



Evaluating B.S. Clinical Pharmacy Curriculum of China Pharmaceutical University (China) by Comparing with Pharm. D Curriculum of Samford University (USA)

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Research Article

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Abstract

Objective: To evaluate the undergraduate clinical pharmacy education provided in China we have compared the curriculum of Bachelor of Science in clinical pharmacy program offered at the China Pharmaceutical University (China), one of pioneer institutes for clinical pharmacy education in China with the PharmD curriculum offered at Samford University (USA).

Method: A descriptive method involving discussion is used. The curriculum of these two programs offered in two different regions compared regarding 1) the core curriculum: credit hour distribution, teaching methodology and course outcome evaluation 2) Pharmacy practice experience.

Results: Credits allocated to the courses of clinical and pharmaceutical sciences in the two programs are approximately same but courses offered in B.S. clinical pharmacy are too general and repetitive. Pharmacy practice experiential component for PharmD is well structured and diverse than B.S. degree. Classical methods of teaching and course outcome evaluation are used for B.S. program.

Conclusion: B.S. Clinical pharmacy curriculum in China cannot be considered specialized and require up gradation to a unified, well structured and professional PharmD program.

Keywords: *BS Clinical pharmacy, PharmD, Curriculum, Pharmacy practice experience*

Introduction

China has the biggest population in the world. With introduction of PharmD in USA, emphasizing patient centered care, clinical pharmacy has become the most popular pharmacy practice worldwide. In China the shift from B.S. of Pharmacy as entry level degree, emphasizing pharmaceutical sciences, to the BS of clinical pharmacy has helped in developing effective clinical expertise. MOE allowed China pharmaceutical University (CPU) to reestablish its 5 yrs B.S. clinical pharmacy program in 2006. These programs are considered equivalent to PharmD program offered in the United States ^[1]. In 2011, there were 25 colleges offering clinical pharmacy education. Where 11 schools offer a BS clinical pharmacy degree with clinical pharmacy as a specialty, where other 11 schools offer B.S. in pharmacy or 1 offer B.S. in clinical medicine having clinical pharmacy as subspecialty. Some schools that offer Bachelor's program with clinical pharmacy as a subspecialty award BM (Bachelor's in Medicine) degree instead of a B.S. degree, as they consider clinical pharmacy a type of physician education ^[2]. Duration of program was also varied from 4 to 5 years. A 6-month practice was normally arranged for the 4 year program whereas one year practice was usually arranged for the 5 year program ^[3]. From 2012 all pharmacy schools in China are required to upgrade their B.S. clinical pharmacy program to 5 years.

Although PharmD offered in USA and BS clinical pharmacy program in China are different in course length while have same goal of providing patient centered care as a health care team member. A research involving 6272 clinicians have revealed high frequency of ineffective interventions used in China, which indicate the need of proper clinical pharmacy practice in hospitals ^[4]. But due to the lack of accreditation standards or guidelines and unified degree program with defined curriculum and practice, clinical pharmacy development in China is insufficient. With most of the World focusing and implementing PharmD, in 2006 China has implemented Bachelors in clinical pharmacy program to fulfill the need of patient oriented education. In our paper, we have practically showed



the comparison of two programs to enforce the need of a defined professional curriculum and practice. In the end considering ACPE standards, used in USA for implementing PharmD, some recommendations are given about how our B.S. clinical pharmacy can be upgraded to a professional graduate program like PharmD.

Material and Method

A descriptive method is used and discussion is carried out among authors. Current PharmD curriculum of Samford University is compared with the B.S. Clinical pharmacy curriculum of China pharmaceutical university regarding two basic aspects; core curriculum and pharmacy practice experiential component. To elaborate difference in core curriculum, we have identified 3 main factors: credit distribution among five key area courses of these two programs, teaching methodology used to teach these courses and process used for curriculum evaluation in these two universities. We have also searched Pubmed for articles written in English about BS clinical pharmacy program in China and verified if they showed satisfaction regarding BS program. While discussing short comings in BS curriculum, ACPE standards and guidelines for PharmD in USA are considered to find out possible ways to improve the syllabi up to PharmD level.

Results

In USA, PharmD curriculum is developed according to ACPE standards and school needs. Every school follows the same guidelines but has sufficient liberty for innovation. While in China different schools have developed their own curriculum with no established standards or structure. Three articles retrieved from Pubmed regarding BS clinical pharmacy program in China, indicated the lacking in BS syllabi and suggested up gradation of BS clinical pharmacy to PharmD. [1][2][5]

Pharm D offered at Samford University is a four year professional program, requires at least two years of pre-pharmacy (undergraduate education) thus 6 years. During the Professional education first three years involve didactic course work, labs and introductory pharmacy practice experience (IPPE). While fourth year is dedicated to full time advanced pharmacy practice experience (APPE). In CPU, B.S. clinical pharmacy is a 5 years degree program having first 2 years basic sciences courses just like pre-pharmacy. For these first two years, students from major other than clinical pharmacy will also take the same courses. Next 2 years involve clinical pharmacy oriented education and labs. Final year allows student to get a full time pharmacy practice experience (PPE).

1) Core Curriculum:

Considering the credits, Samford University PharmD pre-pharmacy, undergraduate course offers 71 credits to enter professional program. Professional curriculum of 4 years has total 141 credits with 98 credits for course work and lab, while 43 credits for PPE. So 6 year PharmD degree program of Samford University requires 212 credits. In CPU, first two years

course of basic sciences, somewhat similar to pre-pharmacy, have 82 credits. Next 3 years clinical pharmacy didactic courses and labs have 89 credits while PPE is for 21 credits. Some other graduation requirements like army training, social activities and physical training etc needs 9 credits. This makes a total of 201 credits requirement for 5 years B.S. Clinical Pharmacy program. Credit distribution among key course areas in these two programs is shown by the figure 1. Even in the same course area, the types of the courses taught in these two degree programs are quite different. This can be observed in Table 1.

2) Teaching Methodologies:

Samford University uses active learning (AL) concepts in its courses, with the percentage of time devoted to AL dependent upon the adaptability of the course material to these learning methods. Students in each professional year are divided into groups of four to nine students and group work is periodically assigned to them. There are also some special courses like capstone project or integrated pharmacy application, where students are encouraged to share knowledge and inquiries regarding different subjects. In CPU most commonly used technique is power point presentations by teachers and mostly in all courses students are also required to give group presentations. But other techniques like case studies, group discussions or simulations are not common.

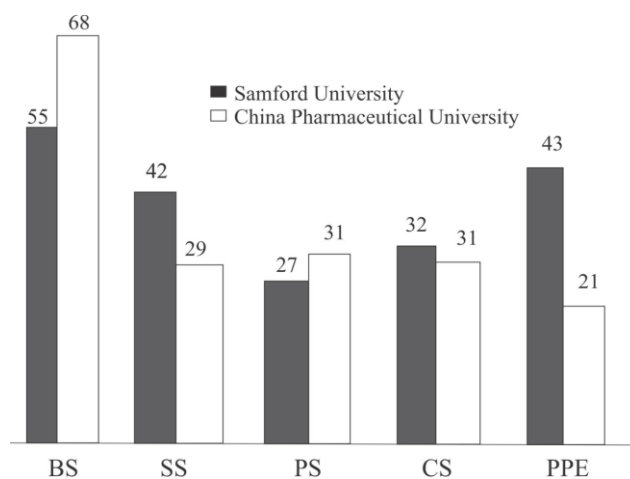


Figure 1: Credit Distribution Among Five Major Sections of curriculum

BS: Basic Sciences, SS: Social Sciences, PS: Pharmaceutical Sciences
CS: Clinical Sciences, PPE: Pharmacy Practice Experience

3) Course Outcome Evaluation:

Along with traditional examination method, Samford University needs all students to fill their own portfolio according to instructions and information provided to them by school of pharmacy. Also each student has a mentor who reads the portfolio and



Table 1: Comparison of courses taught in PharmD & B.S. Clinical Pharmacy program

Courses	PhamD Courses-Samford University (Pre-pharmacy + Professional)	B.S. Clinical pharmacy courses -China Pharmaceutical university
Social/Administrative/ Behavioral Sciences	Communication Arts(I , II), Cultural Perspectives (I , II), Biblical perspectives, Liberal Arts, Financial Management, Ethics in Christianity and Health care, Human resource Management, Population health, Pharmacy law	Ideological and Moral Cultivation and Legal Basis, University English, Chinese Modern and Contemporary History, Introduction to basic principles of Marxism, Mao Zedong Thought and theoretical system of socialism with Chinese characteristics Introduction
Basic Sciences	Foundations of chemistry T/P *, Precalculus, Principles of human anatomy, Fundamental of organic chemistry T/P, Microbiology, Organic reactions and mechanisms T/P, Calculus, Quantitative chemical analysis T/P, Concepts in fitness and health, Principles of human physiology, Elementary Statics, Physiologic basis of diseases (I , II), Cellular and Molecular Biochemistry	Higher Mathematics, Basic chemistry T/P, Medical Physics T/P, Chemical analysis, physical chemistry T/P, Computer Applications, Programming language, Mathematical Statistics , Instrumental Analysis T/P , Organic Chemistry T/P, : Basic Medicines T/P, Medical Biochemistry T/P, Pathophysiology T/P, Medical Ethics, Molecular biology T/P , Medical Microbiology & Immunology T/P, Cell biology, Medical psychology, Medical Genetics
Pharmaceutical Sciences	Introduction to pharmaceutical sciences, Pharmaceutical Sciences(I , II , III), Biopharmaceutics/Pharmacokinetics	Pharmacy T/P, Pharmacy Information Retrieval, Medicinal Chemistry T/P, Pharmacoeconomics, Pharmacology T/P, Pharmacognosy T/P, Drug analysis T/P Pharmacokinetics T/P, Toxicology T/P, Industrial pharmacy training
Clinical Sciences	Basics of drug information, Introduction to patient care systems, Institutional practice/ sterile compounding, Pharmacotherapy(I , II , III , IV), Patient self care and monitoring (I , II), Preparation for patient care, Drug literature evaluation	Clinical pharmacology T/ P, Clinical Training, Clinical Therapeutics, Adverse drug reactions and pharmacovigilance, Hospital pharmacy regulations and GCP, Clinical pharmacokinetics T/ P, Hospital Pharmacy, Doctor-patient communication skills, Analog pharmacy training, Diagnostics T/P, Internal Medicine, Surgery, Gynecology, Pediatrics
Special Programs/other graduation requirements	Capstone project (I , II ,), Integrated Pharmacy Application (I , II , III , IV , V ,VI)	Army training, Social activities, Physical training

T/P*: Theory/Practical

gives feedback and advice. This kind of method is not established properly in CPU, and classical approach is used, student take exams and for pharmacy practice experience evaluation technique depends on the hospital, where student is placed for orientation.

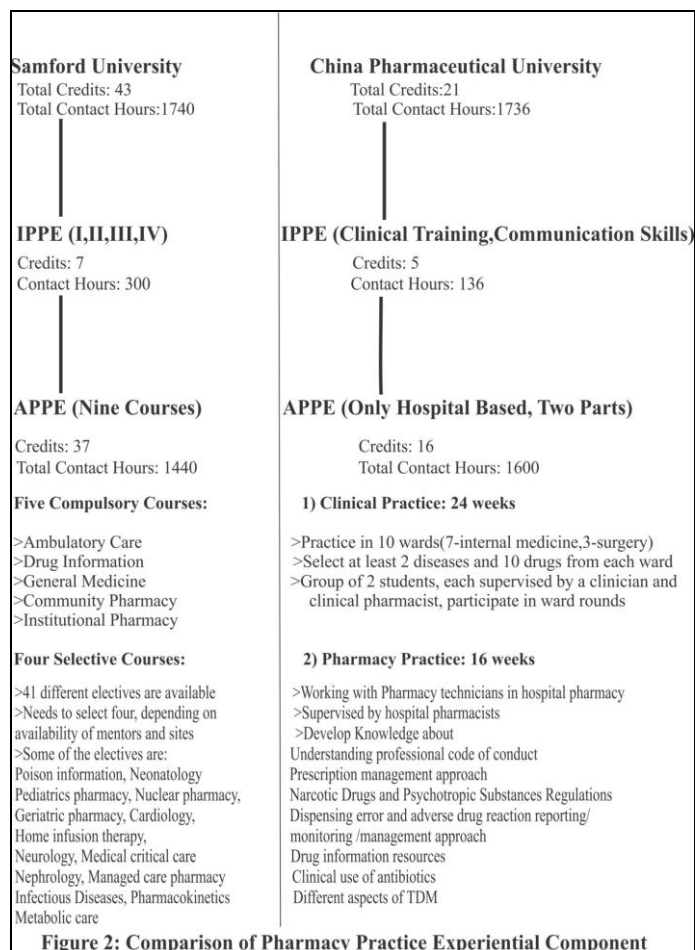
4) Pharmacy Practice Experience:

According to ACPE guidelines for Pharm D curriculum, PPE is clearly divided in two phases; introductory pharmacy practice experiences (IPPE) and advanced pharmacy practice experience (APPE) which provides students with an opportunity to practice in different health care settings. Colleges and schools are encouraged to identify or develop IPPE and APPE that consistently expose students to and allow participation in various activities, which are already described in detail by ACPE standards and guidelines.⁶ In Samford University IPPE starts with the first year of professional education and is continued for next two years to prepare students for APPE. While final year APPE includes 9 experience

courses where 5 are compulsory and 4 electives. There are 41 elective practice courses available and students can choose according to their interest and availability of mentors or sites. The required and elective experiences should be full-time, provide continuity of care, and be conducted under pharmacist-preceptor supervision and monitoring. In BS clinical pharmacy curriculum in CPU although there are no standardized IPPE courses but two courses (Clinical pharmacy training and Communication skills) are offered in fourth year to introduce students with hospital settings and develop familiarity with hospital staff. For providing APPE in final year CPU has collaborations with ten hospitals. Students are placed in any of them according to availability of preceptors and student interest. Among all these hospitals, Nanjing Gulou (Drum Tower) Hospital has devised a much organized practice plan to provide APPE to the final year students. The comparison of various aspects of



pharmacy practice experiences offered by these two programs is shown in figure 2.



Discussion

Considering the above differences in curriculum of PharmD of Samford University and B.S. clinical pharmacy program of CPU, some recommendations which are based on ACPE standards and guidelines for PharmD^[6], are given for the up gradation of current B.S. clinical pharmacy curriculum to the standards of PharmD.

1) Core-Curriculum:

a) The goal of PharmD professional degree curriculum is to prepare graduates with the professional competencies to enter pharmacy practice in any setting to ensure optimal medication therapy outcomes and patient safety. B.S. clinical pharmacy is a major oriented or specialty degree, where students are prepared to work as clinical pharmacist, so assuming that clinical courses would be emphasized. Contrary to this fact, credit distribution among courses of clinical sciences and pharmaceutical sciences in both degree programs are approximately same. In fact, BS Clinical pharmacy program offered not only in our university but in various other institutes in China, do not exactly have a special clinical oriented curriculum.^{[1][2][5]}

b) Courses in PharmD are more specialized than B.S. clinical pharmacy curriculum where duplication is also expected in courses like Pharmacology/Clinical Pharmacology/ Clinical

Therapeutics and Pharmacokinetic/Clinical Pharmacokinetics/Drug analysis. Awareness by faculty of each other's courses may eliminate this possibility but it is not mostly practiced.

c) There is an excessive basic sciences course load. Maximum load for pharmacy student in PharmD is 21 semester hours, while for B.S. in CPU it is 30 semester hours with 11 courses. ACPE guidelines enforce provision of a reasonable and balanced course load for students.

d) PharmD curriculum (Samford University = 13 electives) is obliged to provide sufficient electives. For B.S. program, available choices for elective courses related to clinical pharmacy major are only four, showing that it cannot be considered clinical pharmacy specialty program.

e) A specialized course provided in Samford University, Integrated Pharmacy Application, helps to link information both across the semester as well as between years in the curriculum. Students enrolled in same courses have opportunity to meet all through four years periodically to see how content from various classes benefit patients. This type of course must be incorporated in B.S. curriculum.

2) Teaching Methodologies:

The development of critical thinking and problem-solving skills needs the use of active learning strategies like case studies, guided group discussions, simulations and other practice-based exercises. These are nowadays very common in USA. But mostly in China conventional method of lecture delivery is used. This practice is changing with experimenting new teaching methodologies. A research involving pharmacy students showed that cooperative learning together with role play can effectively enhance student active-learning and communication skills. But Chinese students will take some time to adapt to this new teaching method^[7].

3) Course Outcome Evaluation:

In order to access the efficacy of curriculum, along with the conventional examination methods, it is required to develop a method to evaluate students understanding of various course contents and level of satisfaction regarding the knowledge and training they are getting. It must be a compulsion to involve students in this type of assessment as it is mostly practiced in USA.

4) Pharmacy Practice Experience:

a) The PPE offered in CPU is only hospital oriented. Community pharmacy and ambulatory health care practice is required to enable students to integrate and apply all competency areas needed for the delivery of holistic patient care. It is an established fact that clinical pharmacists provide care to their



patients (i.e., they don't just provide clinical services), and that this practice can occur in any practice setting^[8].

b) IPPE needs to be well structured and established. ACPE standards define IPPE to be not less than 5% (300 contact hours) of total curriculum length and 150 hours should be balanced between community and hospital practice. Some other forms can also be used like simulations and service learning.

c) APPE involve direct patient care and it must include primary, acute, chronic, and preventive care among patients of all ages and develop pharmacist-delivered patient care competencies in the following settings: community pharmacy, hospital or health-system pharmacy, ambulatory care, inpatient/acute care general medicine. In APPE offered in B.S. clinical pharmacy program, students are limited to a hospital setting, where they check medical records, interview patients and access therapy but all this data is copied in students note books or Performa's to evaluate students instead of incorporating their useful assessments under supervision of physician in patient therapies.

d) As different hospitals have their own APPE plan and there is lack of an organized practice devised by the university itself, students practicing in different hospitals or even those in same settings have completely different level or type of practice knowledge.

e) Practice should be task oriented with time limits, instead of asking students to visit different wards for 24 weeks doing the same things. It can be divided as therapeutic drug monitoring, pharmaceutical care plan, drug utilization reviews or patient counseling with defined contact hours.

Conclusion

The B.S. Clinical pharmacy program in China needs to focus specialized patient care oriented education or practice experience of PharmD professional standards. A unified structured curriculum should be devised and implemented for all pharmacy institutes, so that students can have equal opportunities of learning the same basic pharmacy knowledge. This may help avoiding inequity in pharmacy services provided by graduates from different universities.

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AUTHORS' CONTRIBUTIONS

Authors contributed equally to all aspects of the study.

PEER REVIEW

Not commissioned; externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.