Empowering Pharmacists, Protecting the People

Nigerian Journal of Community Pharmacy (NJCP)

Volume 2

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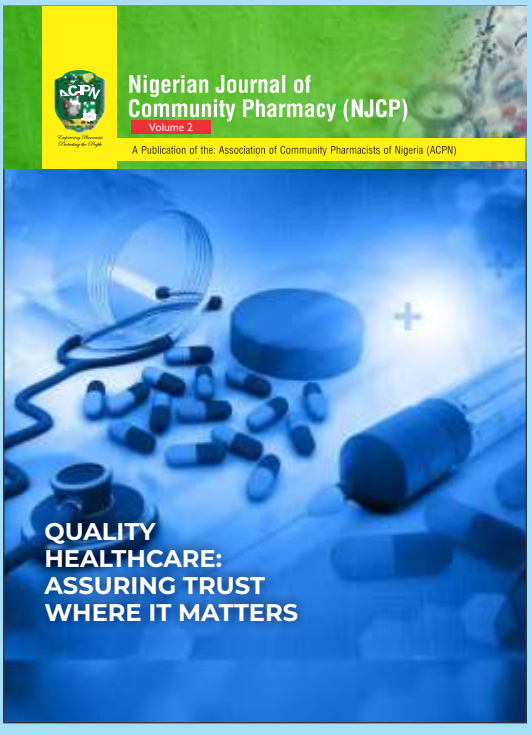

Nigerian Journal of Community Pharmacy (NJCP)

The Nigerian Journal of Community Pharmacy is the official Journal of the Association of Community Pharmacists of Nigeria and began in 1999 as The Drug Bulletin. The Drug Bulletin enjoys the readership of Community Pharmacists and other healthcare providers across the states in Nigeria and it is produced one or two times a year.

In our 41st Annual National Scientific Conference, held in Lagos (2022), the Association launched the presentation of scientific papers in our Conferences. This follows the decision to engender the culture of Research in Community Practice in consonance with the vision of the International Pharmaceutical Federation (FIP). This necessarily transforms the ACPN Drug Bulletin into the Nigerian Journal of Community Pharmacy and the restructuring of the ACPN Drug Information Centre into the Research and Development Unit.

Scope: To cultivate, accentuate and incentivize the culture of research in Community Pharmacy practice. To keep the readers in touch with the latest development in pharmacy practice and healthcare space, improve global health by providing professional article reviews and advanced treatment plans for common health problems.

Submission of Articles: Scientific papers can be sent to our mail at acpnresearchgate@gmail.com

Inside this Issue

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EDITOR'S NOTE

As the Journey continues in this era of disruption, innovation, and mind-blowing inventions, policies are being renewed and reviewed to live up to the immense and sometimes unimaginable trajectory our profession is taking. This called for proactive measures by community pharmacists to take the bull by the horns, dig deep into our treasure of dynamism of thought and develop solutions that speak to these ever-changing healthcare ecosystems.

One of such innovation is the idea of entrenching the culture of research in our practice and this EXCO has done a lot of justice to this underexplored area of our practice by encouraging and rewarding the efforts of our members in this area. The Clean Health Initiative (CHI) is an innovation that further speaks to the community pharmacists to brace up and perform up to expectations on the challenges confronting them in our contemporary times. With its Quality Healthcare, Quality Pharmaceutical Service and care as well as Quality drug distribution mantra it is clear beyond reasonable doubt that to fulfill our calling extensive research and knowledge are required to speak for community pharmacists in areas that concern them in the healthcare ecosystem as research and knowledge will definitely help in speaking to ideas and policies that governs the healthcare system. This will surely give wind to our sail in taking what naturally belongs to us in the Nigeria Healthcare System.

This edition being my valedictory edition as the National Edition – in – chief of our noble Association comes with a lot of reflections and gratitude. For this reason, I want to specially thank my brother and National Chairman Pharm. (Prince) Adewale Oladigbolu, FPSN for his unwavering support, leadership and ideas in bringing to the fore many of the innovative concepts being witnessed in this journal. Special thanks also go to Pharm. (Mrs.) Folashade Lawal, FPSN for mentoring me on the job. "Mummy Lawal" as I fondly call her is tireless and ever willing to give the required zest to the Research and Development Unit (formerly DIC). The Nigeria Community Pharmacy space is indeed blessed to have her.

I also want to thank Pharm. (Mrs.) Olanike Olatawura for her support and encouragement. Members of the Research and Development Unit from the thirty-six states and Federal Capital Territory Abuja, I appreciate you all. I want to specially thank Pharm. Charles Oluwole for his dedication, relentless efforts and his thoughts in seeking new frontiers on this job. PHARM. CHARLES OLUWOLE I THANK YOU FROM THE BOTTOM OF MY HEART.

As always your feedback is important to us in our bid to serve you better. Many thanks to all the contributors to this edition. We appreciate your efforts immensely and hope that the information contained in this edition will inspire further greatness in our practice.

Regards

Pharm Giwa Babajide Hammed, MAW
National Editor-in-Chief

Assessment of the Perception, Readiness and Willingness of Community Pharmacists to Provide Vaccination Services in Edo State

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Abstract

Background: Vaccines stand out as the most cost-effective intervention in preventing infectious diseases. In recent times, attention has turned to preventing infections and diseases in adulthood. Community pharmacists are possibly underutilized public health professionals especially as they are conveniently located and offer extended working hours. By virtue of their accessibility and reach in local communities, community pharmacists are ideally positioned to promote and provide vaccination services.

Aim: To assess the perception, readiness and willingness of community pharmacists to provide vaccination services in Edo State.

Method: This was a quantitative cross-sectional study that was conducted among 250 licensed and registered community pharmacies in Edo State. Interviewer questionnaire was the data collection tool. Descriptive and inferential ($\chi 2$ test) analyses were done using SPSS software with significance value set at <0.05.

Result: One hundred and fifty-nine (77.6%) community pharmacists had a good perception of pharmacist' involvement in vaccination services. The most common vaccines available in the pharmacies included tetanus [191 (93.2%)], antirabies [123(60%)], hepatitis b [31(15.1%)], and typhoid [31(15.1%)]. Eighty-five (41.5%) pharmacists have been trained in all aspects of vaccination services. Eight (3.9%) pharmacists have in place all requirements in terms of equipment and conditions to providing vaccination services, while 99 (48.3%) meet some requirements. Regarding willingness to engage in vaccination provision, 109 (53.2%) community pharmacists expressed strong desire. Government policy 188(91.7%) and support from pharmacy regulatory body and Associations are enablers, while cost of equipment 165(80.5%) and poor knowledge and skills 160(78%) of community pharmacists are possible hindrances to community pharmacists' participation in vaccination programme. Pharmacists with >5 years of experience (p=0.00), owners of pharmacies (p=0.001), and those working more than 12 hours daily (p=0.000) were more ready to provide vaccine service.

Conclusion: Most community pharmacists have embraced their expanded role of providing vaccination services. Some are currently providing this service, while others who are yet to get involved are willing to do so. The need for Pharmacy Regulatory organization and Associations to advocate for community pharmacists as vaccinators and training and retraining of pharmacists will facilitate the recognition of community pharmacists in the National Vaccination Programme.

Keywords: Community pharmacists, Vaccination, Willingness, Perception

Community Pharmacist Perception on Diabetic Foot Ulcers (DFU) and Foot Care in Niger State, Nigeria

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Background: The number of diabetic patients who develop foot ulcers each year across the world is about 18.6 million. Amputation of the lower limbs due to diabetic foot ulcers (DFU) is a common and fatal complication of diabetic mellitus (DM) if the condition is poorly controlled. Community pharmacist can prevent diabetic complication by counseling patients on medication adherence, foot care and risk factors.

Aim: To explore the perceptions and experience of Community Pharmacists regarding diabetic foot ulcer (DFU) and foot care practices in Niger State, Nigeria.

Method: A descriptive cross-sectional study was conducted between May 18 to June 24, 2024 on Community Pharmacist who agree to participate in Niger State using a valid pre-tested structured questionnaire. The data collected were analyzed using IBM SPSS statistics for Windows Version 26 (Released in 2019), with p-value ($p< 0.05$) considered to be significant. A two-section questionnaire was employed. First section, included demographic variables of participants and section to explore the perceptions about DM, DFU and foot care, scored based on (Yes/No/ I don't know) nominal scale.

Results: A total of 64 Community Pharmacist participated in the study, representing a response rate of 54 %. Majority (58 %) were females. Majority (28.6 %) are greater than 50 years of age, those with Bachelor of Pharmacy/Doctor of Pharmacy constitute the majority (71.4 %). Majority (57.1 %) have been practicing for over 20 years. Majority 55 (85.7 %) of Community Pharmacist in this study, have good perception of diabetic foot ulcers (DFU), diabetic mellitus (DM) and foot care. Majority of Community Pharmacists 46 (71.4 %) said they were satisfied with caring for diabetic patients, of these, 18 (28.6 %) have wound care experience above 20 years while the majority 28 (42.9 %) have between 11-15 years of wound care experience. Our study showed different perceptions of Community Pharmacist with regards to wound care as 9 (14.3 %) said diabetic wound care is time-consuming to manage, and about 18 (28.6 %) said they are not satisfied with managing diabetic patients.

Conclusion: This study shows that majority of Community Pharmacist had good perception of diabetic foot ulcers but slightly poor wound care practices. This further shows the need for further in-service training on foot care. Pharmacy premises should be equipped with resources and supply chains commodities to ensure Community

Physicochemical and Microbiological Assessment of Clarithromycin Tablets Marketed in Enugu State Nigeria

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Abstract

Background: There is a widespread distribution of substandard and counterfeit drugs in developing countries. The potency of antibiotics is estimated by comparing the inhibition of the growth of sensitive microorganisms produced by known concentrations of antibiotics being examined with a reference substance. Clarithromycin is a macrolide antibiotic used for the treatment of a wide variety of bacterial infections such as acute otitis, pharyngitis, tonsillitis, uncomplicated skin infections, and helicobacter pylori infection.

Objectives: The study focused on the evaluation of the physicochemical and microbiology properties of the Clarithromycin tablet marketed in Enugu state by comparing the in vitro susceptibility of isolates of Staphylococcus aureus to various brands.

Methods: Clarithromycin tablets labeled A-D were sourced from various Pharmacies. All brands were evaluated for various physicochemical properties namely: physical examination, Chemical test, weight uniformity, and disintegration time. A microbiology assay was also conducted using the agar cup-diffusion method. Staphylococcus aureus clinical isolates were used for seeding the solidified nutrient agar plates. The diluted drug was introduced into the bored cup. Then the plates were kept in the incubator at 37oC for 13 hours. Parameters monitored were inhibition zone diameter (IZD) and percentage drug potency which was determined from each brand IZD.

Results: Physical properties of all the brands were satisfactory in terms of colour and absence of mottling. Labeling guidelines were followed and no mistakes were detected in spellings for all the brands. The packaging materials of all the brands were clean. Weight uniformity tests of all the brands showed percentage deviation of less than ± 10%. Disintegration of all the brands was within 6mins. Microbiology results showed that all the brands had good potency with exception of Brand B. The percentage potency of all the brands lies from 100 to 112%. One brand failed the percentage potency test for being out of range of 95 – 105%.

Conclusion: Three brands passed physicochemical and microbiology parameters when compared to innovator product. Hence, they will elicit therapeutic responses on time thereby improving patient related quality of life.

Keywords: Clarithromycin, Substandard, physicochemical, microbiology assay, potency

Public health information needs of urban residents: An opportunity to promote pharmacists role in community health

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Abstract

Background: Health information is a foundational component of public healthcare education that is intended to promote individual and community health, prevent diseases and optimize treatment outcomes for patients. Generally, health information assist people make healthcare decisions, adjust lifestyle and promote self-care.

Aim: Health information needs within the community is less well studied in Nigeria, so this study aims to explore the needs for health information within an urban community.

Method: This was a cross-sectional questionnaire-based survey study among randomly selected adults (18 years). Data was analyzed using descriptive statistics as well as Chi square to determine association between demographic variables and health information needs. P values ≤ 0.05 was considered statistically significant.

Results: The results showed that about half of respondents expressed their need for information related to sexual/reproductive health, childhood diseases, vaccination, identification of disease symptoms and how to participate in the medical decision-making process. More than half of respondents needed information to enable them participate in the medical decision-making process [68.3%], management of childhood diseases [55.1%], vaccination [53.1%], sexual/reproductive health [54.2%] etc. There was significant association between demographic variables and the need for health information.

Conclusion: There were diversity of health information needs which reflected the desire to participate in many aspects of healthcare through access to relevant and accurate information. This will provide opportunity for pharmacists to deepen their involvement in providing health information in the course of pharmaceutical care services.

Health information needs of the community was largely unmet by the cadre of health workers providing them. It's therefore important that Pharmacists at the community level step up to fill this huge information gap as part of value-added services to the public.

Typhoid Testing in Community Pharmacy: Emerging Epidemiological Data and Opportunities for Preventing Antimicrobial Resistance.

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Background: Despite many reported Typhoid treatments in community pharmacies, there is paucity of data on Typhoid rapid diagnostic tests (RDT) and prevalence in this setting. Also, the widespread use of the Widal Test, clinical symptoms or mere suspicion for diagnosis of Typhoid infection, despite proven inadequacies, are associated with over prescription, indiscriminate requests, abuse and purchase of antibiotics across the counter while contributing to the growing menace of antimicrobial resistance.

Aim

1. To determine the outcomes of, and opportunities for pharmacist-initiated Typhoid RDT for preventing antibiotic misuse, promoting antimicrobial stewardship, and improving epidemiological data in community settings in Nigeria.
2. To compare Typhoid prevalence in pharmacy-based RDT versus Widal Test

Method : Community pharmacy-based retrospective study on 441 patients (aged from 2 months to 87 years) who presented at the participating pharmacies across three Local Government Areas of Oyo State for Typhoid treatment or with fever or headache. Five-year data sets from records of patients tested for S. typhi using approved IgG/IgM Typhoid RDT for qualitative assay of patients' blood samples were analysed.

SPSS was used for data summarisation: association of age, gender and marital status with Typhoid fever was obtained through Chi-square test.

Results: The records of 441 patients were studied. 15.6% of the patients tested positive for Typhoid as against over 60% reported for Widal Tests. Prevalence was high among female patients (17.6%), singles (19.7%) and age range 21-25 years (27.5%) but low in patients above 45 years (14%). Chi square test showed an association of Typhoid fever with marital status ($p < 0.05$) but not with specific age bracket and gender.

Conclusion: Aggregating Typhoid RDT data from community pharmacies has the potential to provide valuable insights into the true prevalence of Typhoid, especially where current data have come mainly from hospitals/laboratories. Implementing Typhidot RDTs can help inform public health strategies, reduce antibiotic misuse, and promote antimicrobial stewardship among pharmacists.

Comparative Study of Physicochemical Properties of Paracetamol Injection Marketed in South East, Nigeria.

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Background: Substandard medicines are widespread and represent a threat to health because they can lead to healthcare failures, such as antibiotic resistance and prolonged stay in hospital as well as death. The estimated overall prevalence of poor-quality medicines was found to be 13.6 %. Because of this, physicians encounter problems in the selection of quality brands of drugs.

Aim: To determine the quality of Paracetamol injection brands, a comparative study on the physicochemical properties of the injection was done.

Method: Eight brands of Paracetamol injections were analyzed. Physicochemical properties were evaluated including physical examination and pH determination. Drug content was assayed using ultra violet spectroscopic method according to British Pharmacopoeia (BP). Quantitative determination of bacterial endotoxin test was also carried using Limulus amoebocyte lysate (LAL) test.

Results: Physical examination of the original and all generics showed no presence of particles and colourless. The pH of all the brands ranged from pH 4.67 – 5.89 and four brands were outside official specifications. Drug assay showed paracetamol content of only three brands complied with British pharmacopeia standard of 95 – 105%. The bacterial endotoxin concentration of all the injections complies with the standard specification since all contain less than 0.5 EU/ml release limit.

Conclusion: Based on these results, 37.5% of Paracetamol injections complied with quality specifications.

Keywords: Substandard drugs, Paracetamol, Drug quality, Ultra Violet Spectroscopy, Limulus amoebocyte lysate test.

Community Pharmacists' Role in Identifying Fermented Cassava-Related Gastrointestinal Symptoms: A Preliminary Study

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Abstract

Background: Fermented cassava products are staple foods in Nigeria, but their consumption may be associated with gastrointestinal symptoms that are sometimes misattributed to other conditions.

Objective: To assess the prevalence of gastrointestinal symptoms among fermented cassava consumers and evaluate the effectiveness of a questionnaire-based screening tool for community pharmacists to identify potential fermented cassava-related symptoms.

Methods: A cross-sectional study was conducted using an online questionnaire distributed to regular customers of a community pharmacy. The questionnaire, serving as a screening tool, was completed by 58 respondents, assessing their fermented cassava consumption patterns, associated gastrointestinal symptoms, timing of symptom onset, and knowledge of cassava processing methods.

Results: Of the 58 respondents, 84.5% regularly consumed fermented cassava products, with 36.2% reporting gastrointestinal symptoms post-consumption. Symptom onset varied from within 1 hour to more than 4 hours post-consumption. The screening tool identified that 37.9% of respondents had diagnosed gastrointestinal conditions, with peptic ulcer disease being the most common.

Conclusion: This preliminary study suggests that a significant proportion of gastrointestinal symptoms presented in community pharmacies may be related to fermented cassava consumption. The online questionnaire-based screening tool can help community pharmacists identify these cases, potentially reducing misdiagnosis and improving patient care. Further research is needed to refine this tool and establish clearer links between cassava consumption, method of processing and gastrointestinal health.

Keywords: Fermented cassava, Food Safety, Gastrointestinal symptoms, Communitypharmacy, Online screening questionnaire carried using Limulus amoebocyte lysate (LAL) test.

Pharmacists' Evaluation of the Role of Non-Pharmacists in Community Pharmacy Practice

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Abstract

Background: The involvement of non-pharmacists in community pharmacy practice has raised significant concerns in recent years, prompting a need for this study to examine their roles, impact on pharmacists, and the satisfaction levels of pharmacists employed by non-pharmacist owners.

Methods: This cross-sectional descriptive study was conducted across Osun state, Nigeria, involving 122 pharmacists from selected community pharmacy stores. A pretested semi-structured questionnaire comprising four sections was utilized to gather data on the roles of non-pharmacists, their effect on community pharmacists, and pharmacists' satisfaction levels. Data analysis incorporated descriptive statistics, including frequencies, percentages, means, and weighted averages, alongside inferential techniques such as factor analysis, KMO, and Bartlett's test.

Results: Non-pharmacists were found to engage in process-oriented roles (I =1.766), maintenance tasks (I =1.169), and the sales of nonprescription items within community pharmacy settings (I =1.010). A notable proportion of pharmacists (90%) attributed a decline in client patronage to neighbouring medicine stores operated by non-pharmacists. Pharmacists employed by non-pharmacist owners reported high levels of job satisfaction, with parameters measuring satisfaction averaging 3.83 on a Likert scale, while dissatisfaction parameters averaged 2.53. Dissatisfaction was notably associated with preferences for pharmacist-owned establishments.

Conclusion: In conclusion, this study found that non-pharmacists undertake process-oriented tasks, maintenance responsibilities, and nonprescription sales within community pharmacy settings. Additionally, it revealed that most pharmacists employed by non-pharmacists expressed satisfaction with their jobs. The study highlights non-pharmacists' diverse roles and advocates transparent regulation to ensure high-quality patient care and safety in pharmacy practice.

Keywords: Non-pharmacists; Pharmacists; Community pharmacy practice; Regulation; Satisfaction levels

Quality Of Healthcare

By Pharm Oluwaseyi Oluwole Charles

Introduction

According to a report by the World Health Organization, poor-quality care accounts for up to 15% of overall deaths in low- and middle-income countries (LMICs). Specifically, the report indicated that between 5.7 and 8.4 million deaths in these countries are attributed to low-quality healthcare services. It is estimated that sixty percent of deaths in LMICs from conditions requiring healthcare occur due to poor quality care, whereas the remaining deaths result from non-utilization of the health system.

With Nigeria currently ranking 157 out of 167 countries on healthcare indices (Statista 2023), issues surrounding access to quality healthcare services should be a mega focus for all who care for the consumers of health in Nigeria.

In their article titled "Improving Access, Quality and Efficiency in HealthCare Delivery in Nigeria: A Perspective," McKing and Ifunanya 2021, noted that "providing equitable access to healthcare for every Nigerian, is central in the country's National Health Act.

However, the Nigerian Health System ranks poorly in terms of access and quality, just as the country also ranks poorly on Transparency International's Corruption Perception Index. The problem of lack of access to quality healthcare is linked to the wasteful use of referral centers to render primary care services.

In rural communities where the burden of disease morbidity and mortality is high, efficient health expenditure and service utilization, are plagued by the absence of adequately functioning Primary Health Centers (PHCs), and poor or inadequate cost-sharing schemes; all due to corrupt practices in the health sector."

The low quality of healthcare has reached a critical stage in Nigeria, culminating in rousing doubts and speculations about the efficiency of orthodox medicine among the consumers, and fuelling medical tourism among the political class and elites who can afford 'better' healthcare in another land.
In their article titled "Quality of Health Care in Nigeria: A Myth or a Reality," Benson et al., 2018, opined that "the pace of development of quality healthcare services in Nigeria remains quite unsatisfactory. This is because Nigeria, a highly populous nation has a world health system ranking, of 187 out of 200 countries; still has weak or non-existent healthcare standards and accreditation systems, poor quality healthcare services, inequitably distributed, as well as insufficient healthcare service delivery. Despite the investments into primary, secondary, and tertiary healthcare, coverage of basic healthcare services, especially for the rural populace of the country is yet to be attained."

In March 2024, the Clean Healthcare Initiative (CHI), a Foundation concerned with the quality of healthcare services and medicine supply in Nigeria, held the maiden edition of the International Conference on Quality of Medicines and Healthcare Services in conjunction with the Association of Community Pharmacists of Nigeria (ACPN) in Abuja, Nigeria.

The Conference, which consisted of all stakeholders, researchers, and some key regulators of the healthcare system, focused on the panacea to the decelerating quality of healthcare services in Nigeria.

The Conference was amazed when the regulators and some researchers in their presentations revealed the level of substandard and falsified

medicines in Nigeria. (Some Abstracts from the Conference are published in this Journal).

Researchers, over the years, have raised alarm on the quality of medicines available in Nigeria and Sub-Saharan Africa. A comprehensive study by Taylor et al., 2001 noted that "the quality of medicines available in some less-developed countries, is inadequate, in terms of content of active ingredient".
Reasons for the poor quality of drugs include;

i. Widespread counterfeiting of medicines in less-developed countries,
ii. Excessive or accelerated decomposition of active ingredients as a result of high temperature, humidity, and poor quality assurance, during the manufacture of medicinal products.

The study, which was conducted in Lagos and Abuja, randomly sampled 581 products from different pharmacies for analysis. The result indicated that 279 samples, representing the gross, 48 percent, failed the standard test. This includes some preparations, which contained no active ingredient, and some with amounts just outside the pharmacopeial limits.

Previous studies by affiliated bodies of the WHO have indicated that at least one in 10 medicines in Sub-Saharan Africa, is either substandard or falsified.

Case Study
Mrs. Ajiga has gone to a notable Tertiary hospital with her old mother who has been complaining of lower back pain for the past few months. This was after all the efforts to curtail the pain, using various ranges of available analgesics (as 'prescribed' by neighbors, friends, and relatives) bought from the neighborhood Pharmacies, had failed to produce any substantial result.

Their first visit was hectic, but unsuccessful, due to their 'late arrival'. They were however lucky to see the Consultant on the second visit after waiting for 7 hours (four weeks later).

The laboratory analysis suggested that the old woman was suffering from appendicitis, which required immediate surgical removal. Another two months later, the old woman was diagnosed with stage 3 ovarian cancer, in another Tertiary institution. Mama died 4 months later; the post surveillance testing done a week later revealed that the chemotherapy used on her were either substandard or falsified

What is Quality Healthcare?
According to the National Academy of Medicine, quality healthcare is care that is safe, effective, patient-centered, timely, efficient, and equitable.
Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes. It is based on evidence-based professional knowledge and is critical for achieving universal health coverage.

The World Health Organization supplemented that quality healthcare should be integrated.

Elements of Quality Healthcare
Quality Healthcare should be;

i. Safe: Preventing harm to patients from the care that is intended to help them.
ii. Effective: Providing services, based on scientific knowledge, to all who would benefit, and refraining from providing services to those not likely to benefit (avoiding underuse and misuse, respectively).
iii. Patient-centered: Providing care that is respectful of, and responsive to individual patient preferences; needs, and values. Ensuring that patient values guide all clinical decisions.
iv. Timely: Reducing waiting, and sometimes harmful delays, for both recipients of healthcare and their caregivers.
v. Efficient: Eliminating waste of equipment, supplies, ideas, and energy.
vi. Equitable: Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.
vii. Integrated: Providing care that is coordinated across levels and providers; making available the full range of health

services throughout the patient's life.

Where are We?

Fortunately, we know where we are, as well as where we want or ought to be. The potential and will to advance is also resident within us.

In their review, Benson et al., 2018 concluded that "there is a void that needs to be filled by all relevant stakeholders in the Nigerian healthcare system if the provision of quality healthcare is to be attained to its fullest capacity. The 'Great Fix' is of absolute importance at this stage of development of the Nigerian State so that in reality, Nigerians can say that they indeed abide in a state of complete physical, mental, and social well-being while remaining economically productive and viable."

Speaking specifically on the quality of medicines, Taylor et al., 2001 highlighted that "the most probable cause of the poor quality of drugs is the absence of adequate quality assurance during manufacture. Substandard drugs sold in the Pharmacies of less-developed countries could contribute to global microbial resistance and therapeutic failure of infectious diseases."

Part of the resolutions of the International Conference on Quality of Medicines and Healthcare Services is the immediate deployment of quality assurance tools to three regions in Nigeria, with other recommendations for regulators and professionals on quality measures.

As a nation that relies on the importation of up to 70 percent of its pharmaceuticals, vibrant quality assurance tools remain a requirement for the assurance of quality medicines and pharmaceutical supplies.

Conclusion

As commonly stated in quality assurance, Good quality is not a parameter to search for but rather, a product to build. Thus, quality requires a deliberate and pragmatic action that is woven into an integrated system. We must therefore go beyond the assessment of quality of care in 'finished dosage forms' to the integration of quality from the onset. This requires ensuring the right professionals, engage in the right services (as trained), in the right facility, to the right clients.

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ASSURANCE OF QUALITY OF HEALTHCARE SERVICES: THE ROLE OF PATIENT AND HEALTHCARE PROFESSIONALS

By Pharm Charles Akinsete, *MAW*

Background:
The health sector should adopt integrated quality systems because of the need to survive and develop, in a highly competitive environment.
Inefficiency of mechanistic procedures, along with inadequate administrative infrastructure, require innovative approaches to improve operations and increase revenues by reducing quality failures.

Objective:
A health system that relies on quality healthcare services can directly benefit the entire society, through reduced mortality and disease severity, thus increasing life expectancy.
The following review constitutes an attempt to assess the contributions of healthcare professionals and the patient on issues that relate to the quality of healthcare services.
Assuring the quality of healthcare services is a shared responsibility of patients and healthcare professionals.

Patients' Contribution Towards Quality Healthcare
To ensure the delivery of quality healthcare services, patients should:

1. Be informed: Educate themselves about their condition, treatment options, and expected outcomes.
2. Ask questions: Clarify any doubts or concerns with the healthcare provider.
3. Share history: Provide accurate and complete medical history and information.
4. Follow instructions: Adhere to treatment plans and medication regimens.
5. Speak up: Report any concerns or dissatisfaction with care.
6. Choose reputable providers: Research and select qualified healthcare professionals and facilities.

Contribution Of Healthcare Professionals Towards Quality Healthcare
To ensure the delivery of quality healthcare services, Healthcare Professionals should:

1. Stay updated: Be current with the latest research, guidelines, and best practices.
2. Communicate effectively: Clearly explain diagnoses, treatments, and plans to patients.
3. Coordinate care: Collaborate with other healthcare professionals to ensure comprehensive care.
4. Monitor and evaluate: Regularly assess patient outcomes and improve care accordingly.
5. Maintain accurate records: Keep accurate and up-to-date patient records.
6. Prioritize patient-centered care: Focus on individualized care that respects the patient's values and preferences.
7. Continuously improve: Engage in ongoing quality improvement initiatives and professional development.

Conclusion:
The contribution of Health professionals towards the strategic planning of healthcare in organizations, through the institution of quality activities, can lead to better outputs; both in patient satisfaction and safety.
By working together, patients and healthcare professionals can ensure high-quality healthcare services that prioritize patient safety, effective care, and positive outcomes.

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An Assessment Of In-vitro Quality Control Of Different Brands Of Ciprofloxacin 500 Mg Tablets Marketed In Zaria

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ABSTRACT

Ciprofloxacin is a 4-fluoroquinolone antibiotic with a broader spectrum of action than nalidixic acid and more favourable pharmacokinetics, which allows its use in systemic infections. It is used to treat various infections. There are many different brands of Ciprofloxacin Hydrochloride (500 mg) tablets available in the Zaria metropolis and the quality of these brands is important for product usage. The present study aimed to evaluate the quality of five brands of ciprofloxacin hydrochloride tablets marketed in Zaria metropolis. Five brands of ciprofloxacin hydrochloride tablets (500 mg) were purchased from retail pharmacies. Each brand was assigned different codes, and its pharmaceutical quality was evaluated using official and unofficial in-vitro quality control tests, namely identification by Fourier Transform Infrared Spectroscopy, weight variation, friability, hardness, disintegration time, dissolution test and analysis by Ultraviolet spectrophotometric method to determine content. All brands evaluated passed the in-vitro quality control tests required for the tablets according to USP and BP standards. The results showed that the overall quality of all ciprofloxacin hydrochloride tablet brands tested was satisfactory as they met the requirements of official and unofficial quality control tests.

Keywords: Ciprofloxacin HCl, dissolution, disintegration, friability, hardness, quality control.

INTRODUCTION

Ciprofloxacin, a synthetic antibacterial agent derived from nalidixic acid, belongs to the fluoroquinolone class and features a fluorine atom located at the sixth position of the naphthyridine ring. Extensive structure-activity studies have been published, indicating that the presence of fluorine contributes significantly to the broad-spectrum antibacterial activity of this compound against a wide range of pathogens, including both gram-negative and gram-positive bacteria (Majalekar & Shirote, 2020). Accidentally discovered in 1962, ciprofloxacin has emerged as a pivotal component in the management of various infectious diseases, such as urinary tract infections, gastrointestinal and abdominal infections, and sexually transmitted infections, The efficacy of this medication renders it a valuable resource in the healthcare sector, particularly in the fight against bacterial infections that show resistance to alternative antibiotics (Murugaiyan et al., 2022).

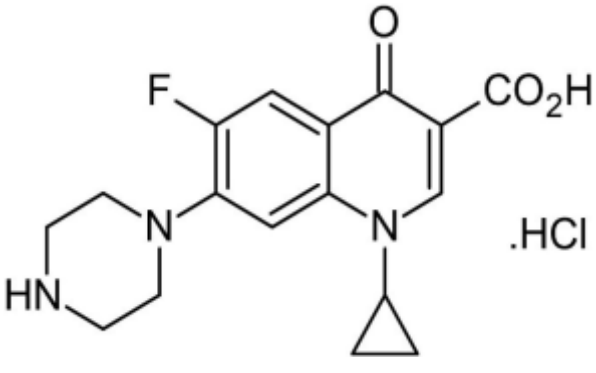

Figure 1: Chemical structure of ciprofloxacin hydrochloride

Quality control is a procedure or set of procedures intended to ensure that a manufactured product adheres to a defined set of quality criteria listed in the official monographs or meets the requirements specified by regulatory bodies such as the National Agency for Food and Drugs Administration and Control (NAFDAC) and World Health Organization (Derby, 2020). In-vitro quality control assessment of a tablet involves comprehensive evaluation which includes physical examination of the sample of tablet with the label information, identification test, uniformity of

weight, disintegration and dissolution rates and assay (Muhammad et al., 2021). This is usually carried out by regulatory bodies, designated laboratories and those in academia. WHO (2010) reported that "substandard medicines are pharmaceutical products that do not meet their quality standards and specifications. Each pharmaceutical product that a manufacturer produces has to comply with quality assurance standards and specifications, at release and throughout its shelf-life, according to the requirements of the territory of use. Normally, these standards and specifications are reviewed, assessed and approved by the applicable national or regional medicines regulatory authority before the product is authorized for marketing." There are many diverse brands of Ciprofloxacin Hydrochloride (500 mg) tablets readily available within the Zaria metropolis and the quality of these brands is imperative for product utilization. The present study aimed to carry out the in-vitro quality control evaluation of five brands of ciprofloxacin hydrochloride tablets marketed within the Zaria metropolis in Kaduna State, Nigeria.

MATERIALS AND METHODS

Drugs, Chemicals and Equipment

Ciprofloxacin hydrochloride standard powder (Sigma-Aldrich) and five different brands of ciprofloxacin tablets purchased from retail Pharmacy outlets in Zaria and coded, analytical grade methanol (BDH, Germany), distilled water (was obtained from Pharmaceutics Laboratory, Ahmadu Bello University, Zaria), Ultraviolet-visible spectrophotometer (SPS-100, Cambridge, England), Fourier transform infrared machine (Agilent, Germany), Friabilator (Erweka, TA3, Germany), Dissolution apparatus (Erweka, Germany), Disintegration apparatus (Erweka, Germany), Analytical balance (Mettler Gallenkamp), Melting point apparatus (Erweka, England), Manual tablet hardness tester (Vinsyst Technologies, India), Centrifuge (Mettler Gallenkamp, England), Refrigerator (Haier Thermocool, Nigeria), Vernier calliper, and Mortar and pestle.

In-vitro Quality Assessment Tests

Physical assessment of the ciprofloxacin tablet brands: The five (5) brands of ciprofloxacin (500 mg) tablet were examined for batch number, manufacturing date and expiry date. The physical assessment of the tablets from the various brands was carried out taking note of their colours, shapes, presence or absence of scoring. The diameter and thickness of the tablets from the various brands were also measured with the aid of a vernier calliper as described in BP 2013.

Identification test of the ciprofloxacin standard powder and the various brands of ciprofloxacin tablets

a. Identification test of ciprofloxacin standard powder using FTIR: A small quantity of the standard ciprofloxacin powder obtained was analyzed using Agilent Technology Cary 630 FTIR machine (USP, 2006) Identification of the ciprofloxacin powder was achieved by superimposing the FTIR spectrum obtained with a standard IR spectrum of ciprofloxacin.
b. Identification test of the various brands of ciprofloxacin tablets: One tablet from each brand of ciprofloxacin tablet was grinded and made into a solution with 20 mL methanol. The solution was shaken for 30 minutes, filtered and the filtrate was allowed to evaporate to dryness at room temperature for 48 hours (about 2 days). A small quantity of the dried filtrate for each brand of the ciprofloxacin tablet obtained was analyzed using Agilent Technology Cary 630 FTIR machine (USP, 2006). Identification of the ciprofloxacin powder was achieved by superimposing the FTIR spectrum obtained with a standard IR spectrum of ciprofloxacin.

Assay of the ciprofloxacin tablet brands using Ultraviolet-Visible Spectroscopy

Sample preparation and determination of wavelength of maximum absorption (I max)

Ciprofloxacin stock solution (1 mg/mL) was prepared by dissolving standard ciprofloxacin powder (100 mg) in 20 mL of distilled water. The solution was then made up to 100 mL with distilled water. The solution, after ten-fold dilution, was scanned within 200 to 600 nm to obtain I max.

Construction of calibration curve

A calibration curve of ciprofloxacin in distilled water was constructed by preparing a series of working solutions within the concentrations range of 10 to 160 µg/mL from the stock solution. The

absorbance was measured at the I max of the ciprofloxacin previously determined. The absorbance obtained was plotted against their corresponding concentrations. The calibration curve generated was used to determine the concentration of ciprofloxacin for both the assay and dissolution rate test.

Extraction and quantification

Ciprofloxacin tablets (20) were grinded into a fine powder and a portion of the powdered tablets equivalent to 100 mg of ciprofloxacin HCl was carefully weighed and transferred into a 100 mL volumetric flask and was extracted by addition of 10 mL of distilled water. The volumetric flask was shaken for a few minutes to enable the complete dissolution of the drug and the solution was made up to the volume with distilled water and filtered. The filtrate containing ciprofloxacin was analyzed by taking the absorbance at the obtained I max. The concentration of ciprofloxacin was extrapolated from the calibration curve generated above.

Weight variation: Uniformity of weight test for ciprofloxacin was conducted by weighing 20 tablets individually and the mean weight was determined. The percentage deviation of each of the tablets from the mean was determined.

Hardness test: A manual tablet hardness tester was used to carry out the crushing strength test of ciprofloxacin tablets of each brand (n=6) as described in BP (2013).

Friability: The ciprofloxacin tablets (n = 10) from each brand were weighed and placed in a friabilator operated at 25 revolutions per minute. After four minutes (100 revolutions), the tablets were removed, dusted with tissue paper, weighed and the difference in the tablet's weight was determined. The percentage loss was calculated using the formula:

$$\text{Friability (\%)} = \frac{\text{Initial weight of ten tablets - Final weight of ten tablets}}{\text{The initial weight of ten tablets}} \times 100$$

Disintegration test: The disintegration test was carried out using the Erweka disintegration apparatus as described in BP, 2002. The medium employed for the disintegration test was 900 mL of distilled water at 37 ± 2°C. Ciprofloxacin tablets (n = 6) were selected from each brand and a tablet was placed in each of the six units of the disintegration apparatus. The disintegration apparatus was turned on and the time taken for the tablet fragment to completely pass through the mesh Erweka disintegration apparatus was taken with the aid of a stopwatch.

Dissolution test: The dissolution rate for ciprofloxacin tablets from each brand was determined using the Erweka dissolution apparatus. One tablet was placed into the rotating paddle, the apparatus was assembled and the medium (900 mL distilled water) was allowed to equilibrate at 37°C. Thereafter, the apparatus was allowed to run at 50 rpm for 45 minutes and a sample of 5 ml was withdrawn from a zone midway between the surface of the dissolution medium and the top of the rotating paddle. The absorbance of ciprofloxacin from the solution was determined using an ultraviolet-visible spectrophotometer at I max determined against a blank (distilled water) after 100-fold dilution. The percentage release of ciprofloxacin at 45 minutes was determined for each brand at this wavelength using concentrations derived from the calibration curve constructed previously.

Results

The label information and the physical appearance of the five brands of ciprofloxacin tablets revealed information as indicated in Tables 1 and 2.

Table 1: Label information of ciprofloxacin tablet brands

Code	Batch No.	NAFDAC No.	Manuf. Date	Expiry Date	Manufacturer
A	+	+	03/2021	02/2024	Imported
B	+	+	05/2021	04/2024	Imported
C	+	+	05/2022	04/2025	Indigenous
D	+	+	08/2021	07/2024	Imported
E	+	+	09/2022	08/2025	Indigenous

+ indicates presence while – indicates absence

Table 2: Physical characteristics of ciprofloxacin tablet brands

Code	Presence of score	Presence of logo	Mean Thickness (mm) ± STD	Mean Diameter (mm) ± STD
A	+	-	6.73 ± 0.04	9.56 ± 0.14
B	-	+	6.34 ± 0.09	8.26 ± 0.12
C	+	+	4.61 ± 0.11	9.24 ± 0.07
D	+	-	5.18 ± 0.03	8.40 ± 0.08
E	+	-	5.05 ± 0.02	9.4 ± 0.06

All the brands (A – E) were white, uncoated, and oblong with smooth surfaces. + indicates presence while – indicates absence

Results of Identification of ciprofloxacin standard powder and the five brands of ciprofloxacin tablet using FTIR

The superimposed FTIR spectra of ciprofloxacin standard powder and each of the five brands of ciprofloxacin against ciprofloxacin BP reference IR spectrum are presented in Figures 2-7.

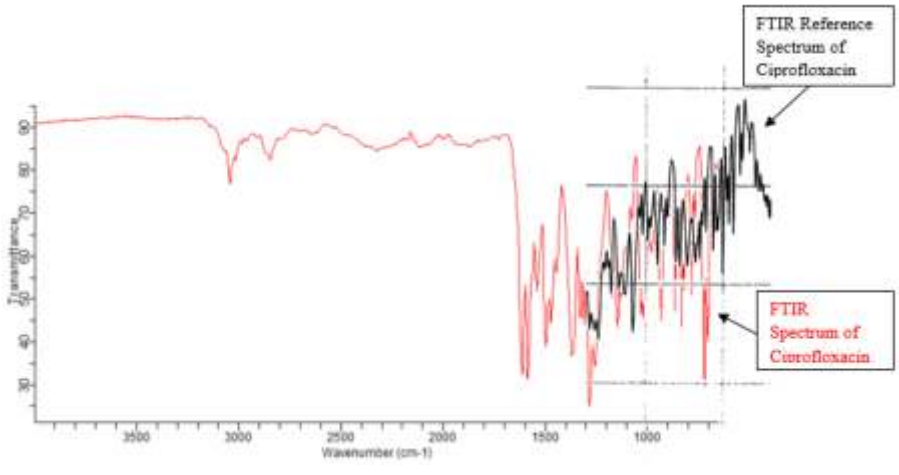

Figure 2: Superimposed FTIR spectra of ciprofloxacin standard powder against ciprofloxacin BP reference

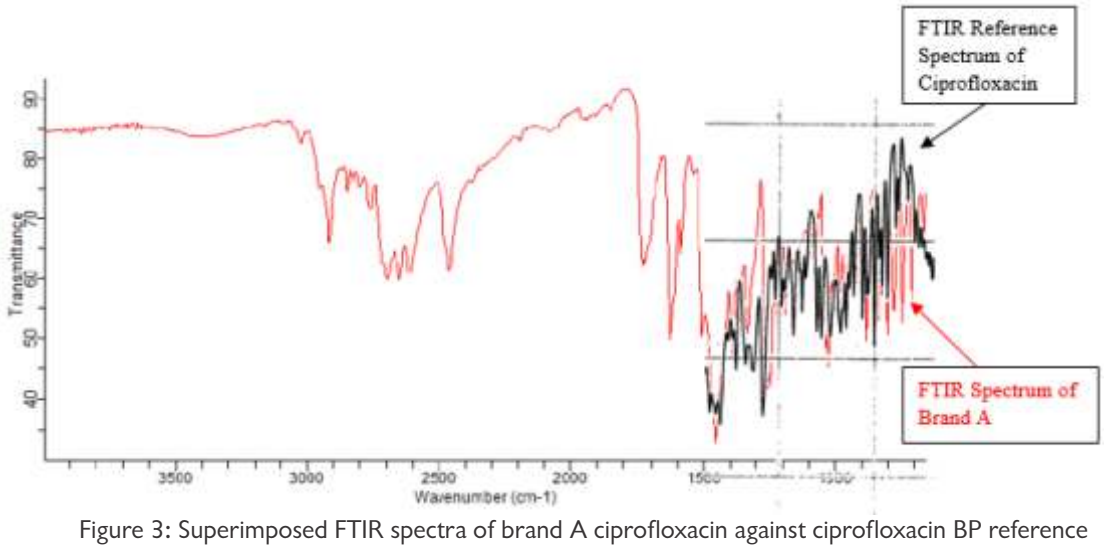

Figure 3: Superimposed FTIR spectra of brand A ciprofloxacin against ciprofloxacin BP reference

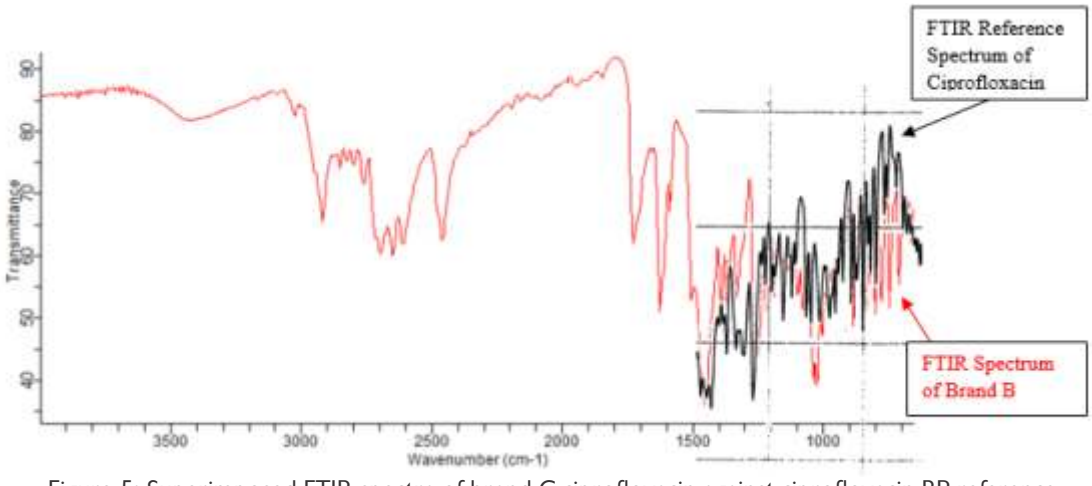

Figure 5: Superimposed FTIR spectra of brand C ciprofloxacin against ciprofloxacin BP reference

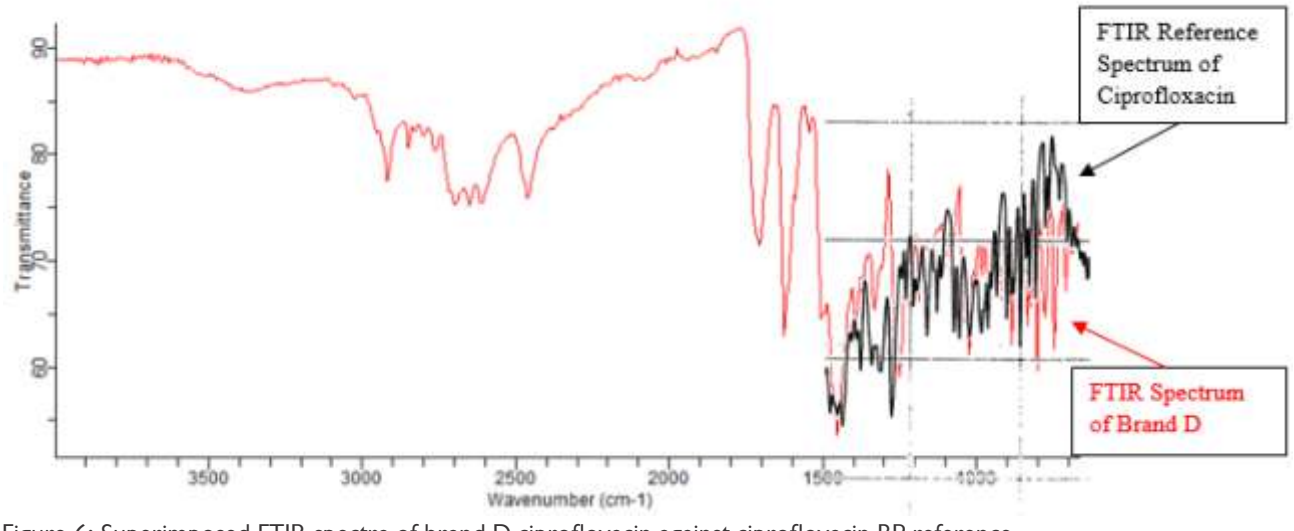

Figure 6: Superimposed FTIR spectra of brand D ciprofloxacin against ciprofloxacin BP reference

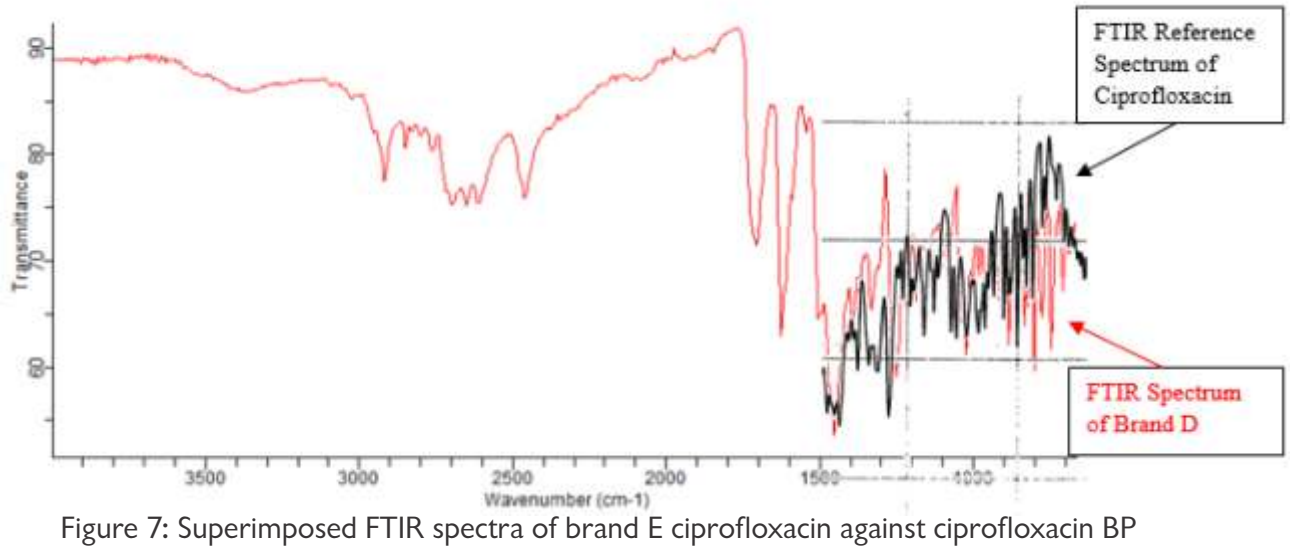

Figure 7: Superimposed FTIR spectra of brand E ciprofloxacin against ciprofloxacin BP

Assay, disintegration and dissolution rate for the different brands of ciprofloxacin tablets

The five-point calibration curve prepared within the range of 10 – 160 µg/mL of ciprofloxacin hydrochloride powder in distilled water is shown in Figure 8.

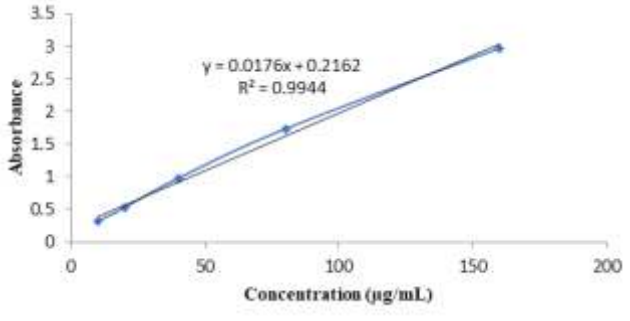

Figure 8: Calibration curve for ciprofloxacin hydrochloride in distilled water

The percentage content, mean disintegration time and the dissolution rate for each brand of ciprofloxacin tablet evaluated are shown in the Table 3.

Table 3: Assay, mean disintegration time and the dissolution rate of ciprofloxacin tablet brands

Code	Percentage Content (%)	Mean Disintegration Time (min) ± SD	Percentage Drug Release at 45 minutes (%)
A	96.36	0.25 ± 0.09	95.43
B	103.18	5.28 ± 0.77	98.64
C	97.50	2.48 ± 1.58	93.34
D	99.77	12.69 ± 1.53	91.61
E	98.64	14.20 ± 0.42	96.26

SD: standard deviation

Weight variation for the different brands of ciprofloxacin tablets

The results obtained for the weight variation determined for the five brands of the ciprofloxacin tablets are shown in Table 4.

Table 4: Weight variation for the five brands of ciprofloxacin tablets

Code	Mean weight (mg) ± SD	Range of % deviation	Number of tablets that deviate ± 5 % from mean weight
A	920.40 ± 9.00	0.28 – 1.59	None
B	1024.50 ± 8.73	0.34 – 1.31	None
C	746.50 ± 21.06	0.60 – 2.89	None
D	702.30 ± 3.40	0.19 – 1.10	None
E	727.30 ± 9.29	0.51 – 2.24	None

SD: standard deviation

Crushing Strength (Hardness) and percentage friability results for the different brands of ciprofloxacin tablets

The hardness and percentage friability evaluated for the five brands of the ciprofloxacin tablets are shown in Table 5.

Table 5: Mean crushing strength and percentage friability for the five brands of ciprofloxacin tablets

Code	Mean Crushing Strength (Kgf) ± SD	Percentage friability (%)
A	14.6 ± 0.548	0.03
B	14.4 ± 0.548	0.00
C	12.4 ± 0.548	0.00
D	12.6 ± 0.548	0.06
E	14.4 ± 0.548	0.00

SD: standard deviation

Discussion

The tablet samples examined were registered with the National Agency for Food and Drug Administration and Control, NAFDAC and have a reasonable shelf life as seen in Table 1. This is an indication that the drug products met NAFDAC requirements for pharmaceutical products in Nigeria. The brands of the tablet sample obtained were mostly imported as only 40 % of the brands were manufactured by indigenous pharmaceutical companies. The country of origin for all the tablet brands imported was India. Analysis carried out by the National Bureau of Statistics' foreign trade reports in 2022 revealed that the top 10 import trading partners were China, the Netherlands, India, Belgium, the United States, South Korea, the

United Arab Emirates, the United Kingdom, Germany and Norway (NBS, 2023).

The tablet samples have an impressive appearance. The tablets were scored (Table 2) and the scoring permits accurate subdivision of the tablet to provide doses of less than one tablet and also facilitate breaking of the tablet for ease of swallowing a dose consisting of one or more whole tablets (Jacques & Alexandridis, 2019). The tablet thickness test for all five brands of tablet samples revealed that none of the tablets deviated from ±5 % from the mean thickness. The thickness of the tablet is the only dimensional variable which is related to the important process of tablet compression and should be controlled within ±5 % variation for patient adherence and acceptance as well as to make the tablet packaging easier in blister packs (Ahamad, 2023). The tablet samples have a mean diameter which is within the range specified by the United States Food and Drug Administration, USFDA and it recommends that the diameter of the tablet should be 8 mm or less than 8 mm and should not exceed 22 mm (about 0.87 in). The tablet samples were white, uncoated, and oblong with a concave smooth surface. The diameter and oblong shape of the tablet influence esophageal transit, and techniques of administration (such as patient position, and use of fluids). It enables easy oesophagal transit when a patient is in an upright position and when taken with a fluid such as water.

The standard powder and the tablet samples of ciprofloxacin revealed the presence of the active ingredient using the method specified in the official monograph (BP 2013). The fingerprint region for standard powder and that of the different brands namely - A, B, C, D and E superimposed with that of the reference spectrum (Figure 2-7). This confirmed the presence of the ciprofloxacin active ingredient in the standard powder and the brands of tablets.

The calibration curve prepared for quantification of ciprofloxacin in distilled water (Figure 8) was found to be linear within the range of 10 – 160 µg/mL (R2 = 0.9944) and the assay of all the brands of ciprofloxacin tablet (Table 3) showed that the percentage content is within the limit specified in the official book. The acceptable limit for the percentage content of ciprofloxacin tablet according to BP 2013 is 95 - 105% while USP and IP are 90 - 110%. The crushing strength of 4 kgf is usually considered to be the minimum force and 15 kgf is usually considered to be the maximum force for satisfactory tablets according to BP 2013. All the brands passed the test with a crushing strength greater than 4 kgf and less than 15 kgf (Table 5). The BP 2013 specification for uncoated tablets is that for tablets weighing more than 324 mg, not more than two of the individual weights should deviate from the average weight by more than 5%. The entire tablet brands passed the test as none of the tablets deviated from their average weight by 5% (Table 4). BP 2013 specification for friability is that a maximum weight loss of not more than 1% of the weight of the tablets is considered generally acceptable. All the brands passed the test with a friability of less than 1% (Table 5). The disintegration time is the mean time needed for the tablets to break into particles, small enough to pass through the screen into the disintegration medium until no particle remains in the unit. The time limit for disintegration of uncoated tablets in water at 37°C should not exceed 15 minutes according to BP 2013. All the brands passed the test with a disintegration time of less than 15 minutes (Table 3). The percentage of drug release in distilled water at 45 minutes according to BP 2013 should be more than 80%. The tablet sample passed the test as more than 80% of the drug for each brand was released at 45 minutes (Table 3).

Anizor et al, 2023 conducted a similar study to assess the quality of eight brands of ciprofloxacin tablets marketed in Anambra State, South Eastern Nigeria and found that the brands of ciprofloxacin tablets met most of the criteria laid in the official monographs, though they differ slightly in terms of various parameters like weight variation, hardness, friability, disintegration and dissolution.

CONCLUSION

The study attempted to evaluate the in-vitro quality of ciprofloxacin tablets of five brands marketed in the Zaria and the evaluation showed that the ciprofloxacin tablet brands tested for identity, assay, weight variation, hardness, friability, disintegration and dissolution complied with the Pharmacopoeial specifications described in the BP and USP.

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Assessment of knowledge and attitude regarding antibiotics use among students of college of education, Warri, Delta state.

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Introduction

Antibiotics are a type of antimicrobial that are used in the prevention and treatment of bacterial infections (European Center for Disease Prevention and Control, 2014).Their discovery have been shown to be one of the most important events of the 20th century as they are life-saving drugs (WHO, 2015). They have revolutionized the treatment and general containment of infections, including their use in chemotherapy and other complex medical procedures. (Jifar and Ayele, 2018).However, their effectiveness in the resolution of infectious diseases – which include reductions in morbidity and mortality, have over the years, lead to indiscriminate use, as they are largely available without prescription in most developing countries (Igbeneghu, 2013); currently, antibiotics are the most commonly prescribed and sold drug class in many developing countries (Asogwa et al.,2017; Alsayed et al.,2022).

Both rational and irrational use of antibiotics can induce the natural process of selection, which leads to development and spread of resistant bacterial strains (Igbeneghu, 2013; Jairoun et al.,2019). Resistance of bacteria to antibiotics puts the gains of modern medicine at risk as infections become more difficult to treat, and procedures as surgery and cancer chemotherapy are much riskier. (WHO, 2023). Other consequences of inappropriate use includes, increased risk of adverse effects as anaphylaxis, therapeutic failure, increased hospitalizations, high cost of therapy, as well as, increased economic burden on the national health system (Cizman, 2003).

The tremendous increase in use of these drugs irrationally, (i.e. clinically unnecessary uses) in developing countries, including Nigeria is well documented (Yah et al., 2008; Anta et al., 2013; Tuyishimire et al., 2019). The inappropriate use of antibiotics is a major cause of increasing antibiotic resistance and other consequences, including high mortality. The World Health Organization had highlighted in its 2007 Report that antibiotic resistance is a major threat to public health in this 21st century (Azevedo et al.,2013); and in 2015, the World health body, listed antimicrobial resistance as one of the top ten global health threats facing humanity (Egwuenu, 2024). It is estimated that 1.27 million deaths occurred globally in 2019 due to antimicrobial resistance. It affects all countries, but low and middle income countries are most affected. (WHO, 2023).

A common practice in low-resource countries is self-medication practices (Israel et al., 2015). This has been defined by the World Health Organization as the use of medicines for self-recognized symptoms (WHO, 1998). Self-medication is an element of self-care, which encompasses what people do to maintain their health and prevent illnesses, including good hygiene, proper nutrition, and lifestyle (WHO, 1998). Responsible self-medication includes the

use of over-the-counter (OTCs) medications (Rutter, 2015), whose safety and effectiveness are guaranteed for same purpose, under the supervision of a health professional. However, self-medicating with antibiotics can be termed irresponsible because, antibiotics are prescription medicines and proper guidance is needed for appropriate clinical decision making. Also, complex steps are taken to establish infections requiring treatment with antibiotics, and factors as accurate diagnosis, timely administration, optimal dosage and duration, as well as, non-usage when the harm outweighs the benefits are considered (WHO, 2011; Powers, 2009).

Several studies conducted in tertiary institutions, show poor knowledge and attitude towards antibiotics' use; aside the knowledge gap, there was also the problem of easy access to antibiotics (Afolabi et al.,2014; Ayepola et al.,2019; Tiong and Chua, 2020). Effective control measures are predicated on an understanding of the perceptions and attitudes of the populace towards antibiotics (Ayepola et al.,2019); thus, appropriate use can be enhanced by correct knowledge, positive beliefs, right attitude, and best practices regarding antibiotics, which will build right understanding and behavior towards rational use in the society (Asogwa et al.,2017).

The clinical efficacy of antibiotics can be sustained through correct or rational use. (Azevedo et al., 2013), hence several studies have suggested a major control strategy as educational programmes for both consumers and healthcare providers to promote rational use (Igbeneghu, 2013; Asogwa et al.,2017; Ayepola et al.,2019; Raihan et al.,2024). The World Health Organization developed a global action plan in 2015, which identified five strategies for controlling antibiotic resistance; these includes, effective communication, education and training to improve awareness, and optimization of antibiotics use in humans (WHO, 2015; Asogwa et al.,2017).

This study is directed at a section of tertiary students, who are supposed to be highly educated and more inclined to information about health (Ayepola et al., 2019). It is believed that the education of these students on the appropriate use of antibiotics may improve the students' attitude towards antibiotics. ((Igbeneghu, 2013), as correct knowledge and attitude have been shown to be a driver for appropriate or rational use of antibiotics in the society. (Anta et al., 2013).

Justification

Infectious diseases are one of the most common communicable diseases, and antibiotics are key to prevention and treatment of infectious diseases. However, clinically unnecessary uses of antibiotics have been reported in several studies in Nigeria.

The consequences of misuse of antibiotics have been shown to include, reduced effectiveness of antibiotics against common infections due to resistance, increased adverse effects, treatment costs and hospital stay; as well as, faster mortality among others. Considering the global public threat from misuse of antibiotics and the need for caution on use of this important resource by several studies and the World Health Organization, there is need to assess the general knowledge and attitude of usage of antibiotics in this population.

This study aims to create awareness and improve rational use of antibiotics among students of College of Education, Warri. There are no such documented studies of this nature in Colleges of Education in Nigeria, hence the need for this research.

Objectives

1. To assess general knowledge of antibiotics among the students
2. To evaluate the pattern of use of antibiotics

Literature Review

Several studies have been conducted in various tertiary institutions to assess the knowledge and use pattern of antibiotics among students.

A study of the knowledge and practices in the use of antibiotics among a group of Nigerian University students in South-Western Nigeria showed a high rate of consumption of antibiotics without a physician's prescription; about 50% used it for viral infections, 51.2% used left over antibiotics. The study acknowledged the need for education to improve right attitude towards antibiotics (Igbeneghu, 2013).

A cross-sectional survey of the use of antimicrobial medicines among university students in Sierra Leone, showed knowledge gap in the proper use of the medicines and unrestricted access to prescription drugs (Afolabi et al.,2014).

A cross-sectional questionnaire based study of knowledge, attitude and practices towards antibiotics use among university students in Uyo, Nigeria noted poor knowledge of antibiotics use and resistance among the students (62.8%). Age and year of study were significant predictors of knowledge of antibiotics (Asogwa et al.,2017).

A cross-sectional study on the knowledge, attitude and pattern of antibiotic usage among students of a Nigerian university showed 60.6% of the study population had used antibiotics in the past 6 months; two-thirds did not complete their antibiotic dosage. Although the study showed they had fair knowledge of antibiotic use and resistance, they stressed on the need to generate more awareness in this population. (Ayepola et al.,2019). A cross-sectional study in Malaysia of the knowledge and attitude of university students on antibiotics showed 22.6% had good knowledge of antibiotics, 35.6% believed antibiotics can be used for viral infections as cold. The study concluded that the students do not have adequate knowledge and about one-third have misconceptions about antibiotics; it also called for health education interventions at this target population. (Tiong and Chua, 2020).

Method

This study was a cross-sectional survey that was conducted from April to May, 2024, among students of the College of Education, Warri. The College of Education, Warri runs several programmes including the Nigerian Certificate in Education (NCE); Interim Joint Matriculation Board (IJMB); and Degree programmes in Education as an affiliate campus for Delta State University.The student population is as follows: NCE students (777); IJMB students (370) and DELSU degree students (1,307).

The inclusion criteria included students that were 15 years and above; registered undergraduate students of the institution; must have been a student for more than 6 months; must consent to participate in the research project. The exclusion criteria included students under 15 years of age; non-undergraduate students of the institution; students who have not been up to 6 months in the institution; those who did not give their consent to participate in the research project.

Convenience sampling was used. The students were divided into groups based on the programmes run by the institution, and students of each programme were administered questionnaires based on their availability at data collection sites (classrooms).

A structured self-administered questionnaire was adapted from similar studies and designed (Asogwa et al.,2017; Ayepola et al.,2019; Jairoun et al., 2019). The questionnaire was pre-tested on 10 students and adjusted as appropriate to aid understanding. The 24-item questionnaire comprised three sections; section one covered demographic data as age, gender and year of study; section two assessed general knowledge of antibiotics and awareness of implications of inappropriate use; while section three assessed attitudes regarding antibiotics use with questions such as, use of antibiotics in the past six months, ailment treated, use of left over drugs, source of antibiotics, if obtained with or without prescription. The last question is if they will like to know more about antibiotics.

The objective of the study was explained to the students prior to filling the questionnaire.

- Sample Size

The Taro Yamane Formula, 1973 was used as it is suitable for survey research and finite population. (Uakarn et al., 2021).

$$n = \frac{N}{1 + Ne^2}$$

Where: n = sample size

N = population size (2454)

e = level of precision, usually set at 0.05 (reliability level of 95%)

$$n = \frac{2454}{1 + 2454(0.05)^2}$$

$$n = \frac{2454}{7.135}$$

$n = 343.938 \simeq 344$

Therefore, required sample size is 344 students

Data collected from the survey was analyzed using SPSS version 20. Descriptive statistics as percentage and frequency were used to analyze data. Chi square was conducted to assess relationship between dependent and independent variables to establish statistical significance. P-values of less than 0.05 were considered statistically significant. The knowledge thread was assessed by assigning one mark to correct answer and zero to incorrect responses; Participants scoring six points and above were considered to have good knowledge, while those scoring below six points were considered to have low knowledge (Asogwa et al.,2017; Ayepola et al.,2019).

Ethical approval for this study was obtained from the Health Research Ethics Committee (HREC), Lily Hospitals Limited, Warri.

RESULTS

A total of 344 students were intended for the study as shown by the sample size calculated, but 322 questionnaires were completely filled and analyzed, giving a response rate of 93.6%. Out of the 322 included participants, 96 (29.8%) were males and 226 (70.2%) were females. Table 1 describes the demographic characteristics of the respondents and their knowledge of antibiotics use. Generally, the knowledge assessment test showed poor knowledge of antibiotics and the implications of inappropriate use. The study showed a statistically significant correlation in the age variable (p-value less than 0.0001), showing increasing age and good knowledge of antibiotics. Thus, the participants in the age group of 31-40 (55.6%), had better knowledge of antibiotics usage than those of age groups, 15-24 (27.2%) and 25-30 (28.9%). Also, the variable, year of study was significant (p-value less than 0.0001). This indicates that students in third year (30.0%) had better knowledge, than those of other levels.

Table 2 highlights assessment of knowledge of antibiotics according to gender, where at a 95% confidence interval of 0.96-1.01, more respondents (83.3% males, 85.8% females) answered incorrectly that antibiotics treat bacterial infections. Generally, poor responses were obtained for implications of inappropriate use of antibiotics, as more than half of the respondents, 222 students (95%CI 0.83 – 0.97) did not know that non-response of antibiotics is partly due to their use when they are not needed, while 72 students rightly answered, they 'Do not know'. All questions concerning consequences of improper use of antibiotics were incorrectly answered.

For the responses on attitudes regarding antibiotics use, 146 students (45.3%) had used antibiotics in the last six months; More respondents used antibiotics to treat malaria (14.1%), infection (12%) and typhoid fever (4.3%); more persons got their prescription from a Pharmacist (27.6%), than a Doctor (22.0%) and Nurse (13.7%); while others consulted medicine vendors (0.9%), family/friends (3.7%), and self-recommended (5.9%). Most of the responders claimed they got their medications from a pharmacy (65%). Commonly used antibiotics are ampiclox, amoxicillin and ciprofloxacin.

Figure 1. highlights attitudes suggesting self-medication practices, as getting antibiotics without prescription (14.3%); reusing antibiotics for same kind of infections (35.7%); use of leftover antibiotics (20.2%); recommend antibiotics to family members (41.6%); and 56.2% said they completed their antibiotics, whether prescribed or recommended, while 43.8% said they did not. Figure 2.shows the various reasons given for not completing their medications. Nevertheless, 291 students (90.4%) answered yes to the question, "Would you like to know more about antibiotics?"

Table 1.Respondents demographic characteristics and their knowledge of Antibiotics Use

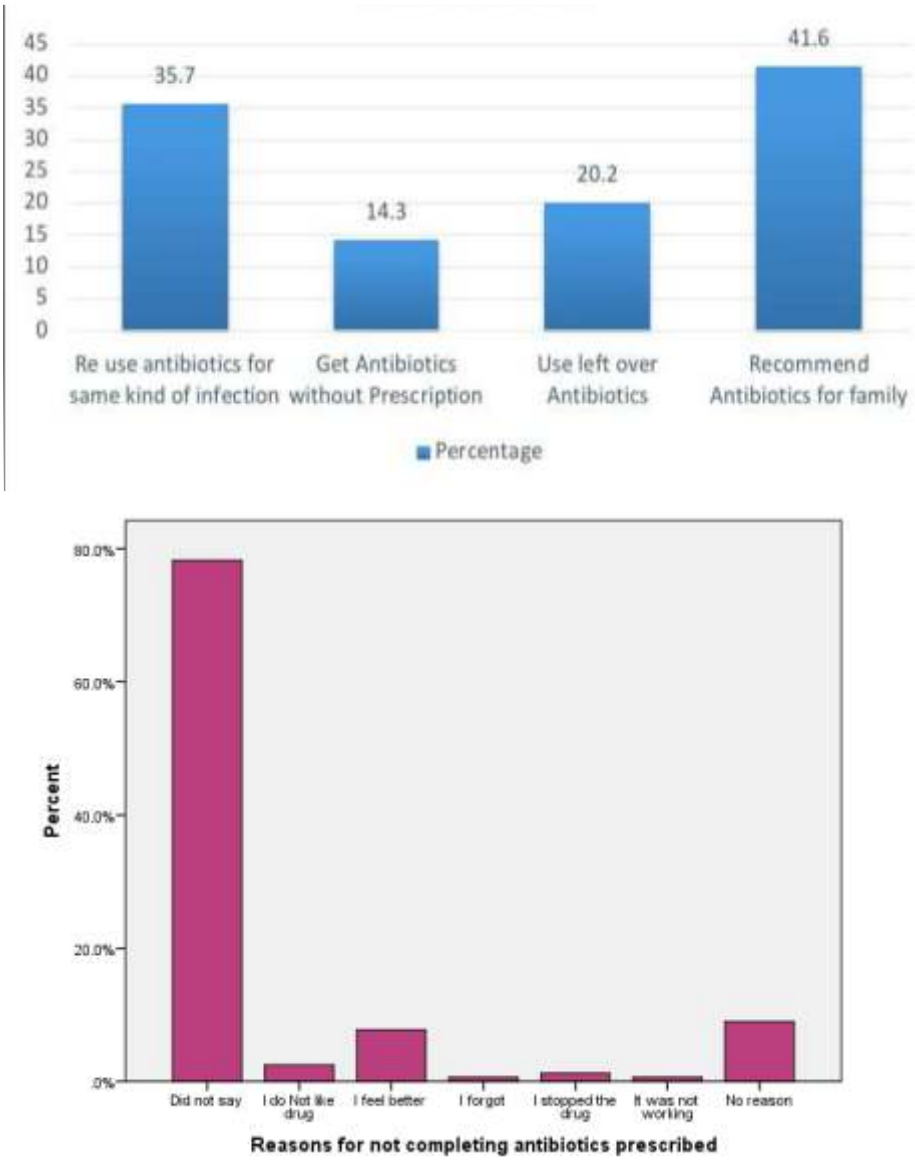
Demographics Characteristics	Total (N = 322)%	Poor knowledge (n =229) %	Good Knowledge (n = 93) %	Chi Square	P – Value
Gender					
Male	96(29.8)	74 (77.1)	22 (22.9)	2.370	0.079
Female	226(70.2)	155 (68.6)	71(31.4)		
Age					
15-24	266(82.6)	194 (72.9)	72 (27.2)	365.804	<0.0001
25-30	38(11.8)	27 (71.1)	11 (28.9)		
31-40	18(5.6)	8 (44.4)	10 (55.6)		
Programme					
Delsu	149(46.3)	99(66.4)	50(33.6)	3.092	0.211
IJMB	97(30.1)	74(76.3)	23(23.7)		
NCE	76(23.6)	56(73.7)	20(26.3)		
Percentage poor/good knowledge (%)=number of respondents in specific category/total number in same category X 100.					
Year of Study					
1st year	144(44.7)	108(75.0)	36(25.0)	360.148	<0.0001
2nd year	168(52.2)	114(67.9)	54(32.1)		
3rd year	10(3.1)	7(70.0)	3(30.0)		

Table 2. Assessment of knowledge of Antibiotics for Gender

1. What are Antibiotics					
Medicines that treat bacteria infections					0.96-1.01
Gender					
Male	2(2.1)	80(83.3)	14(14.6)	96	
Female	4(1.8)	194(85.8)	28(12.4)	266	
Medicine that treat viral infections					0.68-0.87
Male	14(14.6)	51(53.1)	31(32.3)	96	
Female	40(17.7)	114(50.4)	72(31.9)	226	
Medicines that treat all infections					0.33-0.57
Male	40(41.7)	32(33.3)	24(25)	96	
Female	90(39.8)	74(32.7)	62(27.4)	226	
Antibiotics prevent infections					0.69-0.89

Male	9(9.4)	68(70.8)	19(19.8)	96	
Female	33(14.6)	149(65.9)	44(19.5)	226	
Antibiotics relieve pain					0.43-0.67
Male	25(26)	48(50)	23(24)	96	
Female	79(35)	92(40.7)	55(24.3)	226	
Antibiotics stop fever					0.37-0.61
Male	27(28.1)	46(47.9)	23(24)	96	
Female	89(39.3)	63(27.9)	74(32.7)	226	
2. Inappropriate use of Antibiotics					
Unnecessary use of antibiotics can likely make it not work					0.78-0.94
Male	14(14.6)	69(71.9)	13(13.5)	96	
Female	22(9.7)	165(73)	39(17.3)	226	
Non response of infections to antibiotics is due to misuse					0.66-0.86
Male	22(22.9)	43(44.6)	31(32.3)	96	
Female	43(19)	120(53.1)	63(27.9)	226	
Non response to antibiotics is because:					
a. They are used when they are not needed					0.83-0.97
Male	8(8.3)	63(65.6)	25(26)	96	
Female	20(8.8)	159(70.4)	47(20.8)	226	
b. Incomplete treatment of medicines					0.79-0.95
Male	11(11.5)	54(56.2)	31(32.3)	96	
Female	24(10.6)	134(59.3)	68(30.1)	266	
Some consequences of improper use of antibiotics includes:					
a. Prolong illness					0.76-0.93
Male	18(18.8)	52(54.2)	26(27.1)	96	
Female	25(11.1)	138(61.1)	63(27.9)	266	
b. Infections become difficult to treat					0.78-0.94
Male	9(9.4)	62(64.6)	25(26)	96	
Female	36(15.9)	139(61.5)	51(22.6)	266	
c. Resistance of infectious organisms to antibiotics					0.71-0.90
Male	11(11.5)	49(51)	36(37.5)	96	
Female	24(10.6)	112(49.6)	90(39.8)	266	

Fig. 1 Attitudes associated with self medicating on antibiotics



Discussion

This study highlights the poor knowledge and attitude regarding antibiotics as reported in previous studies carried out in tertiary institutions in Nigeria. Although, no such studies in Colleges of Education, the findings of this survey are significant. Age and year of study were found to be major predictors of low knowledge among participants ($p < 0.0001$). This correlates with previous studies as reported by Afolabi et al, 2014; Asogwa et al., 2017).The wide knowledge gap concerning general knowledge of antibiotics and problems with irrational use as resistance and difficult-to-treat infections, is worrisome.

Attitudes regarding antibiotics use as getting antibiotics without prescription, reusing antibiotics, recommending to family and friends, using left over antibiotics, are synonymous with findings in previous studies, as reported by Igbeneghu, 2013; Asogwa et al.,2017; Voidazan et al.,2019). The above practices may be due to ease of availability of antibiotics, as the study reported more respondents claimed they obtained their medicines from Pharmacies. According to National Health Policy, antibiotics are prescription-only medicines (POMs), but their sales are inadequately regulated, hence the ease of obtaining these medications (Olanike and Ogunnowo, 2013; Asogwa et al.,2017). However, Pharmacists as trained

professionals, are expected to provide informed and objective advice on the use of medicines, including antibiotics, as well as, teach patients responsible self-medication or when necessary, refer patients for further medical advice (WHO, 1998; Olanike and Ogunnowo, 2013).It should be noted that exhaustion of this valuable resource is imminent, as poor knowledge and attitude leads to self-medicating with antibiotics, and increasing negative effects as antibiotics resistance, treatment failure, increase in treatment costs, and so on (Isreal et al.,2015).

The need for educational interventions is imperative as educational programmes have been shown to be effective in reducing irrational use of antibiotics. (Asogwa et al.,2017; Ayepola et al.,2019; Jairoun et al., 2019; Tiong and Chua, 2020; Alsayed et al.,2022). A high percentage of the students already indicated the need to participate in learning about antibiotics. This can include workshops and awareness campaigns in schools and communities. Health care providers, including pharmacists, doctors and nurses, all have important roles to play (Asogwa et al., 2017).Also, appropriate use of antibiotics change in attitude. Other important aspects include can be taught in tertiary institutions to foster understanding, and promote positive vaccine advocacy and infection prevention strategies as WaSH (water, sanitation, and hygiene) techniques.

Conclusion

This study highlights poor knowledge of antibiotics and implications of misuse of antibiotics among students of College of Education, Warri. Also, poor attitudes of the students to antibiotics use, with such practices as getting antibiotics without prescription, reusing left-over antibiotics, recommending to family members, as well as as, not completing doses prescribed or recommended, were observed.

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An Assessment of the Effectiveness of Selected Commercially Available Hand Hygiene Products in the Nigerian market

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Abstract

Background: The CDC and WHO recommend the use of effective hand-hygiene products to reduce the spread of infections.

Objective: The purpose of this study was to investigate the effectiveness of commonly available hand hygiene products in the Nigerian market.

Methods: The finger-tip plating method on blood agar was employed in isolating bacteria from apparently health volunteers at 0 minute and at 1, 5, 15 and 25 minutes following swabbing of products on the finger tips. Isolates were identified by morphological and biochemical characteristics. Antimicrobial susceptibilities were determined by the disk-diffusion technique.

Results: All the fingers of volunteers were contaminated. Bacterial loads varied from 19.4 to 69.8 cfu/finger. Only 2 out of twelve products (16.7%) could eradicate all organisms by 5 minutes. Rate of killing of contaminants reduced as follows: Sterlink> Savlon> Dettol hand sanitizer>Lovillea>Dettol>Liby hand wash>Mama lemon>Morning fresh>Honey>Milk and Honey>Septol>Cetrimide. Isolates were Staphylococcus epidemidis, S. haemolyticus, S. warneri, S. sonni, S. hominis, Proteus vulgaris, Salmonella enterica var typhii, Klebsiella pneumonia, E. coli and Bacillus spp. Antibiotic resistance rates were as follows: imipenem (0%); gentamicin, chloramphenicol and erythromycin (50-85%); amoxicillin, tetracycline, cloxacillin and cotrimoxazole (>90%).

Conclusion: The study confirmed the need for regular hand hygiene in the community as bacterial contaminants in the hand include known pathogens. Care should be taken in the choice of hand hygiene products if the aim of hand antisepsis will not be defeated. Imipenem is the most effective antibiotics for treating infections caused by these organisms.

Keywords: hand hygiene products, community, infections, imipenem, Nigeria

Community Pharmacist Perception on Diabetic Foot Ulcers (DFU) and Foot Care in Niger State, Nigeria

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Introduction

The number of diabetic patients who develop foot ulcers each year across the world is about 18.6 million. Amputation of the lower limbs and toes due to diabetic foot ulcers (DFU) is a common and fatal complication of diabetic mellitus (DM) if the condition is poorly controlled.

Community pharmacist can prevent diabetic complication by counseling patients on medication adherence, foot care and risk factors (Armstrong, Tan et al., 2023). The chronic metabolic disease diabetes mellitus is characterized by high blood glucose levels.

Type 2 diabetes mellitus (T2DM) occurs when the body cannot make enough insulin or becomes resistant to insulin (WHO, 2021). According to Olatona, Airede et al., 2019, diabetes mellitus (DM) prevalence worldwide has risen from 4.8% in 1980 to 8.5% in 2014. The World Health Organization (WHO) estimates that 422 million people worldwide have diabetes, causing 1.5 million deaths in 2019 (WHO, 2021). The number of diabetics in sub-Saharan Africa is estimated at 20

million. By 2035, 41.4 million of these will be undiagnosed (Dahiru, Aliyu et al., 2016). With an estimated 3.9 million diabetics living in Nigeria, Nigeria has the highest number of diabetics in sub-Saharan Africa. Despite varying prevalence rates in different regions, it is estimated that 6.8% of adults over 40 are affected (WHO, 2021).

There are two main types of complications related to DM. A macro vascular complication is a long-term damage to large vessels that leads to cardiovascular diseases, while a microvascular complication is damage to small vessels that causes neuropathy, retinopathy, and kidney-related diseases (Zeng, Ley et al., 2018). Of these complications is the nerve damage that results from diabetic neuropathy, which often damages the longer peripheral nerves that innervate the lower extremities, which affects 30% of diabetic patients, of these 50% are over 50 years of age, leading to troubling increase in the risk of foot ulcers and lower limb amputation (Cole, Florez et al., 2020). One of the most dangerous side effects of diabetes is diabetic foot ulcer. For diabetic individuals, it is the main reason for hospitalizations, amputations, and fatalities. Diabetes patients with foot ulcers have a 2.5-fold increased risk of dying compared to those without ulcers (Armstrong, Boulton et al., 2017). Complications from diabetic foot pose a substantial clinical and financial burden. Poor glycemic control, smoking, foot deformities, peripheral neuropathy, vision loss, and chronic kidney illnesses all raise the risk of problems (J Clin Orthop Trauma).

AIM: To explore the perceptions and experience of Community Pharmacists regarding diabetic foot ulcer (DFU) and foot care practices in Niger State, Nigeria.

Method: A descriptive cross-sectional study was conducted between May 18 to June 24, 2024 on Community Pharmacist who agree to participate in Niger State using a valid and pre-tested structured questionnaire. The data collected were analyzed using IBM SPSS statistics for Windows Version 26 (Released in 2019), with p-value ($p< 0.05$) considered to be significant. A two-section questionnaire was employed. First section, included demographic variables of participants and section to explore the perceptions about DM, DFU and foot care, scored based on (Yes/No/ I don't know) nominal scale. The sample size was determined using the formular by Glen, 2014. The total number of registered community pharmacist in Niger State. n = N/1+N (e) 2 n=desired sample size, N= the population size of community pharmacist =120, e= desired level of precision= 0.05. A 10% attrition rate was employed to give room for non-responsive rate and a desired sample size of 119 was obtained. A two-section questionnaire was developed using previous study by Wui et al., 2020. The first section included community pharmacist's demographic variables such as age, gender, level of education (B. Pharm /Pharm D Postgraduate), and years of practice. Second two included perception about DM, DFU, wound care experience scored based on (Yes/No/I don't know) nominal scale.

Results: A total of 64 out of 119 Community Pharmacist participated in the study, representing a response rate of 54 %. Majority (58 %) were females. Majority (28.6 %) are greater than 50 years of age, those with Bachelor of Pharmacy/Doctor of Pharmacy constitute the majority (71.4 %). Majority (57.1 %) have been practicing for over 20 years. Majority 55 (85.7 %) of Community Pharmacist in this study, have good perception of diabetic foot ulcers (DFU), diabetic mellitus (DM) and foot care. Majority of Community Pharmacists 46 (71.4 %) said they were satisfied with caring for diabetic patients, of these, 18 (28.1 %) have wound care experience above 20 years while the majority 28 (43.8 %) have between 11-15 years of wound care experience. Our study showed different perceptions of Community Pharmacist with regards to wound care as 9 (14.1 %) said diabetic wound care is time-consuming to manage, and about 18 (28.6 %) said they are not satisfied with managing diabetic patients.

Table 1: Demographic variables of Community Pharmacist's (N=64)

Variables	Group	Frequency	Percentage
Age (years)	20-29	0	0
	30-39	28	43.8
	40-49	9	14
	>50	27	42.2
Gender	Male	27	42
	Female	37	58

Marital status	Single	0	0
	Married	55	85.9
	Separated	0	0
	Widowed	9	14.1
Duration of practice	<5	0	0
	6-10	9	14.1
	11-15	28	43.7
	16-20	9	14.1
	>20	18	28.01
Educational status	B. Pharm/Pharm D	46	72
	Postgraduate	18	28

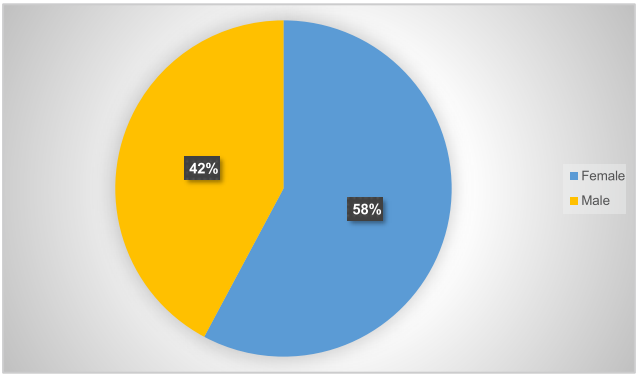
Table 2: Relationship between community pharmacists' (CP's) perception regarding diabetic mellitus (DM), diabetic foot ulcer (DFU) and foot care (N=64)

Perception items	Yes N (%)	No N (&)	I don't know N (%)
Diabetic patients are more likely to have foot ulcer	100(100)	0(0)	0(0)
Diabetic patients are susceptible to deformation	100(100)	0(0)	0(0)
Arterial stiffness is implicated in DFU	54(84.3)	1(1.6)	9(14.1)
DF complication increases in the presence of hypertension	37(57.1)	27(42.9)	0(0)
Infection contributes to DFU	100(100)	0(0)	0(0)
Diabetic wound care is time consuming	9(14.1)	55(85.9)	0(0)
Blood circulation in the feet is improved with exercise	45(70.3)	0(0)	19(29.7)
Ulcers/wound in the diabetic patient takes time to heal	60(93.7)	0(0)	4(6.3)
Deformities may result from uncontrolled serum sugar level	29(45.3)	5(7.8)	30(46.8)
Wearing the correct footwear can reduce the risk of foot ulcer	100(100)	0(0)	0(0)
CP's should counsel their patients with DFU to reduce re-ulceration	100(100)	0(0)	0(0)

Concerning the perception of community pharmacists, all of the participants agreed that diabetic patients are more likely to develop foot ulcers. In the same manner, all the participants agreed that diabetic patients are susceptible to deformation, wearing the correct footwear can reduce the risk of foot ulcer, infection can contribute to diabetic foot ulcer (DFU) and adhering to medications can help reduce the complication of diabetic foot ulcer (DFU).

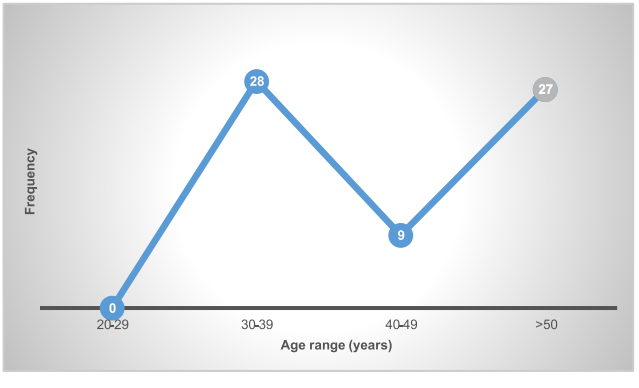
However, about 19(29.7 %) said they don't know if exercise can improve blood circulation in the feet of diabetic patients whereas the majority 45(70.3 %) said they know. In the wound care for diabetic foot ulcer, 9(14.1 %) said wound care management is time consuming but majority 55(85.9 %) said it's not. While majority 60(93.7 %) of community pharmacists said ulcers/ wound in the diabetic patients may take time to heal others 4(6.3 %) said they don't know. All the community pharmacists that participated in our study agrees that providing counseling to diabetic foot ulcer patients can reduce their chances of re-ulceration. The overall perception score were calculated, which gave a mean score of 81.6 +/- 16.8. In all, 55(85.9 %) of the community pharmacist showed a positive perception, where 9(14.1 %) shows a negative perception towards diabetic foot ulcer care as shown in table 2 above.

Figure 1: Distribution of gender among participants



The study had more female (N=37) participants than their male (N=27) counterparts, this shows the willingness of female community pharmacists' to actively participate in improving their knowledge in the area of diabetic foot ulcer and foot care in their various places of practice.

Fig.2 Age distribution among participating community pharmacistsa



This study shows that majority 28(43.8 %) are within the age range of 30-35years of age closely followed by pharmacists aged 50 years and above 27 (42.2 %). Also, the study did not find any community pharmacist under the age of 29 years of age.

Conclusion

This study shows that majority of Community

Pharmacist had good perception of diabetic foot ulcers but slightly poor wound care practices. This further shows the need for further in-service training on foot care. Pharmacy premises should be equipped with resources and supply chains commodities to ensure Community Pharmacists improve quality diabetic foot care. Community pharmacist needs to be train on personalized management plan of diabetic foot ulcer and foot care in other to further improve existing knowledge especially those who considered managing diabetic wounds as time consuming. This study recommends further qualitative study for an accurate understanding on some community pharmacists opinion as it regards to diabetic wound management. Our study recommends that policy makers at the Association of Community Pharmacist (ACPN) national level should mandate all community pharmacies to upgrade existing infrastructure to support the need and space for foot care management within the premises. This intervention is important in providing the way forward for pharmaceutical care and public health intervention for diabetic foot ulcers (DFU).

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QUALITY PHARMACEUTICAL CARE

-Pharm. Giwa Babajide *MAW*

According to the Federation of International Pharmacy (FIP), Pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes that impact a patient's quality of life. These outcomes include;

I. Curing of a disease.
ii. Elimination or reduction of a patient's symptomatology.
iii. Arresting or slowing down a disease process.
iv. Preventing a disease or its symptomatology.

Pharmaceutical care involves the process of a Pharmacist cooperating with a patient, and other professionals in addressing, implementing, and monitoring a therapeutic plan that will produce specific, desired outcomes for a patient.

This in turn involves three major functions

i. Identifying potential and actual drug-related problems
ii. Resolving actual drug-related problems and
iii. Preventing drug-related problems.

Pharmaceutical care as a concept, has shifted the Pharmacist's primary focus from the drug to the patient's drug therapy; optimized outcomes for the individual patient.

The philosophy of pharmaceutical care practice has as its core, social responsibility, patient-centeredness, and caring through establishing therapeutic relationships, to achieve definite outcomes that improve the patient's quality of life.
Over the years, Pharmaceutical care has evolved into the following;

i. Establishment of a therapeutic relationship.
ii. Assessment and identification of actual or potential drug therapy problems (DTPs).
iii. Developing a care plan to resolve or prevent DTPS.
iv. Follow-up or continuous monitoring, to ensure the achievement of the described outcomes or goals of therapy.

Several definitions of Pharmaceutical care have emerged, including new terms and concepts of drug-related patient care such as

i. Medicine Management,
ii. Medication Therapy Management (MTM) and
iii. Medication Use Review (MUR).

The evolution of Pharmacy practice into a patient-centered care approach has occurred to varying degrees in different countries, due to differences in healthcare and Pharmacy systems.

Despite this, the ultimate goal of Pharmaceutical care of optimizing the outcome of patients' drug therapy, and improving patients' quality of life, is globally accepted.

Several challenges are associated with Pharmaceutical care, even in countries where it is being implemented. These include;

i. Shortage of human resources
ii. Increased burden of disease
iii. Increased healthcare costs
iv. Inefficient health systems and
v. Changes in the socioeconomic and political environment.

As Pharmacists assume responsibility for drug therapy outcomes in their patients, they undertake a variety of functions, encompassing both traditional and new roles. Hence, Pharmaceutical care is a revolutionary concept and forms the basis of Pharmacy practice.

Goals of Pharmaceutical Care

The ultimate goal of Pharmaceutical care in all practice settings and cultures involves two major functions

i. Identifying potential and manifest problems in pharmacotherapy
ii. Resolving and preventing problems for the patient during drug therapy.

These should preferably be done in conjunction with other healthcare professionals and the patient, through discussion and review of medications, disease indications, and subsequent counselling.

Achieving these goals also requires a carefully designed healthcare system that ensures collaboration, education, and continuous empowerment of other healthcare providers. Pharmaceutical care should be a win-win for the patient and the healthcare provider. Therefore, all necessary avenues should be explored towards its achievement.

Need For Quality Pharmaceutical Care:
The Pharmacy profession, especially the Community Pharmacy space, has evolved over the years due to increasing demand for patient care and quality of life improvement. The work has evolved far beyond dispensing, presenting a lot of challenges and demands on the Pharmacist, especially in capacity development.

The importance of quality Pharmaceutical care in ensuring qualitative healthcare delivery cannot be over-emphasized as it forms the fulcrum of patients' quality of life improvement. Quality Pharmaceutical care encompasses procurement, logistics, distribution, storage, and control; the pillars of quality Pharmaceutical service.

Pharmaceutical care, the Pharmacist's responsibility, is a necessary element of healthcare, for the patient's benefit. Pharmaceutical care flourishes in a mutually beneficial relationship where the patient grants authority to the provider who reciprocates with competence and commitment. Hence it is a win-win scenario where processes and relationships fuel the achievement of goals, regardless of practice setting.

THE ROLE OF COMMUNITY PHARMACISTS TOWARD ENSURING QUALITY PHARMACEUTICAL CARE SERVICES
Community Pharmacists provide information, education, counselling, training and medication therapy management, in the new Community Pharmacy Practice Model, through Pharmaceutical Care, thus creating greater benefits.

Traditionally, Community Pharmacists (CPs) are known as Retail Pharmacies or drug outlets; stocking and dispensing medicines. CPs are considered the most accessible healthcare professionals because individuals don't require prior appointments to receive care from them.

The new roles of CPs as a result of the Pharmaceutical care (PhC) concept; expanding access to care, and improving patient outcomes, include;
i. Reproductive health services,
ii. Mental health,
iii. Oral health services,
iv. Immunization,
v. Chronic disease management e.g diabetes,
vi. Asthma Management,
vii. Weight Management etc.

Other roles of CPs in ensuring quality Pharmaceutical Care include

i Health Promotion & Immunization
CPs, over the years have played a vital role in health promotion, disease prevention and immunization programs through advanced and expanded PhC services. Through collaboration with other healthcare providers, Pharmacists can help improve the health of the populace; via increased immunization coverage in developed countries where the healthcare systems still lack many medical providers.

Pharmacist-led immunization interventions for better health, were conducted for various vaccination programs. One of such notable programs is being executed by the Association of Community Pharmacists of Nigeria (ACPN). ACPN ensured active involvement of its members in vaccination, by training and empowering them to fill the huge personnel gap, thus ensuring the safety of citizens.
Community pharmacists have been trained to administer COVID- 19 vaccine; well over 50,000 Nigerians have been vaccinated.

ii. Patient Assessment, Disease Screening, Diagnosis And Referring
Pharmaceutical Care services provided by Community Pharmacists require
i. Initiation of patient assessment,
ii. Screening,
iii. Symptomatic diagnosis and
iv. Referral to other healthcare providers
v. Documentation as a vital activity.

Community Pharmacists could contribute substantially to preventing, identifying and managing high blood pressure (BP), via routine assessment. Public health promotion and medicine optimization services, are expanded and immense contributions of CPs, especially in the management, diagnosis and treatment of diseases like high BP, diabetes etc.

The CPs in these studies conducted point-of-care testing (POCT). The POCT provided rapid testing for biomarkers during patient care services. This intervention facilitated disease diagnosis, monitoring and management by the CPs. Significant positive outcomes were achieved. This result showed evidence of the vital roles of CPs in conducting Pharmaceutical Care services regarding assessment, screening and treatment of mild diseases.

iii. System And Structure Redesigning Intervention

Community Pharmacists' services differ between countries. The concept of Pharmaceutical care ranges from specific to more complex services requiring interprofessional collaboration.

Many studies have focused on structural and transformational changes within Community Pharmacies. These studies are to improve safe over-the-counter medication use counselling, expand Pharmacists' roles for urgent care medication services models, electronically enhanced prescriptions, and create a medication safety culture.

All systems and changing structural studies support the provision of Pharmaceutical care within the Community Pharmacy. The most updated and vital study was titled "Structural and Operational Redesigning of Patient – Centred Ambulatory Care Pharmacy Services and its Effectiveness during the COVID - 19 Pandemic".

The author concluded that access to Pharmacy services including delivery, remote area pickup locations, Pharmacy call centre counselling, prescription refilling and online Pharmacy services, were influential in reducing physical contact and virus transmission between individuals and within society.

All efforts to conduct studies concerning Pharmacist-led interventions within Community Pharmacies revealed effective outcomes and improved health benefits.

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Guardians of Health: Upholding Medicine Quality in the Nigerian Healthcare System with Community Pharmacists as the indispensable Frontline Guardians .

- By Olusiji Nelson Benjamin, *B.Pharm, MBA.*

Abstract

Access to high-quality medicines is a fundamental right and a cornerstone of effective healthcare. However, in Nigeria, ensuring medicine quality presents a complex challenge. This article explores the critical role of Community Pharmacists in safeguarding public health by upholding medicine quality. We examine the current landscape of Pharmaceutical Care in Nigeria, highlighting the prevalence of counterfeit drugs, inadequate regulatory frameworks, and vulnerabilities within the supply chain. Despite these challenges, the article explores the multifaceted aspects of medicine quality and proposes comprehensive strategies for improvement. These strategies emphasize the vital role of Community Pharmacists in dispensing safe medications, providing patient education, and collaborating with regulatory bodies. This article argues that Pharmacists can become pivotal "guardians of health" within Nigeria's healthcare system by leveraging their expertise and fostering robust Community Pharmacy practices. The discussion underscores the potential for improved public health outcomes, through a multi-pronged approach that strengthens regulatory frameworks, enhances supply chain management, empowers patients, and leverages the irreplaceable role of Community Pharmacists.

Introduction: The Fragile Landscape of Medicine Quality in Nigeria

Medicine quality, the cornerstone of effective healthcare, transcends the mere presence of drugs. It encompasses the assurance of safety, efficacy, and purity, throughout the entire pharmaceutical journey, from manufacturing to patient consumption.

However, in Nigeria, where the healthcare system grapples with numerous complexities, ensuring medicine quality presents a significant challenge. This intricate landscape is plagued by a confluence of factors, each posing a substantial threat to public health.

One of the most disturbing issues is the rampant prevalence of counterfeit and substandard medicines. These deceptive imitations, often indistinguishable from genuine products, infiltrate the market, jeopardizing patient well-being. Counterfeit drugs can be completely ineffective, leading to treatment failure; potentially worsening a patient's condition. Furthermore, they can contain harmful substances, triggering adverse reactions and antibiotic resistance, with potentially life-threatening consequences.

The Artesunate crisis of 2001 serves as a stark reminder of the peril of counterfeit and substandard medicines. The widespread circulation of counterfeit Artesunate, a crucial antimalarial medication, resulted in a surge of malaria-related deaths, highlighting the devastating impact of substandard drugs.

Another great concern is the integrity of the pharmaceutical supply chain in Nigeria, which faces numerous vulnerabilities. Inadequate storage facilities and transportation infrastructure can expose medications to extreme temperatures or improper handling, compromising their potency or introducing contaminants. Additionally, the infiltration of unauthorized suppliers further disrupts the chain, creating opportunities for the introduction of substandard or counterfeit products.

These challenges are further compounded by the issue of inadequate regulatory enforcement. The

National Agency for Food and Drug Administration and Control (NAFDAC) and the Pharmacists Council of Nigeria (PCN), the regulatory bodies tasked with safeguarding medicine quality, often lack sufficient resources to effectively monitor the market. Limited manpower and budgetary constraints hinder their ability to conduct comprehensive inspections and enforce quality standards. Furthermore, issues of corruption within regulatory bodies often create loopholes, allowing unscrupulous actors to operate with impunity.

Despite these formidable challenges, a glimmer of hope shines through, by the efforts of Community Pharmacists. These healthcare professionals serve as the frontline guardians of medicine quality, acting as a crucial bridge between patients and the healthcare system. Their expertise in dispensing medications, providing patient counseling, and ensuring safe and effective use of medicines, positions them uniquely to combat the challenges plaguing the Nigerian pharmaceutical landscape.

The Conundrums of Quality Medicine in Nigeria

1. Prevalence of Counterfeit Medicines

One of the most pressing issues in Nigeria is the prevalence of counterfeit and substandard medicines. These fake medicines can lead to therapeutic failure, adverse health outcomes, and increased resistance to treatment. Counterfeit medicines are often indistinguishable from genuine products, making detection and control difficult.
Counterfeit and substandard medicines pose a significant threat, often mimicking genuine products in appearance but lacking efficacy or containing harmful substances. These fakes infiltrate the supply chain, putting patients at risk.

Case study 1: Cholroquine

In 2010, Nigerian authorities seized a large shipment of counterfeit chloroquine, a crucial antimalarial medication. Analysis revealed the drugs contained no active ingredients, leaving patients vulnerable to malaria. Thus, potentially delaying effective treatment. This incident highlights the devastating impact of counterfeit medicines on public health efforts.

Case Study 2 : The Artesunate Crisis

In 2001, a public health crisis emerged in Nigeria due to the widespread circulation of counterfeit Artesunate, a medication used to treat malaria. These fake drugs were ineffective and contributed to a rise in malaria-related deaths. This case study highlights the devastating impact of counterfeit medicines and underscores the importance of robust quality control measures.

Best Practice: The Nigerian Pharmacists' Vigilance Network
The Pharmacists Council of Nigeria (PCN) established the Pharmacists' Vigilance Network, a program that encourages Pharmacists to report suspected cases of counterfeit medicines to regulatory authorities. This initiative empowers Pharmacists to be active participants in safeguarding medicine quality.

2. Supply Chain Issues

The Pharmaceutical Supply Chain in Nigeria is fraught with challenges, including poor storage conditions, inadequate transportation, infrastructure, and the infiltration of unauthorized suppliers. These issues can compromise the integrity of medicines, leading to reduced efficacy and safety. Medications may be exposed to extreme temperatures or improper handling during transport, degrading their potency or introducing contaminants. The journey of medicines from manufacturing to patient consumption is riddled with potential pitfalls. Inadequate storage facilities and improper transportation infrastructure can expose medicines to extreme temperatures or humidity, degrading their potency or altering their chemical composition. Additionally, the presence of unauthorized suppliers within the chain, creates opportunities for the introduction of counterfeit products.

Case Study 3

A 2018 investigation uncovered a network of unlicensed warehouses storing Pharmaceuticals in Nigeria. These facilities lacked proper temperature control, raising concerns about the quality and safety of the medications they housed. This incident underscores the need for robust regulations and oversight throughout the entire supply chain.

Best Practice: The Ghanaian Medicine Transparency Alliance

Ghana established the Medicine Transparency Alliance, a multi-stakeholder initiative that brings together government agencies, pharmaceutical companies, and NGOs. This alliance works to improve transparency and traceability within the medicine supply chain, helping to identify and eliminate counterfeit products. By employing serialization and track-and-trace technologies, stakeholders can monitor the movement of medicines throughout the supply chain, pinpointing potential entry points for counterfeits.

3. Limited Resources for Regulatory Enforcement:

The National Agency for Food and Drug Administration and Control (NAFDAC) and the Pharmacists Council of Nigeria (PCN) are tasked with ensuring medicine quality. However, these regulatory bodies often face limitations in resources and manpower. This can hinder their ability to conduct comprehensive inspections, investigate suspected counterfeiting, and enforce quality standards effectively.

Despite the efforts of regulatory bodies like NAFDAC and PCN, enforcement of medicine quality standards remains inconsistent. Limited resources, corruption, and lack of coordination between regulatory agencies contribute to the persistence of substandard medicines in the market. Ineffective enforcement allows for the continued operation of unscrupulous actors within the pharmaceutical supply chain.

Case Study 4:

A 2021 report by a transparency organization documented instances of bribery and corruption within NAFDAC, allowing substandard medicines to enter the market. This highlights the need for increased transparency and accountability within regulatory bodies to safeguard public health.

Success Story: The Indian Track and Trace System India implemented a comprehensive track and trace system that requires unique identifiers to be applied to all medicine packages. This system allows for real-time monitoring of the supply chain, making it difficult for counterfeit medicines to enter the market. The success of India's system demonstrates the effectiveness of robust enforcement mechanisms in combating counterfeit drugs.

4. Lack of Public Awareness

Limited public knowledge about medicine quality further exacerbates the problem. Patients may not be aware of the dangers of counterfeit drugs or how to identify them. This lack of awareness can lead them to unknowingly purchase and consume substandard medications, jeopardizing their health.

Case Study 5:

A 2022 study in a Nigerian city found that a significant portion of the population relied on street vendors for medications. These vendors often sell counterfeit or expired drugs, putting unsuspecting patients at risk. This highlights the importance of public education campaigns to empower individuals to make informed choices about their medications.

5. Inadequate Collaboration:

Effective quality control requires collaboration between various stakeholders – Regulatory Bodies, Pharmacists, Healthcare Providers, and Law Enforcement Agencies. However, fragmented communication and a lack of coordinated efforts can hinder progress

Case Study 6: A 2019 report documented instances where pharmacists suspected counterfeit drugs but lacked a clear reporting mechanism to alert NAFDAC promptly. This communication gap allows counterfeiters to operate with impunity.

Strategies for Enhancing Medicine Quality

1. **Strengthening Regulatory Frameworks**

Enhancing the effectiveness of regulatory bodies like NAFDAC and PCN is crucial. This includes increasing funding, improving coordination, and implementing stricter penalties for violations. Establishing a more transparent and accountable regulatory system can significantly reduce the prevalence of substandard medicines.

2. Improving Supply Chain Management

Ensuring the integrity of the Pharmaceutical Supply Chain is essential for maintaining medicine quality. This involves implementing stringent quality control measures, improving storage and transportation infrastructure, and monitoring the

activities of suppliers and distributors.

3. Enhancing Pharmacists' Education and Training

Continuous education and training for Community Pharmacists are vital for maintaining high standards of practice. This includes training on the latest developments in Pharmaceutical Science, quality assurance techniques, and the identification of counterfeit medicines.

4. Promoting Public Awareness

Raising public awareness about the importance of medicine quality is crucial for empowering patients to make informed choices. Public health campaigns, educational programs, and community outreach initiatives can help increase awareness and demand for high-quality medicines.

5. Utilizing Technology

Leveraging technology can enhance medicine quality control efforts. For example, the use of mobile apps for verifying the authenticity of medicines, electronic tracking systems for monitoring the supply chain, and online platforms for reporting counterfeit medicines can significantly improve the detection and prevention of substandard products. Examining successful strategies from other countries can provide valuable insights for improving medicine quality in Nigeria. For instance, India has implemented a comprehensive track and trace system that allows for real-time monitoring of the Pharmaceutical Supply Chain. This system has significantly reduced the incidence of counterfeit medicines.

6. Local Initiatives and Innovations

Several local initiatives in Nigeria have shown promise in enhancing medicine quality. For example, the Yellow Card Scheme by NAFDAC encourages healthcare professionals and the public to report adverse drug reactions and counterfeit medicines. Such initiatives can be expanded and improved to cover a wider range of quality control measures.

The Roles of Community Pharmacists as Guardians of Health in Ensuring Quality of Medicines

Community Pharmacists are the cornerstones of quality medicines in Nigeria. They serve as the final link in the medicine supply chain before reaching patients, making their role in safeguarding public health truly paramount. Here's a deeper dive into their multifaceted responsibilities as guardians of health:

1. Gatekeepers of Quality:

i. Verification and Authentication: Community Pharmacists act as the first line of defense against counterfeit medicines. Their expertise allows them to meticulously verify the authenticity of medications through visual inspection of packaging, checking batch numbers against databases, and utilizing specialized tools to detect inconsistencies.

ii. Quality Control Measures: Pharmacists can implement proactive quality control measures within their Pharmacies. This includes regularly rotating stock to prevent expired medications from being dispensed and maintaining proper storage conditions (temperature, humidity) to ensure the potency and efficacy of medicines. They can also partner with laboratories to conduct random sample testing for suspicious products.

2. Patient Empowerment Through Education:

i. Importance of Medicine Quality: Pharmacists play a vital role in educating patients about the importance of using high-quality medicines. This includes explaining the dangers of counterfeit drugs, the potential health risks associated with substandard medications, and the benefits of genuine products.

ii. Empowering Informed Choices: Pharmacists can equip patients with the knowledge to identify potential counterfeits. This includes teaching them to be aware of inconsistencies in packaging, unusual pricing, and the importance of verifying the source of their medications. By empowering patients with knowledge, Pharmacists can encourage them to demand high-quality medicines.

iii. Medication Adherence and Safety: Pharmacists play a crucial role in promoting medication adherence and safety. They can provide clear and concise instructions on proper medication use, dosage, potential side

effects, and drug interactions. Additionally, they can offer guidance on storage and disposal of medications to minimize risks associated with expired or unused drugs.

3. **Collaborative Guardianship with Regulatory Bodies:**
   i. Reporting Suspicious Activity: Community Pharmacists are at the forefront of identifying counterfeit medicines. They can act as sentinels, promptly reporting any suspected cases of substandard drugs to regulatory bodies like NAFDAC. This timely reporting allows authorities to investigate, take appropriate action, and prevent the further circulation of counterfeit products.
   ii. Participating in Regulatory Initiatives: Pharmacists can contribute valuable insights and expertise by participating in regulatory discussions and initiatives. This may involve providing feedback on proposed regulations, participating in training programs for other healthcare professionals, and collaborating with NAFDAC on public awareness campaigns regarding medicine quality.

4. **Champions of Ethical Practice:**
   i. Professional Commitment: Upholding the highest ethical standards is a core responsibility for Community Pharmacists. This means prioritizing patient safety above all else, adhering to strict dispensing protocols, and refusing to dispense medications that are suspected to be counterfeit or substandard
   ii. Continuous Learning: The Pharmaceutical landscape is constantly evolving. Community pharmacists have a professional obligation to continuously update their knowledge through continuing education programs. This ensures they stay abreast of the latest developments in medicine quality control, counterfeit detection techniques, and best practices in patient counseling.

Future Directions and Recommendations: Building a Robust Ecosystem for Medicine Quality in Nigeria
While the challenges in ensuring medicine quality in Nigeria are significant, there are promising pathways towards a healthier future. Here, we explore key recommendations for policymakers, healthcare professionals, and the international community:

1. Policy Reforms: Prioritizing Quality and Patient Safety
   i. Strengthening Regulatory Frameworks: Modernizing regulations to reflect evolving threats, including robust track-and-trace systems for medicines, is crucial. This requires updating existing legislation, harmonizing standards with international best practices, and establishing clear procedures for identifying and removing counterfeit products from the market.
   ii. Increased Funding for Regulatory Bodies: NAFDAC and PCN require adequate resources to effectively execute their mandates. Increased funding would allow for the recruitment of more inspectors, investment in advanced testing equipment, and the development of robust surveillance programs.
   iii. Implementing Comprehensive Quality Assurance Programs: A multi-pronged approach is necessary. This includes mandatory quality control measures for manufacturers and distributors, promoting self-reporting mechanisms for Pharmacists to identify suspicious products, and establishing national laboratories for comprehensive medicine testing.

2. **Research and Development: Investing in Innovation for a Safer Future**
   i. Developing New Technologies for Quality Control: Investing in research on advanced authentication technologies like serialization and barcoding can enhance counterfeit detection at various points in the supply chain. Additionally, exploring the potential of mobile apps for real-

time verification of medicine authenticity empowers patients to make informed choices.

ii. Studying the Impact of Counterfeit Medicines: Comprehensive research is needed to understand the full scope of the problem in Nigeria. This includes studying the prevalence of counterfeit medicines across different regions and therapeutic categories, as well as the associated health and economic burden. Such data is crucial for informing targeted interventions.

iii. Exploring Innovative Approaches to Pharmaceutical Care: Researching and implementing new models of Pharmaceutical Care, such as medication therapy management services, can optimize medication use and improve patient outcomes. This can involve Pharmacists collaborating with physicians to create personalized medication plans and monitor adherence.

3. **International Collaboration: Sharing Knowledge and Best Practices**

i. Leveraging Expertise of International Organizations: Collaborating with the World Health Organization (WHO) and other international bodies provides access to valuable resources and expertise. This can involve knowledge exchange on best practices in medicine quality control, training programs for regulatory personnel, and joint efforts to combat the global trade in counterfeit medicines.

ii. Learning from Successful Models: Studying successful initiatives in other countries can offer valuable insights. For instance, Nigeria can learn from India's track-and-trace system or Ghana's Medicine Transparency Alliance to develop tailored solutions for its context.

4. Community Engagement: Empowering Patients and Stakeholders

i. Public Awareness Campaigns: Nationwide public awareness campaigns are essential to educate the public about the dangers of counterfeit medicines and empower them to make informed choices. These campaigns should utilize various communication channels, such as mass media, community outreach programs, and social media engagement, to reach a broad audience.

ii. Engaging Healthcare Providers: Collaboration between pharmacists, physicians, and other healthcare providers is crucial. This can involve joint training programs on counterfeit medicine identification, developing standard operating procedures for reporting suspicious activity, and integrating Pharmacists into multidisciplinary teams for patient care.

iii. Empowering Patients: Providing patients with information on how to identify potential counterfeits and report suspicious activity is essential. This can involve developing patient education materials, establishing dedicated reporting hotlines, and collaborating with patient advocacy groups to raise awareness.

Conclusion:

A Call to Action for a Healthier Nigeria

The fight for medicine quality in Nigeria is not a battle for the fainthearted. It's a relentless pursuit, demanding unwavering commitment from all stakeholders. Yet, amidst the complexities and challenges lies an undeniable truth: Nigerians deserve better. They deserve access to safe and effective medicines; not to gamble with their health. Imagine a future where counterfeit drugs become a relic of the past. Imagine communities where trust in the healthcare system flourishes, where patients confidently reach for medications, knowing they are instruments of healing, not potential harbingers of harm. That future is not a distant dream; it's a tangible goal within reach.

However, achieving that future requires a collective uprising.

Policymakers must be the architects of change, crafting robust regulations and investing in robust

enforcement mechanisms. Regulatory bodies need to be empowered to become vigilant guardians, wielding the tools and resources to combat the scourge of counterfeits.

The medical community – Doctors, Pharmacists, Nurses – must stand united as a vanguard for patient safety. Pharmacists, the unsung heroes on the frontline, must be equipped with the knowledge and technology to become bastions of quality control. Let us not forget the power vested in the Nigerian people themselves. Empowered with knowledge, they can become discerning consumers, demanding genuine medicines and holding the system accountable.

The time for action is now. The future health of millions of Nigerians hangs in the balance. Let us choose a future where healthcare trust thrives, where access to safe medicines is a reality, not a distant hope. Let us, together, build a healthier Nigeria, one high-quality medicine at a time.

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Meet Olusiji Nelson Benjamin, a distinguished Pharmacist whose expertise spans various domains of Pharmacy; from hospital and community settings to public health and manufacturing. Graduating with honors from the esteemed Obafemi Awolowo University, Ile Ife, he embarked on a remarkable journey, leaving an indelible mark in the pharmaceutical landscape. With a fervent commitment to combating counterfeit drugs and substance abuse, Olusiji has emerged as a stalwart advocate for healthcare reform in Nigeria and across Africa. His tireless efforts have not only safeguarded countless lives but have also garnered widespread recognition for his exemplary contributions to public health.A prolific author, Olusiji's body of work encompasses professional, scientific, and political literature, reflecting his deep-rooted passion for advancing pharmaceutical knowledge and societal well-being. His unwavering dedication to patient-centric care has earned him a sterling reputation as a compassionate healthcare practitioner. Amidst the challenges posed by the global pandemic, Olusiji stood at the forefront, courageously battling COVID-19 and championing initiatives to mitigate its impact on communities. His selfless endeavors did not go unnoticed, culminating in a prestigious community award that celebrated his outstanding service and philanthropic endeavors.

In every endeavor, Olusiji Nelson Benjamin epitomizes excellence, compassion, and leadership, embodying the ethos of a true healthcare visionary.

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COMMUNIQUÉ OF THE 42ND ANNUAL NATIONAL SCIENTIFIC CONFERENCE OF THE ASSOCIATION OF COMMUNITY PHARMACISTS OF NIGERIA (ACPN) THEME: BUILDING EFFECTIVE COMMUNITY PHARMACY SERVICES FOR HEALTH COVERAGE

The 42nd Annual International Scientific Conference of the Association of Community Pharmacists of Nigeria (ACPN) was held at the Dome Event Centre, Asaba, Delta State, Nigeria, from Monday, July 31st to August 5th, 2023, under the theme, "Building Effective Community Pharmacy Services for Universal Health Coverage".

The Special Guest of Honour at the opening ceremony was His Excellency, Rt. Hon. Sherrif Oborevwori, the Executive Governor of Delta State. Also in attendance were Prof. Cyril Usifoh FPSN, FPCPharm, FNAPharm, President Pharmaceutical Society of Nigeria (PSN), and Pharm. Babashehu Ahmed, FPSN, Registrar Pharmacy Council of Nigeria (PCN).

The Conference was graced by other eminent Nigerians including the past President of PSN Dr. U.N.O Uwaga, FPSN, and the Chairman Board of Trustees (BOT), ACPN; other Past Presidents of the PSN in attendance were Pharm Sir Anthony Akhimen, FPSN, Pharm Azubike Okwor, FPSN, and Pharm Olumide Akintayo FPSN. Some other dignitaries who graced the conference were Pharm Paul Enebeli, FPSN; Past Chairman Board of Fellows, Dr. Henry Ohre, Director of Medical Services Ministry of Health, Delta State; Pharm. Ifeoma Ndogu, Director, Federal Ministry of Health (FMOH); Hon. Solomon, Special Adviser on Policy; Pharm. (Hon.) Victor Ofobrukueta, DCPharm the Chairman, Ethiope East LGA, Delta State; Hon. Dr. Kelvin Obi Ezenyili, Chairman, Oshimili South LGA, Delta State; Dr. Dickson Owori, Provost College of Education Warri, Delta State; Dr. Clement Ahili, Dean Faculty of Pharmacy, Delta State University as well as several eminent speakers. Pharm Deji Osinoiki, FPSN, a distinguished Past Chairman of ACPN led other Past Chairmen including Pharm (Dr.) Ejiro Foyibo, FPSN, Pharm Femi Adebayo, FPSN, and Pharm (Dr.) Samuel O. Adekola, MAW, DCPharm to the conference.

The Chairman of the opening ceremony was Dr. Dere Awosika MFR, MNI, FPSN. The keynote address speaker was Dr. Chidebelu Ufodike, Chief of Staff, United States Healthcare.

Some highlights of the conference include:

I. Professional certification in point of care testing (POCT).
ii. The finals of the 5th edition of the ACPN National Anti-Drug Abuse Competition (ACPN-NADA) for Secondary School Students nationwide.
iii. Pharmacy-Based Vaccination Delivery / Basic Life Support (BLS) Programme certification training.
iv. Professional Certification in Universal Treatment for Substance Use Disorder
v. Routine Immunization Training by the National Primary Health Care Development Agency (NPHCDA).

Having thoroughly evaluated all the presentations at the 42nd Annual Scientific Conference Delta 2023. The Conference observed and resolved as follows:

1. The conference analyzed the out-of-pocket spending on healthcare in the world which shows South Africa has the least whereas Nigeria has the highest, with the patient being responsible for more than 70% of his healthcare costs.

   Poor treatment outcomes, characterized by people not getting better after incurring very high treatment expenses, with people not knowing what is wrong with them, can be resolved by operating the Values-Based

Pharmacy Care Model.

Universal Health Coverage (UHC) in Nigeria faces the challenge of a fragmented healthcare system which is costly, broken, and disconnected, with no access to care, and haphazardly rising costs of Health care that significantly escalate within five years; something the Value-Based Community Pharmacy model can resolve.

The conference asserted that building effective Community Pharmacy (CP) services is the roadmap to achieving Universal Health Coverage (UHC) with the "Pharmacist-Led Care Team Model" grounded in Value-Based Care (VBC). VBC is a focus on professionalism and knowledge-based Pharmacy Practice, which will better serve the Nigerian populace.

The conference therefore submitted that the solution to the gaps in healthcare in Nigeria, and the achievement of universal healthcare, lies within the Pharmacy profession. Effective Community Pharmacy services can make up for the shortage of healthcare personnel, resulting in effective healthcare coverage in the country, through the management of chronic diseases such as hypertension, diabetes, asthma, kidney disease, etc., to reduce their burden.

2. The Conference posited that there was a need to re-imagine and re-invent healthcare in Nigeria, and change the trajectory of care, to form a new kind of network, where providers of healthcare are reimbursed; properly, decently, and well remunerated for the retention and sustainability of quality healthcare services. Healthcare professionals must be rewarded for their contribution to healthcare provision.

Conference reasoned that the Community Pharmacy represents the front door to a re-imagined healthcare system in Nigeria through the Value-based Care Model; a pharmacist-driven healthcare system. This involves care navigation in:

i. Helping the patient understand his health challenge
ii. Helping the patient identify and articulate his care needs
iii. Helping the patient control costs through targeted knowledgeable and informed care.
iv. Define quality measures coming into play.

Moving forward, the Conference declared a need for the involvement of patients in their own care through a values-based care model in Community Pharmacies, where the patient is educated about his condition and the indices of improvement. This is a model that has worked in Mexico and Chile with very similar healthcare structures to Nigeria.

3. The conference counseled that the value-based care model results in:

i. Good treatment outcomes for the patient
ii. Less spending on the part of the patient, compared to the previous year, as a result of collaboration with a dedicated Community Pharmacist care provider
iii. Knowledgeable patients who know how to help themselves and understand the intricacies of their disease
iv. Patients who work towards getting better through knowledge of the parameters of their illness which they can improve through lifestyle modifications, diet, and other changes
v. Medication compliance is due to set goals in the form of progressive treatment outcomes.
vi. Total patient care; all parameters being managed by a Community Pharmacist.

The conference therefore encourages the Community Pharmacist to co-opt the patient into setting treatment goals through improved health indices which are discussed, jointly agreed upon, and monitored, forming a Pharmacist-patient coalition. Thus,

i. A therapeutic goal is set; a treatment outcome stated
ii. A goal-defined matrix is drawn up
iii. A timeline is allocated.

iv. The Community Pharmacist helps the patient achieve that goal.
v. The patient understands the inconveniences and impending complications of their disease condition if it is allowed to fester.

4. The conference admonished stakeholders to champion a healthcare disruption because

i. The patient is willing and able to pay for his individual healthcare and can be negotiated with
ii. The regulatory environment is flexible.
iii. The patient wants better treatment outcomes

Conference alluded that the value-based care model offers a high cost-benefit ratio; being cost-effective, benefit-loaded, and patient-friendly because it increases the patient's lifespan and reduces days of disability and helplessness. This is made possible by the Community Pharmacist's capacity to give total care through a differentiated skill set. Conference believed CPs know what they are doing and what they are tweaking.

5. The conference reminded stakeholders in health advocacy that Pharmacists must of necessity be the leading providers in re-imagining the local healthcare well-being for all. The Community Pharmacist is best positioned to drive this model of care because:

i. They are accessible
ii. They have enough knowledge
iii. They have enough training
iv. They are more affordable; low acuity care.
v. They are positioned to support the patient across the continuum of care,
vi. They are highly qualified healthcare professionals.

Conference advocated diversity through training in different areas is a way of empowering and boosting the Community Pharmacists' knowledge and ability to meet the needs of patients.

From the foregoing, the conference inferred Community Pharmacy services are aimed at delivering excellent customer care where:

i. The customer is king and is to be held in high esteem.
ii. Extra value is added above the care services
iii. Delighting the customer by exceeding expectations is prioritized
iv. Customers are consistently given an "A-Plus" experience.
v. A customer-centric approach to service delivery is adopted.

6. The conference called for the institution of prescribing Pharmacists as this will drive
i. Better patient care
ii. The heightened level of Universal Health Coverage
iii. Greater utilization of the Community Pharmacist's expertise to support national health care.
iv. Greater motivation and retention of the Community Pharmacist.

7. The conference advised Community Pharmacies to embrace Key Performance Indicators (KPIs) that are S.M.A.R.T, i.e., Specific, Measurable, Actionable, Relevant, and Time-bound:

i. Enhance data records
ii. Guide stock value estimation
iii. Close gaps and leakages in business management
iv. Focus on details of daily business activities influencing profit optimization.

Conference reiterated that once KPIs are embraced, leveraging special health sector loan packages by financial institutions will help to boost the business capacity of Community Pharmacies.

Conference further counselled that ensuring profitability of Community Pharmacy practice through Financial Forensic Auditing (FFA) is of utmost importance, achievable through:

i. Blocking leakages in the company banking system.
ii. Thoroughly understanding the concept of forensic auditing.

8. Conference called for a curriculum for the training of Community Pharmacists and pharmacy students in Traditional Complementary and Alternative Medicines (TCAM) to be developed in collaboration with PCN, to increase multidimensional treatment benefits to the Nigerian citizenry.

9. Conference evolved new strategies to boost Universal Health Coverage. This will include:
The involvement of Community Pharmacies in the HIV self-testing (HIVST) distribution model, through the rural network, which has increased access and reduced the cost of HIV testing.

The involvement of Community Pharmacies in immunization services which has increased Universal Health Coverage due to patients' convenience.

All Community Pharmacies should identify the proper channels and protocol for information dissemination to enhance UHC.

10. Conference supported the pooling of funds by Community Pharmacies, for bulk drug purchases through a secure and traceable supply chain that will ensure economies of scale, reduced retail prices, and elimination of counterfeit drugs.

11. Members under the aegis of the ACPN approved the incorporation of data gathering and collating systems in Community Pharmacy facilities, for the purpose of extracting and sharing information with PCN and other relevant government agencies that will improve advocacy and policy-making.

Flowing from the above, Conference resolved that periodic consultative meeting with the Federal Ministry of Health (MOH), NGOs, NAFDAC, NDLEA, and PCN would be necessary.

12. The Conference critically appraised the activities of PCN and tasked it as follows:
    i. Step up Pharmaceutical Inspection Committee (PIC) activities, empowered by the new PCN ACT 2022, catalysing implementation of NDDG, clamping down on unregistered premises and more stringent PPMV regulation.
    ii. Hasten the processing of Practice Licenses.
    iii. Completely supports the Pharmacy Profession and Pharma stakeholders with the whole ambit of the new law at their disposal.
    iv. Remains independent, unmerged with any other regulatory agency, in recognition of the peculiarity of drugs that are on the exclusive list.
    v. Ensures every Pharmacy Outlet is licensed
    vi. Commence the regulation of Hospital Pharmacy in both the public and private sector.
    vii. Immediately eliminating online Schools of Pharmacy.

13. The conference advocated that Pharmacare Centers should be established in each of the six geopolitical zones of the federation. The under-served areas of the community or state should be given preference while the National Secretariat supports them with training, provision of IT, and other materials.

14. The conference gave approbation to the e-label initiative in Community Pharmacies.

This will ensure adequate maintenance of accurate data on dispensing activities as well as assist patients in understanding the usage of their medications for optimal therapeutic outcomes in a process that creates a verifiable measure of accountability for services rendered.

The conference put on record that the e-label initiative ensures the traceability of all drugs in circulation amongst Pharmacists as all drugs dispensed can be traced to the source using the QR code of the label

15. The Conference AGM approved some amendments to the 2020 Constitution of the ACPN.

16. Conference conveyed its gratitude to H.E. the Executive Governor of Delta State and the

good people of Delta State for their hospitality which enhanced the success of the 42nd Annual National Conference of the ACPN.

17. At the end of the Conference, the following Pharmacists were elected to pilot the affairs of the association for the next year:

Pharm. Adewale Oladigbolu, FPSN - *National Chairman*
Pharm. (Mrs.) Bridget Otote Aladi, *FPSN* - *National Vice Chairman*
Pharm Omokhafe Ashore, *MAW, DCPharm* - *National Secretary*
Pharm (Dr.) Samuel Iyen, *MAW*
National Assistant Secretary
Pharm Babatunde Aremu Samuel, *MAW*
National Treasurer
Pharm Obiageri Ikwu
National Financial Secretary
Pharm Chukwudi Mekwunyei
National Publicity Secretary
Pharm. Giwa Babajide, MAW
National Editor-in-Chief
Pharm. Ikechukwu Okwor
Internal Auditor
Pharm. (Dr) Adekola O. Samuel, *MAW, DCPharm*
Immediate Past National Chairman

Pharm Ambrose Igwekamma Ezeh, *MAW*
National Secretary

Pharm. Adewale Oladigbolu, *FPSN*
National Chairman

1. Pharm. Giwa Babajide MAW
2. Pharm Charles Akinste, MAW
3. Pharm Charles Oluwole Oluwaseyi
4. Pharm. Olusiji Nelson Benjamin

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PHARMACY

The Pharmacy Emblem, a property registered with Corporate Affairs Commission(CAC) (with Reg. No. RT M 63583) belongs to the Pharmaceutical Society of Nigeria (PSN).

The PSN entrusted the Association of Community Pharmacists of Nigeria (ACPN)With power of attorney to manage the Pharmacy Emblem often referred to as the"Green Cross" or the "Rx Sign"

The Emblem made its debut in 1976, and till date, functions as a mark of identification for Registered and Pharmacists' owned Pharmaceutical Premises(Retails).

The Rx sign is a symbol with which the PSN guarantees the general public where to source for quality products and excellent professional pharmaceutical care and services.

The Council of PCN has resolved that the Pharmacists Council of Nigeria (PCN) shall henceforth enforce the Pharmacy Emblem and the Registrar has so been mandated.

The general public should therefore watch out for the Green Cross with Rx sign before patronizing any drug or medicine shops because the Pharmacy Emblem guarantees:

- Genuine and Quality Drugs/Medicines
- Professionalism/Pharmaceutical Care Services
- Health Education and Drug Information
- Conselling and Proper use of drugs

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