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Developing a model for teaching and learning clinical pharmacy components of the pharmacy curriculum in Nigeria

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Abstract

Background: Increasing clinical roles of pharmacists necessitate the need for adopting innovative teaching and learning methods that will enhance pharmacist's clinical skills especially in developing countries.

Aim: To develop appropriate model(s) for teaching clinical pharmacy in Nigeria.

Method: The study consisted of focus group discussions (FGDs) with final year pharmacy students of a Nigerian university investigating their preferred methods for learning clinical pharmacy. The FGDs resulted in a 50-item questionnaire exploring appropriate models for teaching clinical pharmacy among the teachers. Data was evaluated using thematic analysis and descriptive statistics.

Result: Integrated and interactive active-learning teaching models were proposed in the FGDs. Models proposed included Direct Instruction (DI), Guided Design (GD) Cognitive apprenticeship (CA), Cooperative Learning (CL) and Problem-based learning (PBL) with clinical pharmacy teachers ranking them GD=DI>CA>>CL=PBL for teaching clinical pharmacy components

Conclusion: FGDs preferred low structure while the teachers preferred moderate to high structure of learning.

Keywords: *Clinical Pharmacy, Nigeria, Teaching, Learning*

Introduction

The recent introduction of clinical pharmacy into pharmacy education in developing countries has dramatically changed the duties of the pharmacist practitioner from product-oriented practice to product- and patient-oriented practice which is the core philosophy of pharmaceutical care (Hepler & Strand, 1990; World Health Organisation, 1994). This has however brought up the challenges of how clinical skills can be acquired by the pharmacist-in-training in such areas as pharmaceutical care and related clinical pharmacy components most especially since traditional methods may not be appropriate for imparting the required clinical skills (Azmi, 2010; Khan, 2011). Clinical skills, unlike the traditional pharmaceutical sciences, cannot be taught to students using traditional didactic methods of teaching. Contemporary methods of instruction that are appropriate to imparting clinical skills to students need to be implemented, as emphasised in many studies (Strand & Morley, 1987; Kassam & Volume-Smith, 2003; Austin *et al.*, 2005; Ross *et al.*, 2007; Estus *et al.*, 2010; Jawad *et al.*, 2012). Some other studies showed that non-traditional interactive methods help build students' skills to practically implement what they are taught (Austin & Tabak, 1998; Austin *et al.*, 2005; Ross *et al.*, 2007; Estus *et al.*, 2010; Caliph *et al.*, 2013).

This study was aimed at exploring appropriate model(s) for teaching clinical pharmacy in Nigeria. This was found pertinent especially with the proposed upgrade of the minimum entry qualification into the pharmacy profession with Doctor of Pharmacy (Pharm.D). The main objectives of the study included identifying areas that may be challenging in the training of clinical pharmacists, as well as the teaching or combination of teaching models that can be used to overcome these challenges.

Method

Study Design

The study was designed as Focus Group Discussions (FGDs) among the final year Bachelor of Pharmacy (B.Pharm) students of the University of Ibadan followed by cross sectional study using self-administered structured questionnaires among teachers of clinical pharmacy in seven of the ten Nigerian schools of pharmacy with full accreditation status five years prior to the time of the study. Ethical approval for the study was obtained from the University of Ibadan/University College Hospital Institutional Review Board (UI/UCH IRB) with approval number UI/EC/13/0299.

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Study Population

Final year B.Pharm students for the 2013/2014 academic session from the University of Ibadan and teachers of clinical pharmacy in accredited Nigerian schools of pharmacy.

Inclusion & Exclusion Criteria

Final year B.Pharm students in the University of Ibadan, Nigeria, who had completed three out of the four semesters of the clinical pharmacy phase of the curriculum who consented to participate in the FGDs by giving written consent were enrolled. Teachers of clinical pharmacy from seven of the ten Nigerian schools of pharmacy which had full accreditation status five years prior to the time of the study, and who consented to participate in the study were enrolled.

Sample Size

Twenty-four out of the forty final year pharmacy students from the University consented and participated in the FGDs. All the teachers of clinical pharmacy in the selected schools of pharmacy were invited to participate in the cross sectional questionnaire-guided survey.

Research Instruments & Data Collection Procedure

Twenty-four qualified student participants were divided into three groups for the purpose of focus discussion groups. Discussion started in each group with the introduction of the participants and highlights of the objectives of the study. This took approximately five-six minutes. The main discussion which lasted for one hour and twenty minutes for each group explored participants' perception of the advantages of the current methods of teaching clinical pharmacy; highlights of the challenges of the existing method of teaching clinical pharmacy topics; ways by which the current methods of teaching/ learning clinical pharmacy can be improved; and the expectations of the students from the teacher with selected proposed teaching and desired learning methods. The relevance of specific standard teaching models (Teaching Models, 2013) ranging from direct teaching methods to radical teaching methods, to the curriculum were also evaluated. Participants discussed the relevance of each teaching method, and the preferred teaching methods that would encourage enhanced learning. Once a method was found relevant to clinical pharmacy, the operations of the model (syntax, social environment, principle of reaction and the support system) were deeply explored. The last five-six minutes were spent summarising the key points emanating from the discussion.

The sessions were both videotaped and recorded in writing with the permission of the students. The written records and videotaped sessions were reconciled.

A cross-sectional questionnaire-guided survey among teachers of clinical pharmacy was developed based on the models found appropriate by the focus group discussion participants (FGDPs). The 50-item questionnaire was pre-tested and tested for content validity among three teachers of clinical pharmacy who were excluded from the main study. Feedback from the pre-test and validation led to the modification of the final version of the questionnaire administered as email attachments to teachers of clinical pharmacy/pharmacy practice in the seven schools of pharmacy in Nigeria. The six models were direct teaching, guided design (GD), co-operative learning, cognitive apprenticeship and PBL. The appropriateness of the selected teaching models obtained from the FGDs for teaching the forty-nine clinical pharmacy components of the B.Pharm curriculum were evaluated. The respondents were asked to indicate the most appropriate method for teaching each component with a response of "Yes" or "No" against the teaching models for each component. Respondents had the option of choosing more than one model/method as appropriate for teaching each component. Demographic information of the teachers as well as length of time they have been teaching clinical pharmacy and areas of research interest were also obtained.

Data analysis & Statistics

Coding and re-coding of data from FGDs were done to generate themes and were subsequently analysed using thematic analysis. Descriptive statistics were used to summarise data from the cross sectional study. The model(s) that had a frequency of ≥50% selection by the respondents was chosen as the method of choice for teaching that component.

Results & Discussion

At the time of the study, almost all schools of pharmacy in Nigeria run the five-year B.Pharm curriculum in which components of clinical pharmacy are introduced in the third professional year *i.e.* the fourth year of the programme. The total number of contact hours for clinical pharmacy courses at the University of Ibadan is slightly more than one-tenth of the total contact hours in the four professional years. All the participants in the FGDs believed that the current B.Pharm curriculum is heavily lopsided towards the basic pharmaceutical sciences, which might not be directly relevant to practice in retail community and hospital pharmacy settings.

A total of twenty-one out of thirty-five questionnaires sent were found fit for analysis giving a response rate of 60%. The details of the demographics of the teachers are shown in Table I. The seven themes identified from the focus group discussions were: Requirements of pharmacy curriculum; Curriculum organisation; Time allotted for the clinical pharmacy components; Methods of teaching; Roles of teachers; Learning environment, and Technical facilities.

Table I: The demographics of the teachers of clinical pharmacy in the selected universities (n=7)

S/N	VARIABLE		FREQUENCY (% FREQUENCY)
1	Age (years)	30-39	8 (38.1)
		40-49	7 (33.3)
		50-59	6 (28.6)
2	Highest Academic Qualification	B.Pharm	4 (19.0)
		M.Pharm/M.Sc	8 (38.1)
		Pharm.D	1 (4.8)
		Ph.D	8 (38.1)
3	Rank	Lecturer	14 (66.7)
		Senior Lecturer	4 (19.0)
		Associate Professor/ Professor	3 (14.3)
4	Experience as teacher of clinical pharmacy (years)	0-5	10 (47.6)
		6-10	5 (23.8)
		11-15	1 (4.8)
		15-20	1 (4.8)
		> 20	4 (19.0)
5	Courses taught	Core Clinical Pharmacy	9 (42.9)
		Clinical Pharmacy & Management	12 (57.1)

Requirement of Pharmacy Curriculum & Curriculum Reorganisation

A reorganisation of the curriculum which will allow practice-setting based teaching was proposed by the FGD participants. Strong suggestions were made that the curriculum be modified in favour of clinical pharmacy components believing that improvement on time used for clinical pharmacy will be more relevant to practice after graduation. Introducing clinical pharmacy components of the curriculum earlier than the third professional year could be done to achieve this. FGD participants believed that the schools of pharmacy should collaborate with community pharmacies and hospitals in the environments. This, they believed, will make learning easier and more accessible during holidays, outside the mandatory three-months industrial training period to learn some of the practical details of practice.

Observation of real life cases in a hospital environment immediately after a topic is taught was proposed by the FGDPs. This may however not be feasible in the first and second professional years. The participants also wanted "*classes to be more interactive*". The use of human patient simulators (HPS) as suggested by some of the participants has been used in the United Kingdom to practice near-patient teaching (Reape *et al.*, 2011), but not in Nigeria. One of the limitations of the use of HPS is the high cost which may not be feasible in Nigeria, a developing economy. They also wanted the outside posting for clerkship and externship components of the curriculum to be integrated with clinical pharmacy lectures so that teaching of related diseases will be tied to bedside teaching and exposure.

The respondents strongly believed that whatever they are taught during the five-year programme should end in clinical pharmacy. They also suggested that some of the basic pharmaceutical sciences should be removed from the curriculum. Some of the modules had no relevance in pharmaceutical practice from their experience during industrial training and externship.

Time Allotted

Participants mentioned that the time allowed for the clinical pharmacy components of the pharmacy curriculum was too short. Also, the respondents believed that topics within the clinical pharmacy components should be started early in the first or second professional years to help students reduce, as much as possible, the course load that is found within the third and fourth professional years.

Methods of teaching

The participants were not so impressed with the current method of teaching, which was mainly direct teaching for most of the components. FGDPs would like pharmacotherapeutics to be taught using case-based learning methods. They believed that this will make everyone participate as they would have been given the cases before coming to class, and would therefore have searched for alternative therapies in relevant cases.

Guided Design (GD) and Direct Instruction (DI) were the major methods selected by teacher participants as tools for teaching 32 (65.3%) topics by the teacher respondents. Cognitive Apprenticeship (CA) was selected for 23 topics (46.9%); Cooperative learning (CL) for 14 topics (28.6%) and Problem-Based Learning (PBL) for 14 topics (28.6%); singly or in combination. The breakdown of which methods to use for specific topics is shown in Table II, while Table III shows the summary for the major areas making up the clinical pharmacy components of the curriculum, as well as the main methods that can be used in teaching them.

The choice of models/methods selected for teaching clinical pharmacy topics varied widely. Also, different combinations of methods were chosen by the teachers for specific topics as shown in Table II.

The teachers obviously preferred direct and semi-direct teaching models to the social and radical methods preferred by the students. Majority of the topics were proposed to be taught by DI and GD (which is a blend of direct and social methods) by the teachers. Though particular topics were not discussed in the FGDs, FGDPs were of the opinion that clinical pharmacy should be taught with social/radical methods. Some of the proposed methods selected by the students were integrated and interactive methods such as case-based and PBL methods in which they, the students, will fully participate, and in which the teacher will explore their knowledge of the subject matter before and after the teaching period. Teaching models that will promote active learning were strongly suggested by the FGDPs confirming studies by

Table II: Models chosen by more than 50% of the teacher participants for teaching components on topic-by-topic basis.

S/N	COURSE COMPONENT	PREFERRED TEACHING MODEL(S)
1	Mechanism of cellular injury and death	**DI**
2	Pathogenesis/Pathophysiology of the disease states discussed	**DI/GD**
3	Pathways & factors affecting ADME	**DI**
4	Methods of studying drug metabolism	**DI/GD**
5	Basic concepts of pharmacokinetics	**DI**
6	Deriving pharmacokinetic models and parameters that best describe ADME from raw data	**DI/GD**
7	Design, evaluate and individualise dosage regimen using pharmacokinetic parameters	**GD**
8	Detect potential clinical problems with drug therapy and apply basic pharmacokinetic principles to solve them	**PBL**
9	Aetiology and pathophysiology of disease states	**DI/GD**
10	Identifying the signs and symptoms characteristic of a given disease state	**GD/CA/DI**
11	Recommend drug therapy of choice, and other drug therapy options for specific disease states	**PBL/CL**
12	Recognise complications that may arise from drug therapy, recommend appropriate measures	**CA/CL/DI/PBL**
13	Developing skills necessary to make meaningful contributions to the investigation and management of patients with various diseases	**CA/CL/GD/DI**
14	Study of the methods and resources available for the rapid and efficient handling of factual drug information, and its effective utilisation in the promotion of safe, effective and rational drug therapy	**DI/PBL/GD**
15	Resources needed for establishment of a drug information centre & provision of drug information service	**DI/GD**
16	Development of the hospital formulary system and essential drugs list	**GD/DI/CL**
17	Publication of drug information bulletin	**DI/CA**
18	Health informatics; electronic medical record	**GD**
19	Internet and Pharmacy practice	**CL/GD/PBL**
20	Evaluation of information from the Internet	**GD/CL**
21	Development of skills to Communicate effectively with patient and other health care professionals	**CA/GD**
22	Organisation of patients' medical charts and medication profiles, medication dosages, posology and administration	**DI/CA/GD**
23	Monitoring of drug interactions and adverse drug reactions	**DI/CA/GD**
24	Patient counselling	**DI/GD/CA/PBL**
25	Developing and maintaining a patient medication profile for drug monitoring	**DI/GD**
26	Counsel a patient on how to use his/her drugs.	**CA/GD/DI**
27	Appearance as a mode of communication	**DI/CA/GD**
28	Various styles of listening and response; their application in pharmacist-patient relationship	**CA/DI**
29	Factors affecting patient compliance with drug regimen.	**GD/DI**
30	Pharmacist's relationship with other health care professionals	**PBL/DI**
31	Preventive medicine - education of patients on the prevention of communicable diseases, surveillance on patients immunisation status	**DI/PBL/GD/CL**
32	Rural pharmacy services as extension work	**CL/PBL**
33	Acute primary care to patients who have episodic self-limiting diseases	**GD**
34	Chronic primary care to patients who have chronic diseases or are utilising chronic medication therapy after diagnosis and stabilisation by a physician	**DI/CA/GD**
35	Educating the patient on oral rehydration therapy and personal hygiene	**PBL**
36	Use of traditional therapeutic agents and herbal phytotherapy in management of patients	**GD**
37	Scrutinising of prescriptions, and dispensing	**DI/GD/PBL/CA**
38	Taking Patient drug history and medication profiles	**DI/GD/CL/CA**
39	Developing patient medication instruction cards	**GD/CA/CL**
40	Counselling patient on compliance	**CA/DI**
41	Structure Hospital or Community Pharmacy Environment	**DI/CL/GD**
42	Drug Information Centre/Services	**GD/DI/CA**
43	Participation of clinical pharmacist in the medical team to observe patients and review their therapeutic progress	**CA**
44	Monitoring selected in-patients medication programmes, charts and profiles	**CA/CL**
45	Participating in education/counselling in-patients about the rational use of their medication after discharge	**CA/GD**
46	Monitoring selected patients for development of signs of possible adverse drug reactions, side effects and therapeutic failures	**DI/GD/CA/CL/ PBL**
47	Discussing drug therapeutic regimens, e.g. available options, suitable alternatives, dosage modifications with age and disease states *etc*	**DI/GD/CA/CL**
48	Brief presentations to supervisors and fellow students on the above experiences, explain the rationale for chosen drug therapies and suggestions for the alternatives	**CL/PBL**
49	Participation in primary health care activities in selected communities	**GD/CA/PBL**

KEY: DI – Direct Instruction; GD – Guided Design; CA – Cognitive Apprenticeship; CL – Cooperative Learning; PBL – Problem-based learning

Table III: Summary of models selected by more than 50% teacher participants that could be used for teaching the major subject areas of Clinical Pharmacy

S/N	MAJOR COMPONENTS OF CLINICAL PHARMACY	PREFERRED MODELS
1	Principles of disease and pathophysiology	**Direct Instruction**
2	Biopharmaceutics	**Direct Instruction** **Guided Design**
3	Pharmacokinetics	**Direct Instruction** **Guided Design**
4	Clinical Pharmacokinetics	**Guided Design** **Problem Based Learning**
5	Pharmacotherapeutics	**Direct Instruction** **Guided Design**
6	Literature Evaluation & Drug Information Services	**Direct Instruction** **Guided Design**
7	Communication Skills	**Direct Instruction** **Guided Design** **Cognitive Apprenticeship**
8	Pharmacists in primary health care	**Guided Design** **Cognitive Apprenticeship**
9	Clinical Clerkship/Externship	**Cognitive Apprenticeship**

Estus *et al.* (2010) and Malone *et al.* (2013) in which students participants had better recall with active learning methods compared to traditional teaching methods.

The "*low structure*" model of teaching/learning is a student-centred system in which radical and social methods (*e.g.* cognitive apprenticeship, cooperative learning and PBL methods) are found; while the "*high structure*" model of teaching/learning is teacher-centred which encompasses the direct teaching and GD. The students preferred social systems with "*low structure*" while the teachers preferred the "*moderate*" to "*high structure*" where either the activities are distributed evenly between the teacher and students or the activities are teacher-focused. Introduction of a low or moderate structure will require a pharmacy curriculum review, which with time, may eventually transit to a "*low structure*". The teacher will need to act more like a facilitator, patient and supportive, but will also need to put a time limit to activities within which students are expected to perform and may need to correct if the wrong answers were given. The teacher will also steer the students in the direction of arriving at the right answers even when radical models are used.

The PBL model, which is the most widely used methods in schools of pharmacy in various countries (Strand & Morley, 1987; Cheng *et al.*, 2003; Jones, 2005; Ross *et al.*, 2007; Silverthorne, 2009; Wasif *et al.*, 2011), does not seem to have wide acceptability with the teachers in this present study, and is not known to be used for pharmacy training in Nigeria. This non-acceptability could be due to the amount of work that needs to be done by the teacher as suggested by other studies (Cheng *et al.*, 2003; Jones 2005). In most of the schools where PBL is used in developed countries, there was a record of wide acceptance with commensurate increase in skill and knowledge of the students (Cheng *et al.*, 2003; Jones, 2005).

Roles of teachers

The FGDPs wanted the teacher to "*be less of an instructor*", and more supportive. They prefer that the teachers correct students in privacy *i.e.* in the absence of a third party. The teachers should also be "*practitioners of the profession*". Teachers "*should provide a relaxed atmosphere*" so that the student will be free to express him/herself: "*..the teacher should allow students to participate freely and then correct when students give wrong answers*". Participants would also want teachers to "*give pre/post-test for a topic or cluster of related topics" and "not wait until the mid semester examination*".

Learning Environment

The FGDPs strongly believed that the learning environment under which they currently learn is obsolete. Modern technology "*such as a smart board, power point projectors and visual aids*" and "*adequate internet connectivity for easy access to information*" are important facilities required for a good learning environment. They also expressed that there cannot be improvement "*in teaching methods if there is no easy access to Internet*" and that learning and teaching should be done in places of practice.

Technical Facilities

The FGDPs expressed the opinion that their instructors should have access to "*basic teaching tools such as video clips and other visual aids necessary for teaching and demonstrating certain skills for students*". Well-equipped laboratories should be available for "*patient counselling and drug therapy assessment, and should be readily accessible to students*".

For some of the practicals in clinical pharmacy, "*computerised human dummies*" should be available. The participants believed that this may however, not be useful in areas such as "*patient counselling*".

Without the availability of certain facilities as suggested by the FGDPs, such as the internet, appropriately well-equipped laboratories, most of the methods proposed by the FGDPs cannot be used.

General

In the study setting, aspects of GD, cognitive apprenticeship, and co-operative learning are used in teaching clinical pharmacy. The GD reflects DI by requiring students to read or work on pre-specified content segments or problems, and classified as a social model of teaching/learning since it requires students

applying and transferring skills learnt to real life problems. Co-operative learning is used in this setting by asking students to work in teams on projects with both personal and team accountability for understanding. This is a model that encourages students to look for information without the intervention of the teacher whether as a moderator or instructor. However, some caution should be taken when using co-operative learning. There may be students in the group who may want to dominate (de Grave *et al.*, 2001) while those who are quiet or who do not want to share information may be reticent about participating (Hendry *et al.*, 2003). Cognitive apprenticeship (CA) model is used in teaching students in the University of Ibadan to learn use of devices such as the glucometer, sphygmomanometer and peak flow meter, which are simple instruments for monitoring certain physiologic parameters in patients with chronic diseases such as diabetes mellitus, hypertension and asthma. CAs, from other studies, has also been used in the areas of simulating professional activities such as the Family practice simulator model (Austin *et al.*, 2005), teaching in a simulated community practice in an academic environment (Fejzic *et al.*, 2013) and the use of standardised patients for teaching (Taylor & Taylor, 2013). These models, for example, using simulated community practice and standardised patients, are practicable and can easily be inculcated into the curriculum of schools of pharmacy in Nigeria.

This study was limited by low participation of the lecturers. This made it impossible to use inferential statistics since there were up to thirty-one combinations of models that could be selected for each clinical pharmacy component of the curriculum, while only twenty-one respondents responded. The use of FGDs with the teachers might have also helped elicit more information.

In conclusion, there is a need to review the clinical pharmacy components of the pharmacy curriculum for increasing contact hours so that students get introduced early in their professional learning years. There might be a need for curriculum review if social and radical methods of teaching are to be adopted. Teachers might also need to be trained on the use of the more social/ radical models to be effective.

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