Assessment of the Application of a Multidisciplinary Learning Approach for Pharmaceutical Care in the Bachelor of Pharmacy Curriculum among Pharmacy Educators in Southern Nigeria

Abstract

Background: Pharmacy practice has increasingly focused on pharmaceutical care from traditional product-centred practice, and now emphasizing the multidisciplinary management of patients, which requires a collaborative, multidisciplinary approach. This has necessitated a re-assessment of the pharmacy training curricula. This study thus aimed to evaluate pharmacy educators' perceptions of implementing a multidisciplinary learning approach within the Bachelor of Pharmacy curriculum in Southern Nigeria.

Methods: A mixed-method approach was used, combining quantitative and qualitative techniques in obtaining data for this study. The quantitative component employed a descriptive design where multi-stage sampling was used to select pharmacy educators from various Faculties of Pharmacy in Southern Nigeria. The qualitative component involved key informant interviews (KIIs) with Deans of Pharmacy Faculties, using a narrative design to gather insights on the multidisciplinary applicability, challenges, and curriculum relevance of the learning approach. Descriptive statistics were developed for responses provided and the thematic content analysis was used to analyseresponses from the KIIs.

Results: The majority of pharmacy educators supported the multidisciplinary learning approach, believing it could address deficiencies in patient care education. Identified challenges included insufficient manpower (52%) and resistance from other healthcare team members (42%). The approach was perceived as being relevant for improving patient care experiences (72%), problem-solving skills (72%), and evidence-based pharmacotherapy (68%). Issues such as outdated teaching methods (56%) and a lack of e-learning systems (52%) were also noted. Thematic analysis identified five key themes: holistic educational approach, development of practical proficiency, navigating educational challenges, curriculum dynamics, and integration of educational components.

Conclusion: The study underscores the need for a multidisciplinary integrated curriculum that involves multiple departments within the Faculty of Pharmacy to enhance pharmacy education and pharmaceutical care. While the emphasis has been on practical patient care skills, there is a need for a broader approach to address other aspects of pharmacy practice and current challenges effectively.

Keywords: Multidisciplinary learning, pharmaceutical care, Pharmacy education, Curriculum

Comment [A1]: Change to " traditional product-centered approaches"

Comment [A2]: Change to "now emphasizing multidisciplinary patient management"

Comment [A3]: Change to "reassessment" It is the more standard form.

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Introduction

Pharmacy education plays a pivotal role in advancing health services, including sustainable pharmaceutical services, to effectively address the health requirements of communities as well as develop the healthcare system of a country (Etukakpan et al., 2023). It has however been reported that ineffective healthcare systems and suboptimal quality of health services worldwide, including Nigeria, can be partly attributed to the lack of collaboration and teamwork among healthcare professionals, among other factors (Mohammed et al., 2022).The non-inclusion or non-participation of pharmacists in clinical multidisciplinary teams involved in patient management, can also be linked to the absence of interprofessionaleducation as well as a deficiency in the curriculum used in training pharmacists (Binghouth et al., 2020; Langley et al., 2010; Lash et al., 2014). Pharmacy practice revolves around pharmaceutical care, as such the curriculum for training pharmacists should embody a well-rounded compilation and arrangement of knowledge and skills that students are meant to gain to fulfill the goals

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of the pharmacy training program (Ikhile&Chijioke-Nwauche, 2016). Pharmaceutical care has in recent times been promoted as a central component of the pharmacy training curricula, with emphasis on the importance of addressing patients' needs and optimising their medication therapy for better health outcomes (Abdulwahab et al., 2022; Fakeye et al., 2017).

The multidisciplinary approach to learning refers to the integration of various academic disciplines to address a particular subject or issue. The application of the multidisciplinary approach to practice is crucial not only in patient care but also in the pharmacy training curriculum, in the form of developing the concept of multidisciplinary learning (Paralikar, 2016; Tramonti et al., 2019). This learning approach however comes with its set of challenges, with a major concern being the potential for distraction of the learner, given the array of courses offered in the approach. The diverse range of courses may divert learners' attention, causing them to lose focus. Additionally, a learner's affinity for a specific course or subject area, which could lead to a drive towards specialization, is not strongly supported by this approach (Feng et al., 2023). These notwithstanding, the approach when systematically adopted has been shown to effectively promote the functionality of the pharmacy professional especially regarding the wholesome management of a patient (Ikhile&Chijioke-Nwauche, 2016; Saka et al., 2021).

In practice, ensuring the delivery of pharmaceutical care requires the multidisciplinary practice approach, interdisciplinary tolerance, and collaboration to ensure quality outcomes (Alrasheedy, 2020). A study by (Bin-ghouth et al., 2020), showed a weak connection between actual education received and the job practice of a pharmacist while another study described basic pharmacy courses as being not in tandem with clinical pharmacy components (Saka et al., 2021). These could form pointers, calling for the inclusion of the multidisciplinary learning and practice approach when training pharmacists (Saka et al., 2021). Even though health professional education models have included teamwork as a core competency, coupled with years of evidence that teamwork skills contribute to performance, there is still a lack of balance as there is a greater emphasis on developing individual skills, personal contributions, and accountability (Weiss et al., 2014; Zajac et al., 2021). In another study conducted by Abdulwahab et al., (2022), it was suggested that improving the interprofessional environment through collaboration, strengthened health workforce culture, essential policies, and regulations and pharmacy education will improve the practice of pharmaceutical care in Nigeria (Abdulwahab et al., 2022). Pharmacists who possess adequate clinical training and professional education are well-placed to assist patients and other healthcare professionals (Fakeye et al., 2017; Tramonti et al., 2019; Saka et al., 2021). In Southern Nigeria, very few studies have explored the perceptions of pharmacy educators regarding the integration of a multidisciplinary learning approach in the Bachelor of Pharmacy program. It is pertinent that for the tenets of the multidisciplinary learning approach to be widely adopted by pharmacy educators, their perceptions regarding the approach alongside challenges in its implementation need to be known, as an avenue to enhance methods used to promote this learning approach for pharmacy education.This study thus aimed at evaluating pharmacy educators' perceptions of implementing a multidisciplinary learning approach within the Bachelor of Pharmacy curriculum in Southern Nigeria.

Comment [A14]: Although health professional education models have included teamwork as a core competency, supported by years of evidence that teamwork skills contribute to performance, there remains an imbalance with a greater emphasis on developing individual skills, personal contributions, and accountability.

Comment [A15]: Pharmacists with adequate clinical training

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Comment [A17]: In Southern Nigeria, few studies have explored pharmacy educators' perceptions regarding the integration of a multidisciplinary learning approach into the Bachelor of Pharmacy program.

Comment [A18]: This study aims to evaluate pharmacy educators' perceptions of implementing a multidisciplinary learning approach within the Bachelor of Pharmacy curriculum in Southern Nigeria.

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Method

This study utilized a descriptive design and was conducted among 50 full-time pharmacy educators involved in the Bachelor of Pharmacy training programme in 15 public and private tertiary institutions located in Southern Nigeria. Data was collectedusing a mixed method approach involving quantitative

and qualitative aspects.Sample size for this study was calculated using the Cochran's formula shown below (Bolarinwa, 2020)

$n = \frac{Z_{\alpha}{}^{2} pq}{d^{2}}$, where n is the minimum sample size required for the study, Zα is the standard normal deviate corresponding to 95% confidence interval which is 1.96. 'p' is the percentage or proportion of the attribute of interest (perception of pharmacy educators on the use of a multidisciplinary integrated pharmacotherapy curriculum for developing problem-solving skills needed in pharmacy practice: 96.88%) estimated from a previous study (Alrasheedy, 2020). 'q' is the complementary proportion given as 100 – p, d is the error margin (level of precision) that would be allowed in the study which is taken as 5%. Substituting these values and accounting for 10% non-response, sample size was obtained as 51.

A multistage sampling involving stratified and simple random sampling techniques, was used to select pharmacy educators at the Faculties of Pharmacy for the quantitative aspect, while all the Deans of Faculties of Pharmacy were interviewed for the qualitative aspect of the study.

Data was collected using a structured self-administered questionnaire which was administered to the pharmacy educators via Google Forms and they were followed-up to ensure completion and submission of the instrument. The instrument comprised five sections: Section A for demographic details, Section B for perceptions of the multidisciplinary learning approach, and Sections C, D, and E for perceived challenges, understanding of the approach's importance, and opinions on curriculum improvements, respectively. Responses to questions asked were made using a 5-point Likert scale of strongly agree to strongly disagree.

For the qualitative aspect, key informant interviews (KIIs) were conductedamong the Deans of Faculties of Pharmacy to explore their perceptions of the Multidisciplinary Learning Approach, associated challenges, and its importance in the Bachelor of Pharmacy curriculum. An interview-guide with open-ended questions, adapted from Alrasheedy (2020), was used to gather data on their perceptions, challenges, understanding, and views on improving the multidisciplinary learning approach in the Bachelor of Pharmacy curriculum.

For the quantitative aspect of the study, data management was performed using Microsoft Excel 2021, and statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 23. Descriptive data were presented in tables and charts, expressed as frequencies and percentages for categorical variables, and included participants' perceptions, challenges, and areas for improvement in the Bachelor of Pharmacy curriculum. Numerical data, such as age and years of experience, were summarised with means and standard deviations. For the qualitative data, it was transcribed verbatim and analysed using the N-Vivo software, where a thematic content analysis was performed. The data was then categorised into themes and nodes relating to the study objectives. Finally, results from both qualitative and quantitative analyses were triangulated and used for making robust inferences from the study.

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Comment [A23]: 'p' represents the percentage or proportion of the attribute of interest—specifically, the perception of pharmacy educators regarding the use of a multidisciplinary integrated pharmacotherapy curriculum for

Comment [A24]: practice, estimated at 96.88% from a previous study

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Results

Table 1: Socio-Demographic characteristics of respondents

Variable	Frequency (n=50)	Percentage (%)
Gender		
• Male	24	48.0
• Female	26	52.0
Age (years)		
• 20-29	1	2.0
• 30-39	18	36.0
• 40-49	14	28.0
• 50-59	11	22.0
• 60-69	6	12.0
	Age of respondents: 44.5±10.5 years	
Institution		
• Bayelsa Medical University	4	8.0
• Delta State University	4	8.0
• Federal University, Oye-Ekiti	1	2.0
• Igbinedion University, Okada	1	2.0
• Madonna University	1	2.0
• NnamdiAzikwe, University	1	2.0
• Niger Delta University, Amassoma	7	14.0
• Obafemi Awolowo University	2	4.0
• OlabisiOnabanjo University	4	8.0
• University of Benin	2	4.0
• University of Ibadan	2	4.0
• University of Lagos	7	14.0
• University of Nigeria, Nsukka	7	14.0
• University of Port Harcourt	4	8.0
• University of Uyo	3	6.0
Rank		
• Associate Professor/ Professor	11	22.0
• Senior Lecturer	26	52.0
• Lecturer 1	13	26.0

Perception of the multidisciplinary learning approach

Concerning the perception of the pharmacy educators on the applicability of the multidisciplinary learning approach, it was identified that most of the respondents strongly agreed that this learning approach could improve students' learning deficiencies regarding patient care 29 (58%), while majority either agreed 21 (42%) or strongly agreed 10 (20%) that adopting the approach would create more workload for the pharmacy educators.It was however vital to note that majority also agreed 22 (44%) or strongly agreed 27 (54%) that adopting the approach would require the integration of more medical/clinical-oriented educators for student training. Also, most of the respondents strongly agreed 33 (66.0%) that adopting the multidisciplinary learning approach would foster evidence-based pharmaceutical care/clinical practice, and that it would require effective communication and good

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Comment [A32]: When providing percentages, it may be clearer to specify the number of respondents in parentheses immediately after the percentage, especially when the percentages are derived from the same group (e.g., "58% (n=29)")

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coordination among all departments 38 (76%). In addition to these 35 (70%) of them strongly agreed that the approach would require careful design and implementation to avoid marginalization of certain course contents while 32 (64%) strongly agreed that it would require the application of e-learning systems. However, as much as 18 (36%) of them either strongly disagreed or disagreed that this approach may not be fully achievable in Nigerian Pharmacy schools, while most 31 (62%) strongly agreed that adopting the approach would result in more opportunities for interaction and ideas sharing among faculty members. These can be seen in Table 2.

Perceived Challenges of the Applicability of the Multidisciplinary Approach

Regarding the challenges perceived to affect the applicability of the multidisciplinary learning approach, it was identified that most of the respondents 26 (52%) strongly agreed that having insufficient manpower for the intended curriculum coverage was a challenge. Others included 21 (42%) strongly agreeing that experiencing resistance from other members of the healthcare teams who would see no need for the pharmacist was another challenge as well as the problem of infrastructural insufficiencies to which the largest proportion of them 24 (48%) strongly agreed to. However, as much as 17 (34%) disagreed that another challenge facing the adoption of the multidisciplinary approach was the prolonged time to successfully graduate a student. Communication gaps between the pharmacist and other members of the healthcare team was also a challenge to which 18 (36%) agreed with, while 14 (28%) were in disagreement with it. Finally, the largest proportion of the respondents 15 (30%) agreed that another challenge to the adoption of the approach was that certain courses would be perceived as being irrelevant. These are shown in Table 3.

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Knowledge of the Importance of Applying a Multidisciplinary Learning Approach

Concerning the knowledge of the importance of applying the multidisciplinary approach, it was identified in this study that most respondents strongly agreed that using this approach would improve learning experiences in patient care 36 (72%), improve problem-solving skills needed in practice 36 (72%), as well as improve evidence-based pharmacotherapy practice 34 (68%). In addition, most respondents strongly agreed that applying this approach would improve evidence-based pharmaceutical/clinical practice 29 (58%), improve the ability for engagement in an effective multidisciplinary practice 30 (60%), and 21 (42%) agreed that adopting this approach would improve better understanding and application of medicinal chemistry. Overall, it was found that all the respondents had good knowledge of the importance of applying a multidisciplinary approach. These are shown in Table 4.

Table 2: Perception of the multidisciplinary learning approach among respondents

Using the Multidisciplinary Approach to learning will:	Frequency (n=50)	Percentage (%)
Improve students' learning deficiencies regarding patient care		
• Disagree	1	2.0
• Agree	20	40.0
• Strongly Agree	29	58.0
Create more workload for the educators		
• Strongly Disagree	4	8.0
• Disagree	7	14.0
• Undecided	8	16.0
• Agree	21	42.0
• Strongly Agree	10	20.0
Require the integration of more medical/clinical-oriented educators for student training		
• Disagree	1	2.0
• Agree	22	44.0
• Strongly Agree	27	54.0
Foster evidence-based pharmaceutical care/clinical practice		
• Undecided	1	2.0
• Agree	16	32.0
• Strongly Agree	33	66.0
Require effective communication and good coordination among all departments		
• Undecided	1	2.0
• Agree	11	22.0
• Strongly Agree	38	76.0
Require careful design and implementation to avoid marginalization of certain course contents		
• Undecided	1	2.0
• Agree	14	28.0
• Strongly Agree	35	70.0
Require the application of e-learning systems		
• Undecided	3	6.0
• Agree	15	30.0
• Strongly Agree	32	64.0
May not be fully achievable in Nigerian Pharmacy schools		
• Strongly Disagree	6	12.0
• Disagree	12	24.0
• Undecided	8	16.0
• Agree	17	34.0
• Strongly Agree	7	14.0
Results in more opportunities for interaction and ideas sharing among faculty members		
• Strongly Disagree	1	2.0

• Agree	18	36.0
• Strongly Agree	31	62.0

Table 3: Challenges of the applicability of the multidisciplinary learning approach

Applying the multidisciplinary approach would face the following challenges:	Frequency (n=50)	Percentage (%)
Insufficient manpower for the intended curriculum coverage		
Strongly Disagree	1	2.0
• Disagree	4	8.0
• Undecided	4	8.0
• Agree	15	30.0
• Strongly Agree	26	52.0
Resistance from other members of the healthcare teams who see no need for the pharmacist		
• Disagree	7	14.0
• Undecided	3	6.0
• Agree	19	38.0
• Strongly Agree	21	42.0
Infrastructural insufficiencies e.g. e-learning systems, classroom facilities etc.		
• Disagree	4	8.0
• Undecided	5	10.0
• Agree	17	34.0
• Strongly Agree	24	48.0
Prolonged time to successfully graduate a student		
• Strongly Disagree	4	8.0
• Disagree	17	34.0
• Undecided	12	24.0
• Agree	10	20.0
• Strongly Agree	7	14.0
Communication gaps between the pharmacist and other members of the healthcare team		
• Strongly Disagree	2	4.0
• Disagree	14	28.0
• Undecided	4	8.0
• Agree	18	36.0
• Strongly Agree	12	24.0
Certain courses are perceived as being irrelevant		
• Strongly Disagree	3	6.0
• Disagree	12	24.0
• Undecided	11	22.0
• Agree	15	30.0
• Strongly Agree	9	18.0

Table 4: Knowledge of the importance of applying a multidisciplinary learning approach

Using the multidisciplinary approach to learning will improve students:	Frequency (n=50)	Percentage (%)
Learning experiences in patient care		
• Agree	**13**	**26.0**
• Strongly Agree	**37**	**74.0**
Problem-solving skills needed in practice		
• Agree	**14**	**28.0**
• Strongly Agree	**36**	**72.0**
Evidence-based pharmacotherapy practice		
• Agree	**16**	**32.0**
• Strongly Agree	**34**	**68.0**
Evidence-based pharmaceutical/clinical practice		
• Undecided	**1**	**2.0**
• Agree	**20**	**40.0**
• Strongly Agree	**29**	**58.0**
Better understanding and application of medicinal chemistry		
• Strongly Disagree	**1**	**2.0**
• Disagree	**4**	**8.0**
• Undecided	**5**	**10.0**
• Agree	**21**	**42.0**
• Strongly Agree	**19**	**38.0**
Ability for engagement in an effective multidisciplinary practice		
Undecided	**2**	**4.0**
• Agree	**18**	**36.0**
• Strongly Agree	**30**	**60.0**
Overall knowledge level		
• Good	**50**	**100.0**
Mean knowledge score: 27.3±2.7		

Areas of Improvement of the Bachelor of Pharmacy Training Curriculum

Respondents identified several areas of the B. Pharm training curriculum needing improvement. The majority strongly agreed that outdated teaching/learning methods (28, or 56%) and the lack of e-learning systems (26, or 52%) were significant issues. Course content also needed attention, with 22 (44%) strongly agreeing and 20 (40%) agreeing. Other areas requiring improvement included course load (20, or 40% strongly agreed; 18, or 36% agreed) and the adoption of experiential learning (22, or 44% strongly agreed; 22, or 44% agreed). These areas are detailed in Table 5.

Table 5: Perception of Areas of Improvement of the Bachelor of Pharmacy Training Curriculum

The following are areas of the B. Pharm training curriculum that requires improvement:	Frequency (n=50)	Percentage (%)
Use of outdated teaching/learning methods		
• Disagree	5	10.0
• Undecided	2	4.0
• Agree	15	30.0
• Strongly Agree	28	56.0
Unavailability of e-learning systems		
• Disagree	3	6.0
• Undecided	1	2.0
• Agree	20	40.0
• Strongly Agree	26	52.0
Course content		
• Disagree	4	8.0
• Undecided	4	8.0
• Agree	20	40.0
• Strongly Agree	22	44.0
Course load		
• Strongly Disagree	2	4.0
• Disagree	4	8.0
• Undecided	6	12.0
• Agree	18	36.0
• Strongly Agree	20	40.0
Experiential learning		
• Disagree	3	6.0
• Undecided	3	6.0
• Agree	22	44.0
• Strongly Agree	22	44.0

Comment [A36]: change to "Perceived Areas for Improvement in the Bachelor of Pharmacy Training Curriculum"

Qualitative Results

Socio-demographic characteristics of the participants are shown in Table 6. Semi-structured Interviews were conducted with Deans of Faculties of Pharmacy/Pharmaceutical Sciences with a response rate of 64.2%. Thematic content analysis yielded five major themes across the five interview questions, as shown in Tables 7 and 8.

Comment [A37]: Lower case "interviews"

Comment [A38]: Change to "five major themes derived from the five interview questions"

Table 6: Socio-Demographic characteristics of respondents

Variable	Frequency (n=50)	Percentage (%)
Gender		
• **Male**	**8**	**80.0**
• **Female**	**2**	**20.0**
Years of Experience		
• **10-19**	**2**	**20.0**
• **20-29**	**2**	**20.0**
• **30-39**	**6**	**60.0**
Institution		
• **Bayelsa Medical University**	**1**	**100.0**
• **Delta State University**	**1**	**100.0**
• **Igbinedion University, Okada**	**1**	**100.0**
• **Madonna University**	**1**	**100.0**
• **NnamdiAzikwe, University**	**1**	**100.0**
• **Niger Delta University, Amassoma**	**1**	**100.0**
• **OlabisiOnabanjo University**	**1**	**100.0**
• **University of Benin**	**0**	**100.0**
• **University of Ibadan**	**1**	**100.0**
• **University of Lagos**	**1**	**100.0**
• **University of Port Harcourt**	**1**	**100.0**

Table 7: Thematic analysis and quotes of interview respondents

Major Theme	Sub-theme	Findings	Comments
Understanding of Multidisciplinary Learning Approach	Holistic Educational Approach	90% of the respondents described a multidisciplinary learning approach as a comprehensive education involving the integration of various fields, maintaining a balance between practice and theory. The respondents highlighted that it promotes team and collaborative teaching, with a strong focus on both clinical and technological aspects that leads to a well-rounded and impactful educational experience.	*"Multidisciplinary learning approach is a comprehensive education across fields within and outside pharmacy." UL*
Advantages of Multidisciplinary	Development of Practical	All the respondents emphasised that the advantages of multidisciplinary learning	*"This approach ensures individuals are equipped with*

Learning Approach	Proficiency	approach include provision of enhanced practical skills, improved problem-solving abilities, and adaptability. They reiterated that these are central to fostering collaboration and effective communication. These elements collectively contribute to holistic development, emphasising both specialisation and versatility.	*the necessary competencies to thrive in diverse areas of practice blending specialised knowledge with adaptable skills for comprehensive growth and success." DL*
Disadvantages of Multidisciplinary Learning Approach	Managing Educational Dynamics	The disadvantages of the multidisciplinary learning approach described included the complexity navigating curriculum which involves balancing practical and academic focuses while coordinating resources effectively. Secondly, respondents expressed that it limits the ability of students to understand the whole curriculum as unnecessary elements for practice will be learnt.	*"There will be difficulty in aggregating the whole knowledge acquired in a particular topic from different subjects." ND* *"You are at risk of producing pharmacists that are not laser focused." MU*

Table 8: Thematic analysis and quotes of interview respondents (contd.)

Major Theme	Sub-theme	Findings	Comments
Challenges of Multidisciplinary Learning Approach	Navigating Educational Challenges	Respondents identified several challenges to implementing the multidisciplinary learning approach, including resource constraints, resistance to change, and inadequate specialised training and coordination due to university policies. Poor academic staff welfare and high workloads from staff attrition further hinder implementation. Administrative issues with lecture and results coordination across faculties disrupt the process, and long-standing rivalries between medical doctors and pharmacists, as well as unresolved disparities with other healthcare professionals, impede effective use of the approach.	"*In our university, due to limited staff and resources, the faculty has taken over the teaching of other disciplines outside core pharmacy thereby losing the essence of multidisciplinary learning approach. UP"*

Ways to improve Multidisciplinary Learning Approach	Comprehensive Curriculum Enhancement	Respondents highlighted the need for improved curriculum development to avoid repetition, enhance collaboration, and support strong policy and advocacy efforts. They also stressed adapting to technological advancements, focusing on hands-on training, and ensuring continuous professional development for pharmacy educators.	"*We need to integrate the curriculum to avoid too many repetitions." OU* *"There has to be political will from the university for proper implementation." UL* *"Having a career day and increasing the use of ICT is one way to improve what we currently have." NA*

Discussion

The recent assessment indicates a promising trend among pharmacy educators, with many demonstrating a high level of knowledge about the benefits of multidisciplinary learning for problem-solving and pharmaceutical care. This aligns with findings from Alrasheedy (2020), who showed that curricula incorporating a multidisciplinary learning approach are more innovative and learner-centred, leading to a better understanding and application of vital elements that enhance patient care. (Alrasheedy, 2020). These elements include pathophysiology, medicinal chemistry, pharmacology, and other pharmaceutical sciences applications in practice. The implication of this is that it consequently, results in improved student learning experiences, (Alrasheedy, 2020; Azhar et al., 2015) and also empowers the healthcare system to achieve more successful and efficient outcomes in drug therapy (Ogaji&Ojabo, 2014). In addition to these, adequate dissemination of information on pharmacy education to enhance multidisciplinary learning, has been reported to drive improved awareness, which in turn enhances the training and competencies of the pharmaceutical workforce (Ikhile&Chijioke-Nwauche, 2016; Ogaji&Ojabo, 2014)

This study indicated that lecturers were supportive of this approach within their various faculties, despite the challenges highlighted on effective implementation of the approach. The major challenging issues included limited resources, heavy lecturer workloads, administrative difficulties in result collation and lecture organization, and conflicts between the College of Medicine and the Faculty of Pharmacy. In addition, the disparity between lecturers with pharmacy backgrounds and others without pharmacy backgrounds was pointed out as another barrier to multidisciplinary pharmacy education. Langley et al. (2010) found that there was limited human and material resources for implementing a multidisciplinary learning approach in pharmacy training. Similar challenges were noted by Langley et al. (2010) and Ikhile&Chijioke-Nwauche (2016), who highlighted that implementing multidisciplinary education approaches across professional disciplines involved inherent difficulties. These included having limited human and material resources for implementing this approach in pharmacy training. (Ikhile&Chijioke-

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Nwauche, 2016; Langley et al., 2010). Another practical display of these challenges has also been highlighted in the report showing health professionals perceiving specific responsibilities as their exclusive responsibility in Nigeria, which creates an atmosphere of restiveness when others attempt to participate in those tasks. (Mohammed et al., 2022). The implication of these challenges will be the inadvertent occurrence of poor patient-centred health care provision, with attendant issues of poor collaboration, prescription errors and poor patient outcomes. (Abdulwahab et al., 2022; Funsho&Titilayo, 2015). To address these obstacles, effective strategies such as advocacy, relationship management, patient-centred care, teamwork and robust policy frameworks have been recommended to be essential, if successful implementation of multidisciplinary learning is to be achieved (Albassam et al., 2020; Eze et al., 2021; Ikhile&Chijioke-Nwauche, 2016).

Regarding the knowledge of pharmacy educators on the importance of applying a multidisciplinary learning approach in the Bachelor of Pharmacy training curriculum, most of the pharmacy educators had good knowledge of these benefits. This view is shared by other authors who have also called for multidisciplinary pharmacy education due to the existence of weak connections between actual pharmacy education received and the actual practice of a pharmacist (Bin-ghouth et al., 2020; Saka et al, 2021). In addition to these, it has also been reported that using the integrated curriculum can be an effective approach for producing better student learning experiences and professional application of pharmaceutical sciences (Alrasheedy, 2020; Azhar et al., 2015). When members of multidisciplinary clinical teams are not able to recognize the need for the professional contributions of the pharmacist in patient care, it acts as a barrier to their inclusion in such teams (Wilbur & Kur, 2015). Thus, the patient management team which includes clinical pharmacy practitioners must be regularly educated on the need to adopt the multidisciplinary management approach of patients, considering its benefits for effective patient management (Alrasheedy, 2020; Wilbur & Kur, 2015). To deal with this at the training stage of pharmacy education, the introduction of the Core Curriculum Minimum Academic Standards (CCMAS) by the National Universities Commission (NUC), has also provided an avenue for attaining academic standards that ensure global competitiveness and adaptability (Rasheed, 2023; Sun et al., 2023).

On the aspect of educators' views on areas requiring improvement of the Bachelor of Pharmacy training curriculum, this study also revealed the need for a focus shift from theoretical knowledge to more practical knowledge, and the need for a shift from Bachelor of Pharmacy to the Doctor of Pharmacy. In regions like the Arab world, America, and Europe, pharmacy curricula have increasingly focused on practical patient care skills rather than theoretical knowledge. In contrast, countries like India emphasise training for the industrial sector due to industrial demands (Azhar et al., 2015; Ikhile&Chijioke-Nwauche, 2016). However, some Nigerian educators believe that the focus should shift not only to pharmaceutical care, but to other aspects of pharmacy practice such as herbal medicine production, as well as the application of Information, Communication and Technology (ICT) in pharmacy practice (Rasheed, 2023). It should however be noted that by improving the inter-professional clinical environment through collaboration, strengthened health workforce culture, health insurance, among others, the inadvertent improvement of pharmaceutical care in Nigeria is unavoidable (Abdulwahab et al., 2022).

Conclusion and Recommendations

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Comment [A46]: Change to "(NUC) has provided"

Comment [A47]: Change to "In regions such as the Arab world, the United States, and Europe,"

Comment [A48]: Change to "It should, however, be noted that improving the"

Comment [A49]: Change to "a strengthened health workforce culture, and health insurance, among other factors, will inevitably lead to improvements in pharmaceutical care in Nigeria."

In conclusion, this study has shown that the majority of pharmacy educators had positive perceptions on the application of the multidisciplinary learning approach for pharmaceutical care within the Bachelor of Pharmacy curriculum. They were also aware of the benefits of its application for the Bachelor of Pharmacy training curriculum and pharmaceutical care. However, the study highlighted several challenges facing the application of this approach in the Bachelor of Pharmacy training curriculum. Areas for improvement of the Bachelor of Pharmacy training curriculum were also identified to include adopting multidisciplinary learning elements, applying collaborative teaching methods, as well as emphasizing technological avenues for healthcare delivery.

Based on these findings, the following are actionable recommendations:

For Policy

- The formulation and implementation of policies that foster multidisciplinary clinical education and learning by Federal and State Ministries of Education.
- The strict implementation of the Core Curriculum Minimum Academic Standards (CCMAS) provided by the National Universities Commission (NUC) for pharmacy education.
- The establishment of technological frameworks by concerned government stakeholders to drive the adoption of technology in healthcare management systems.

For Practice

- Pinpointing and resolving gaps that are capable of hindering the effective adoption of the multidisciplinary learning approach in the Nigerian university system by the respective university management teams.
- The education of patient management teams in the Nigerian healthcare delivery system through their respective Ministries, Departments and Agencies, on the need to adopt the multidisciplinary approach to patient management. This is essential in providing an avenue for visualizing the strides attained in implementing the multidisciplinary learning approach for pharmacy education.

Comment [A50]: Change to "have positive perceptions of"

Comment [A51]: change to "facing the implementation of this approach"

Comment [A52]: change to "Areas for improvement in the Bachelor of Pharmacy training curriculum were also identified, including"

Comment [A53]: Change to "and an emphasis on"

Comment [A54]: change to "Identifying and addressing gaps that could hinder"

Comment [A55]: Change to "on the necessity of adopting the multidisciplinary approach to patient management"

Comment [A56]: change to "providing a means of visualizing the progress made"

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