as the accessibility, cost, and availability of high-quality, safe, and effective vital drugs. Pharmacy practise and education in Nigeria have seen significant transformation during the 1990s (Awaisu & Ahmed 2016).

Pharmacy practice in Nigeria is categorized into four key areas of practice. The hospital practice, pharmaceutical manufacturing, retail/community pharmacy and wholesale/importation of pharmaceutical products.

The pharmaceutical service that is closest to and most accessible to the general people is the retail pharmacy, commonly referred to as the community pharmacy. Community pharmacies are responsible for managing the logistics and supply chain, filling prescriptions and selling over-the-counter (OTC) medications, and providing patient counselling and education. A superintendent pharmacist's name must be on the registration for a community pharmacy location. In Nigeria, community pharmacy practise is governed and controlled by the Pharmacy Council of Nigeria (PCN) and National Agency for Food and Drug Administration and Control (NAFDAC), with support from the Association of Community Pharmacists of Nigeria (ACPN) for the application of the rules and best practises. It is important to note that there are few chain pharmacies in Nigeria; local neighbourhood pharmacies operate independently. These retail establishments are overwhelmingly underrepresented and concentrated in metropolitan regions (cities) (Awaisu & Ahmed 2016).

Certain barriers have hindered the development of pharmacy practice, these are; lack of confidence, shortage of pharmacy staff, lack of policies that support clinical pharmacy, and medical dominance. Pharmaceutical care is a key aspect in pharmacy practice. It involves the provision of drug therapy with the purpose of achieving definite outcome that will improve

the patient's quality of life. Some of the problems that affect the effective take off of pharmaceutical care practice in Nigeria include; insufficient time to talk with the patient, lack of private counselling room, inadequate training of the pharmacist to practice pharmaceutical care, etc.

1.3 Problem Statement

Drug therapy problems are health challenges that rely on pharmacist's expertise for detection, prevention and resolution. The detection and resolution of drug therapy problems can reduce the rate of hospital admission by at least 5-10% underscoring the relevance of pharmacists in health care delivering system. In the context of developing nations like Nigeria, pharmacies and pharmacists are often the initial point of contact for individuals seeking medical care. Community pharmacists in Nigeria are often confronted with daily demands of prescribing, dispensing, and managing a wide range of medical conditions, spanning both acute and chronic. The incidence and possibility of potential and actual drug therapy problems arising from the care offered is consequently inevitable. Drug therapy problems may affect either or a combination of therapeutic, humanistic, and economic outcomes leading to a possibility of therapeutic failure, need for additional care, diminished patient quality of life, economic waste on the patient and care giving facility, increased mortality and morbidity rate, and consequent loss of confidence in the health care system. Finally, there is a heavy reliance on community pharmacies by the Nigerian population to cater for their drug and health care needs. Presently, there is limited data to demonstrate the nature and frequency of drug therapy problems encountered by community pharmacists in Nigeria. Preceding researches predominantly focused on hospital care facilities and drug therapy problems on specific disease conditions. This research endeavour seeks to bridge this critical knowledge gap by examining the nature and frequency of drug therapy problems often encountered by community pharmacists with ways these challenges have been managed. This research holds the promise of not only optimizing patient care within Edo state, but also furnishing valuable insights for similar healthcare context nationally and globally.

1.4 Justification

Numerous studies have demonstrated the prevalence, nature, and implication of drug therapy problems in hospital care settings and specific disease conditions. Pharmacy and community pharmacists play an important role in the public health system by providing prescription and over-the-counter (OTC) medication with professional counselling, participating in healthcare programs, and maintaining contact with other healthcare professionals in the healthcare system. Therefore, this research holds the promise of granting insights that directly promote patient safety and outcomes, enhance healthcare efficiency, reducing healthcare burden, strengthen the role of community pharmacists, and consequently advancing pharmaceutical care.

1.5 Research Questions

1. What are the drug therapy problems encountered by community pharmacists in Benin City.
2. What is the rate at which drug therapy problems are encountered?
3. How willing are pharmacists to monitor and intervene when drug therapy problems are encountered?
4. What are the interventions made by community pharmacists to resolve drug therapy problems?
5. What is the relationship between demographics and interventions

1.6 General Objective

To assess the drug therapy problems encountered by community pharmacists and actions taken to resolve them.

1.7 Specific Objectives

The specific objectives were:

1. To assess the different types of drug therapy problems commonly encountered by community pharmacists in Benin City, Nigeria.
2. To assess the rate at which these drug therapy problems are encountered.
3. To assess the willingness of the pharmacist to monitor and intervene when drug therapy problems are encountered.
4. To evaluate the intervention(s) made by community pharmacists to resolved the encountered drug therapy problems.
5. To determine the relationship between demographics and interventions

CHAPTER TWO

METHODOLOGY

2.1 Study Design

The study was a descriptive cross-sectional study to assess the rate at which community pharmacists encounter drug therapy problems and actions taken to resolve them.

2.2 Study Setting

The study was conducted in selected community pharmacies within Benin City, Nigeria. Benin City is a city in Edo state, Nigeria, with several healthcare institutions. (primary, secondary and tertiary) and with over 300 registered community pharmacies.

2.3 Study Participants

The target study involved community pharmacists in Benin City, Nigeria.

2.3.1 Inclusion Criteria

1. Registered retail pharmacy outlets within Benin City, Edo state, Nigeria.
2. Retail pharmacies that have operated for a minimum of two (2) years

2.3.2 Exclusion Criteria

1. Wholesale pharmacies
2. Retail pharmacies where the superintendent pharmacist was unavailable
3. Retail pharmacies that had less than two years of operation

2.4 Time Frame for the Study

The study was conducted within a three-month period: June to August, 2023.

2.5 Data Collection

Data collection was done through administration of a structured questionnaire which was designed based on information obtained from review of literatures as required for the study to the pharmacist in the selected retail pharmacy outlets.

2.6 Instrument for Data Collection

Data was collected by the use of standardized questionnaire which consisted of two sections.

Section I: Data such as age, sex, marital status, religion, and years of practice were grouped as demographic data.

Section II: This section comprised of questions to obtain information on encountered drug therapy problems and intervention strategies deployed by the pharmacists to resolve them. This section had a total of 18 questions grouped in a fashion to obtain information on frequency with which drug therapies were encountered, the pharmacist's willingness to monitor drug therapy problems, routine assessment of patients' prescription for possible drug therapy problems and the type of drug therapy problems commonly encountered. Questions were also included to assess the pharmacist's interventions in an attempt to resolve the encountered drug therapy problems.

2.7 Sampling Technique

Convenient Sampling technique was employed in the study. Convenient sampling technique is a non-probabilistic sampling method which allows participants to be enrolled based on the researchers discretion, availability and accessibility of the target population.

2.8 Sample Size Determination

The total number of registered retail pharmacy outlet according to PCN, Edo State is 320.

This was used as the population size to determine the sample size for the study.

The sample size was determined using the formular:

$$SS = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

Where SS = Sample size

N = Population size

Z = Standard error

e = Margin of error²

p = standard of deviation

At the confidence interval of 95%,

$$SS = \frac{\frac{1.96^2 \times 0.5(1-0.5)}{0.1^2}}{1 + \left(\frac{1.96^2 \times 0.5(1-0.5)}{0.1^2 \times 320}\right)} = 74$$

2.9 Ethical Considerations

Ethical approval was sought from the ethics committee of the Faculty of Pharmacy, University of Benin, Benin City, Nigeria, before the study was conducted.

2.10 Informed Consent

Informed consent was obtained from the prospective participants before the administration of the questionnaire. Anonymity and confidentiality of information obtained was also assured.

2.11 Data Analysis

Data was collected through the questionnaire we entered manually into Microsoft Office excel sheet (2010). The data was organised and exported to Statistical Package for Social Science (SPSS) for Windows version 16.0.1 for data analysis. A general descriptive analysis on demographic, drug therapy problems and intervention was carried out to group the data. This description was expressed in frequency and percentages. Cross-tabulation between demographic data and dependent variable were then carried out to determine association of variables.

CHAPTER THREE

RESULTS

Table 1 below shows the result of the socio-demographic of the respondents. More than half 56.0% (42) of the respondents were between the ages of 25 to 34 years, while only 2.7% (2) were above the age of 64 years. More male 72.0% (54) were represented in the study. While 53.3% (40) of the study participants indicated that they had 2 to 5 years of practice, 13.3% (10) had above 20 years of community pharmacy practice experience.

Table1: Demographic data of respondents

Variables	Frequency	Percentage (%)
Age		
25 – 34 years	42	56.0
35 – 44 years	16	21.3
45 – 54 years	10	13.3
55 – 64 years	5	6.7
Above 64 years	2	2.7
Sex		
Male	54	72.0
Female	21	28.0
Marital status		
Single	38	50.7
Married	37	49.3
Religion		
Christianity	75	100.0
Years of practice		
2 – 5	40	53.3
6 – 10	12	16.0
11 – 15	9	12.0
16 – 20	4	5.3
Above 20	10	13.3

The table below summarises the event of DTPs encountered by community pharmacists. All the participants under study agreed to have encountered DTPs. However, a quarter 25.3% (19) indicated to have encountered DTPs on a daily basis, and nearly all participants 94.7% (70) did discuss encountered DTPs with their pharmacist colleagues.

Table 2: Frequency of drug therapy problems encountered by community pharmacists

	Frequency	Percentage (%)
Have you ever encountered DTP		
Yes	75	100.0
How often		
Daily	19	25.3
Weekly	34	45.3
Monthly	22	29.3
Do you feel comfortable in the role of monitoring DTPs		
Yes	71	94.7
No	4	5.3
Do you discuss DTP with your pharmacist colleagues?		
Yes	70	93.3
No	5	6.7
If yes, how often do you discuss DTP?		
Rarely	6	8.6
Sometimes	30	42.9
Frequently	34	48.5

Table 3 below shows the forms of DTPs encountered by study participants. Unnecessary drug therapy 88.0% (66) and non-compliance 85.3%(64) where among the highest encountered form of DTPs, while dosage too high 65.3 (49) and dosage too low 53.3% (40) were the lowest encountered forms DTPs.

Table 3: Drug therapy problems encountered by community pharmacists

	Frequency	Percentage (%)
Do you routinely assess the patient's prescription for possible DTP?		
Yes	73	97.3
No	2	2.7
Unnecessary drug therapy		
Yes	66	88.0
No	9	12.0
Need for additional therapy		
Yes	58	77.3
No	17	22.7
Wrong drug		
Yes	56	74.7
No	19	25.3
Dosage too low		
Yes	40	53.3
No	35	45.7
Dosage too high		
Yes	49	65.3
No	26	34.7
Adverse drug reaction		
Yes	55	73.3
No	20	26.7
Non-compliance		

Yes	64	85.3
No	11	14.7

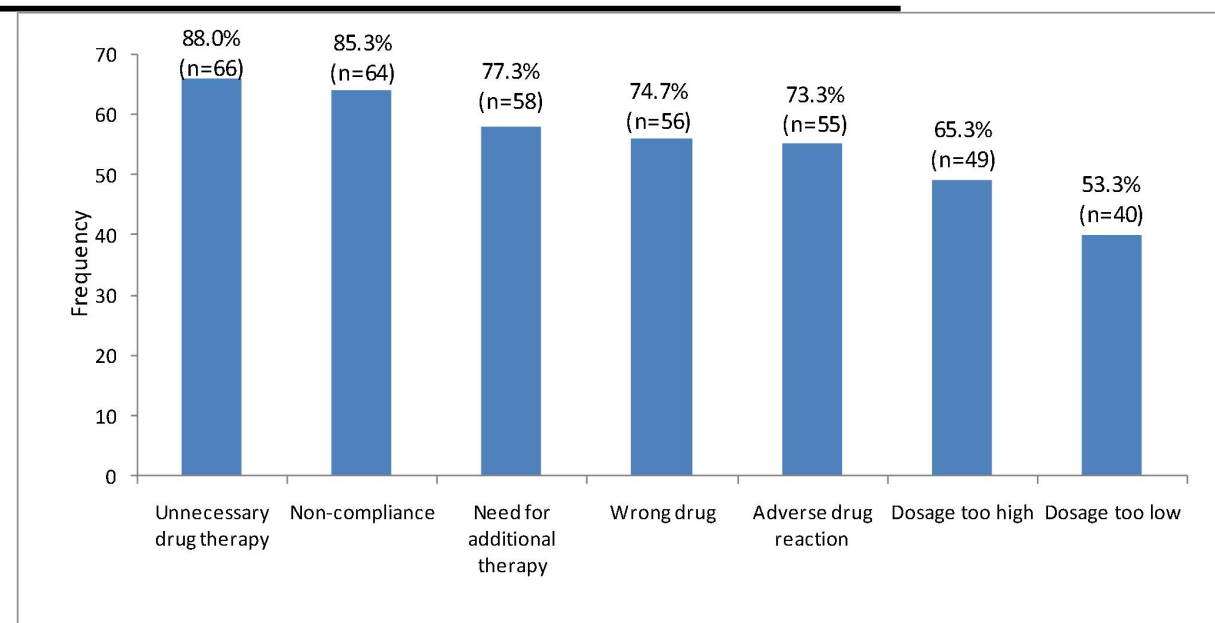


Figure 3.1: Forms of DTPs encountered by community pharmacists

The table below shows the interventions done by pharmacists when DTPs are encountered. 82.7% (62) indicated that they referred the patients to the prescriber, while only 4.0% (3) dispensed as prescribed.

Table 4: Pharmacist’s intervention following an encounter with drug therapy problem

Intervention	Frequency	Percentage (%)
Do you provide any intervention on detecting any DTP?		
Yes	75	100.0
Refers patient to prescriber		
Yes	62	82.7
No	13	17.3
Adjust prescription		
Yes	56	74.7
No	19	25.3
Call prescriber		
Yes	49	65.3
No	26	34.7
Dispensed as prescribed		
Yes	3	4.0
No	72	96.0

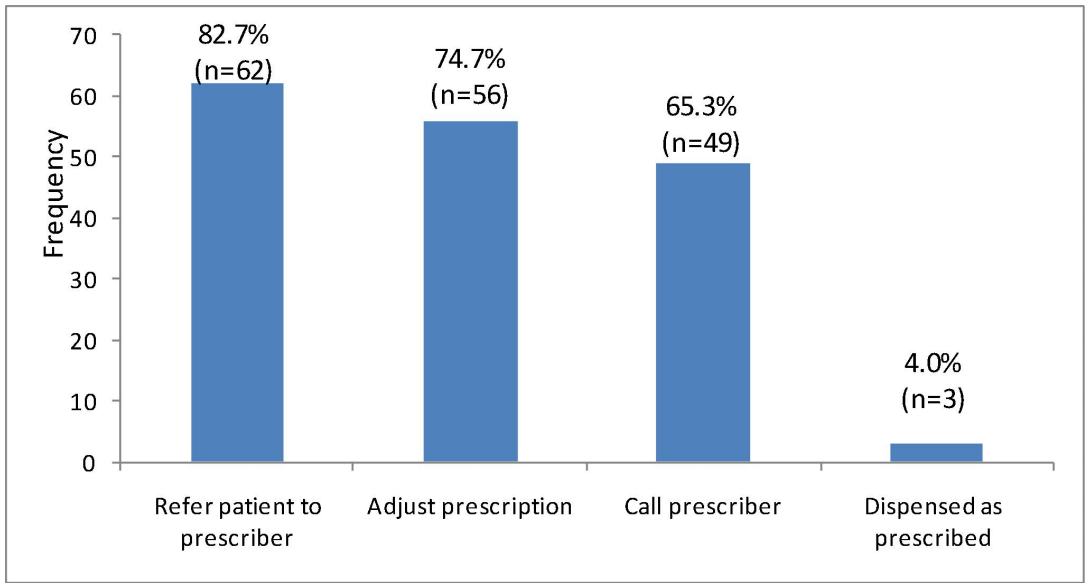


Figure 3.2: Pharmacist's intervention when DTPs are encountered

The table below shows the intervention of pharmacists as it relates to their years of practice.

Table 6: Years of practice Vs Interventions on detection of DTPs

Interventions on detection of DTP				
Years of practice	Refers patient to prescriber	Adjust prescription	Call prescriber	Dispensed as prescribed
2 – 5	34 (54.8)	29 (51.8)	29 (59.2)	1 (33.3)
6 – 10	9 (14.5)	8 (14.3)	6 (12.2)	-
11 – 15	7 (11.3)	6 (10.7)	5 (10.2)	1 (33.3)
16 – 20	4 (6.5)	4 (7.1)	3 (6.1)	-
Above 20	8 (12.9)	9 (16.1)	6 (12.2)	1 (33.3)
Total	62 (100.0)	56 (100.0)	49 (100.0)	3 (100.0)

The table below shows the intervention of pharmacists as it relates to their sex.

Table 7: Sex Vs Interventions on detection of DTPs

Interventions on detection of DTP				
Years of practice	Refers patient to prescriber	Adjust prescription	Call prescriber	Dispensed as prescribed
Male	45 (72.6)	38 (67.9)	34 (69.4)	3 (100.0)
Female	17 (27.4)	18 (32.1)	15 (30.6)	-
Total	62 (100.0)	56 (100.0)	49 (100.0)	3 (100.0)

Demographic data such as age, sex, marital status and years of practice did not influence community pharmacists' intervention following the detection of a drug therapy problem as shown in the table below.

Table 8: Correlation between community pharmacists' intervention and demographics

	Pharmacist's intervention		p-value
	Yes	No	
Age			
25 – 34 years	37 (88.1)	5 (11.9)	0.470
35 – 44 years	13 (81.3)	3 (18.8)	
45 – 54 years	7 (70.0)	3 (30.0)	
55 – 64 years	5 (100.0)	0 (0.0)	
Above 64 years	2 (100.0)	0 (0.0)	
Sex			
Male	44 (81.5)	10 (18.5)	0.131
Female	20 (95.2)	1 (4.8)	
Marital status			
Single	33 (86.8)	5 (13.2)	0.708
Married	31 (83.8)	6 (15.0)	
Years of practice			
2 – 5	34 (85.0)	6 (15.0)	0.057
6 – 10	11 (91.7)	1 (8.3)	
11 – 15	5 (55.6)	4 (44.4)	
16 – 20	4 (100.0)	0 (0.0)	
Above 20	10 (100.0)	0 (0.0)	

Result is considered significant when p-value <0.05 following a chi square test

CHAPTER FOUR

DISCUSSION

In countries like Nigeria, community pharmacists hold a pivotal role as the primary point of contact for medical care (Auta et al., 2014). The daily challenges associated with drug therapy problems have a significant impact on therapeutic outcomes (Viswanathan et al., 2015). Resolving these issues is crucial for enhancing patient care and ultimately improving the quality of life in the nation. Although previous research have delved into drug therapy problems within hospital settings and for specific diseases (Mehra et al., 2020; Lin et al., 2022; Jeon et al., 2017), this study was specifically designed to explore the nature and frequency of these challenges within the context of community pharmacies.

Regarding drug therapy problems, all the community pharmacists who participated in this study reported encountering such issues during their practice in community pharmacy settings. However, the frequency of these encounters varied among participants. Notably, nineteen pharmacists that participated in this study (25.3%) faced drug therapy problems on a daily basis, thirty-two (45.3%) encountered them weekly, and twenty-two (29.3%) confronted such issues monthly. These findings indicate that community pharmacists in Benin City possess a strong understanding of drug therapy problems, aligning with the observations from a study conducted by Segun and Damilola (2022). This earlier study highlighted that community pharmacists in Nigeria demonstrate a moderate level of skill in identifying and addressing drug therapy-related problems, reflecting their competence in providing pharmaceutical care.

The frequency with which these community pharmacists encounter drug therapy problems underscores the high prevalence of such issues among ambulatory patients within the community. This observation is consistent with findings from previous studies (Adisa and Osoba, 2019; Adibe et al., 2017; Gizaw and Dubale, 2017).

The observed frequency of drug therapy problems can be attributed to various factors such as complex medication regimens, patient demographics, health literacy, limited access to primary care physicians, prescription quality, and the expertise of pharmacists (Bokhof & Junius-Walker, 2016; Miller, 2016). This frequency underscores the essential role that pharmacists play in patient education, medication management, and their commitment to providing pharmaceutical care (Awaisu and Mottram, 2018).

In the study, nearly all of the community pharmacists approximately seventy (93.3%) of them expressed comfort in their role of monitoring drug therapy problems and discussing them with their fellow pharmacists. However, the frequency of these discussions varied among participants. Specifically, six (8.6%) of the participants rarely engaged in discussions, while thirty (42.9%) did so sometimes, and thirty-four (48.5%) discussed these matters frequently. The high level of comfort demonstrated by community pharmacists in monitoring drug therapy problems and engaging in discussions aligns with the increasing emphasis on collaborative care within healthcare systems, as highlighted by a study conducted by Löffler et al. (2017). Pharmacists are increasingly acknowledged as valuable members of the healthcare team, and their ability to communicate and collaborate with other healthcare professionals is critical for patient safety and achieving optimal outcomes.

Effective communication contributes to enhancing professional confidence, a vital attribute as pharmacists bears the responsibility of identifying, preventing, and resolving drug therapy problems, which can profoundly impact patient health (Jin et al., 2019). The comfort displayed by community pharmacists in monitoring drug therapy problems suggests that they possess a robust foundation in pharmacotherapy, clinical pharmacy, and pharmaceutical care. This foundation equips them to assess and address drug therapy problems effectively (Whittlesea and Hodson, 2018). Effective communication stands as a crucial component of patient care (Kelling, 2015). The willingness of community pharmacists to engage in

discussions with their colleagues about drug therapy problems, even though the frequency varies, is indicative of their effective communication skills. It is essential to delve into the underlying reasons for these variations, as they might be influenced by workplace culture, time constraints, or the specific cases encountered. These findings emphasize the significance of continuous professional development for pharmacists, as also noted by Wheeler and Chisholm-Burns (2018). Moreover, the active discussion with professional colleagues ensures patient safety and suggests that these pharmacists are proactively involved in activities aimed at upholding the quality and safety of medication within their practice settings (Wheeler and Chisholm-Burns, 2018).

Regarding the assessment of patients' prescriptions for potential drug therapy problems, a significant majority, 73 (97.3%) pharmacists, actively engaged in this practice. These community pharmacists identified various types of drug therapy problems during their assessments. Unnecessary drug prescriptions identified by 64(88.0%) of the community pharmacists and issues related to non-compliance reported by sixty-four (85.3%) were among the most frequently encountered problems. On the other hand, problems related to excessively high dosages reported by 49 (66.3%) and excessively low dosages by 40(53.3%) of the pharmacist were the least frequently encountered. The fact that nearly all community pharmacists in the study assessed prescriptions for potential drug therapy problems underscores their strong commitment to patient safety and the responsible dispensing of medications. This commitment aligns with findings from Schindel et al. (2017) and reflects the pharmacists' awareness of their crucial role in preventing and resolving medication-related issues.

Furthermore, the fact that unnecessary drug use and non-compliance were identified as the most common drug therapy problems underscores the prevalent challenges in medication management. This finding contrasts somewhat with the results of Belayneh et al. (2018),

which identified additional drug needs and unnecessary drug use as the most common issues. This contrast suggests that patients often receive medications that may not be necessary or struggle to adhere to their prescribed regimens. Addressing these challenges can lead to improved patient outcomes and reduced healthcare costs. Unnecessary drug therapy, for example, can result in increased healthcare expenses, a higher risk of adverse drug reactions, and reduced treatment adherence due to complex medication regimens. Identifying and resolving such issues can contribute to better patient outcomes and overall quality of life. The identification of dosage-related problems, such as excessively high or low dosages, highlights potential risks associated with medication administration (Mulac et al., 2022). Pharmacists play a crucial role in ensuring that patients receive the appropriate dosage for their condition, emphasizing the need for vigilance in this aspect of pharmaceutical care. The findings collectively suggest that community pharmacists have numerous opportunities for intervention (Daly et al., 2021). By identifying drug therapy problems, pharmacists can engage in patient counselling, collaborate with prescribers to adjust medications, and provide education to enhance patient adherence. According to a study conducted by William et al. (2005) in a community pharmacy in Iowa City, Nebraska, which reviewed 150 patients over two years, a total of 886 medication-related problems were identified and grouped into seven categories: inappropriate adherence (25.9%), the need for additional therapy (22.0%), use of the wrong drug (13.2%), unnecessary drug therapy (12.9%), adverse drug reactions (11.1%), doses that were too low or high (9.7%), and inappropriate drug choice (5.3%). In total, 313 (47.4%) of the 659 pharmacist-recommended changes to drug therapy were approved by physicians.

Regarding the interventions carried out by community pharmacists when encountering drug therapy problems, every pharmacist in the study reported providing at least one form of intervention following such occurrences. Referring the patient to the prescriber emerged as

the most common intervention strategy, chosen by 62 (82.7%) community pharmacists to resolve drug therapy problems. Adjusting the prescription was the second most frequent choice, with 56 (74.7%) of pharmacists opting for this approach, while calling the prescriber had a response rate of 49 (65.3%). Only a small minority, 3 (4.0%) of the pharmacists, proceeded to dispense the drug as prescribed by the physician. The fact that every community pharmacist in the study undertook some form of intervention underscores their dedication to comprehensive patient care within the pharmacy profession (Fay et al., 2018). This highlights the role of pharmacists as medication therapy experts who actively engage in addressing drug therapy problems to ensure the well-being of their patients, as emphasized by Mohiuddin (2019).

Furthermore, the high frequency of patient referral to the prescriber as the preferred intervention strategy (82.7%), along with the practice of contacting the prescriber, demonstrates the commitment of pharmacists to patient advocacy and indicates that community pharmacists actively engage in interprofessional collaboration (Wilson et al., 2015; Löffler et al., 2017). When pharmacists identify drug therapy problems, referring the patient to the prescriber is a crucial step in ensuring that the patient receives the most appropriate and safe treatment. The adjustment of prescriptions (74.7%) as a leading intervention option reflects the pharmacists' commitment to medication safety (Schepel et al., 2019). Pharmacists are trained to recognize dosing errors, interactions, and other issues that may compromise patient safety (Galt et al., 2019).

Moreover, the act of adjusting prescriptions, when necessary, can prevent potential harm by facilitating effective communication with prescribers, which is vital for resolving drug therapy problems promptly and ensuring collaborative patient care (Löffler et al., 2017). The low percentage of pharmacists who dispensed the drug as prescribed by the physician suggests that pharmacists are cautious about adhering strictly to physician prescription when

they identify potential issues (Cox, 2021). This reflects a commitment to shared decision-making with patients and prescribers to optimize therapy (Mercer et al., 2018). Beyond the mentioned interventions, community pharmacists often engage in patient education (Alaqael and Abanmy, 2015). This could involve explaining medication changes, discussing potential side effects, and providing guidance on proper medication administration, all of which contribute to better patient understanding and adherence. These interventions contribute to the continuity of care for patients. When pharmacists take action to address drug therapy problems, they help ensure that patients receive appropriate treatment without disruptions.

CHAPTER FIVE

CONCLUSION

In conclusion, this study illuminates the crucial role played by community pharmacists in Nigeria in patient care, where they regularly encounter drug therapy problems. Their competence and commitment to pharmaceutical care are evident through their monitoring and discussions of these issues. The prevalent challenges in medication management, particularly unnecessary drug use and non-compliance, underscore the importance of pharmacist involvement. Almost all pharmacists actively assess patient prescriptions, emphasizing their dedication to ensuring patient safety. These findings highlight the opportunities for intervention, including patient counselling and prescription adjustments, with the ultimate goal of enhancing patient well-being. The study underscores the significance of collaborative care and the continuous professional development of pharmacists.

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