Bachelor of Pharmacy Programs in United Arab Emirates

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Abstract The United Arab Emirates (UAE) pharmacy education has undergone significant reform in recent years to introduce more clinical and social pharmacy courses to replace many traditional pharmaceutical sciences courses that were typically dominate pharmacy curricula. The aim of this work was to carry out a comprehensive comparative analysis on all Bachelor of Pharmacy (BPharm) programs in the UAE and to describe the developments of BPharm curricula offered by UAE colleges of pharmacy after increasing the number of credit hours allocated for clinical and social pharmacy courses. BPharm curricula offered by all pharmacy colleges in the UAE were retrieved from their official websites. A comparative study on different curricula was carried out to investigate the structure of BPharm curricula after incorporating more patient-centered courses. Clinical and social pharmacy courses represent between 22% and 51% of the total BPharm credit hours. Non-clinical/social courses are no longer representing the majority of BPharm courses. PharmD degree program is offered by only one university. The course credit hour distribution of different BPharm programs is varied from one program to another. More clinical and social pharmacy courses are increasingly replacing the traditional pharmaceutical sciences subjects such as pharmaceuticals, chemistry, biomedical, and basic sciences.

Keywords Pharmacy Education, BPharm, PharmD, Clinical Pharmacy, Social Pharmacy, CAA, UAE, ACPE

1. Introduction

United Arab Emirates (UAE) is an emerged federation of seven Emirates with a population amounted to 9.3 million in 2017 (1). The UAE is a role model of a multinational country where expatriates from more than 200 nationalities represent more than two-thirds of the population (1, 2)

In less than half a century, the UAE has emerged as one

of the global nations with top education system. The country has established a first-rate quality higher education system, and has witnessed a rise in establishing public and private higher instructional institutions.

Pharmacy is one of the most growing health sciences educational fields with nine pharmacy colleges distributed in almost all the Emirates of the country. In recent years, pharmacy education in UAE has progressed and many changes have been made to pharmacy undergraduate curricula to replace traditional courses with patient-centered pharmacy courses related to clinical and social pharmacy. This is in trend with the global changes in the pharmacy profession from product-oriented to a patient-centered (3).

There are handful publications that have described the pharmacy education in UAE and its status (4–9). However, up to the knowledge of the author no published study has been identified in literature that performed a comparative analysis of different Bachelor of Pharmacy (BPharm) programs offered by UAE universities. Thus, the aim of this work was to carry out a comprehensive analysis on all BPharm programs in the UAE and to describe the developments of BPharm curricula offered by UAE colleges.

2. Background

Around 91% of higher education institutions in UAE are private establishments, and 9% of universities are governmental where 30% of them are located in the capital city of Abu Dhabi (Table 1) (10).

In medical sciences, including pharmacy, UAE students represent only 12% of the total students registered in private higher education institutions in 2016-2017 as shown in Table 2 from official data (10). More than 51% of students are from Arab countries such as Syria, Iraq, Saudi Arabia, Egypt, Palestine, Jordan, and Yemen. On the other hand, around 89% (n=175) of medical science students registered in governmental higher education institutions in 2016-2017 are UAE citizens, compared to 11% (n=19)

expats.

Pharmacy education in UAE dates back to 1990s when two colleges of pharmacy were founded, which are Dubai Pharmacy College that is exclusively for female students and College of Pharmacy and Health Sciences at Ajman University, for both genders, in 1992 and 1996, respectively, to offer BPharm programs (7). Years later,

more pharmacy colleges were established in Emirates of Sharjah, Ajman, Abu Dhabi, and Ras Al Khaimah. Recently, a new BPharm program has been granted an initial accreditation and it will be launched latter in 2019 (7). There are nine pharmacy colleges/departments (Table 3), eight of them offer BPharm programs and one offers Doctor of Pharmacy (PharmD).

Table 1. Higher education institutions by Emirate and sector in 2016-2017 (4)

Emirate	Private				Government			Grand Total
	University	College	Institute	Total	University	College	Total	
Abu Dhabi	7	13	9	29	2	1	3	32
Dubai	13	18	3	34	1	1	2	36
Sharjah	4	2	1	7	0	1	1	8
Ajman	2	2	0	4	0	0	0	4
Umm Al-Quwain	0	1	0	1	0	0	0	1
RAK	2	0	0	2	0	1	1	3
Fujairah	1	1	0	2	0	1	1	3
Grand Total	29	37	13	79	3	5	8	87

Table 2. Distribution of medical sciences students in private institutions by nationality in 2016-2017 (4)

	GCC countries		Other countries		Total		
	UAE	GCC Countries	Arab Countries	Other	GCC countries	Other countries	Total
Male	88	99	999	325	187	1,324	1,511
Female	481	385	1,400	886	866	2,286	3,152
Total	569	484	2,399	1,211	1,053	3,610	4,663

Table 3. List of Pharmacy Colleges/Departments in UAE offering undergraduate Pharmacy programs

Institute	Emirate, main campus	Establishing year	Undergraduate pharmacy program	Program length (Years)	Student gender	Sector
DPC	Dubai	1992	BPharm	5	Female	Private
AU	Ajman	1996	BPharm	4	Both	Private
GMU	Ajman	1998	PharmD	5	Both	Private
HCT	Dubai	2003	BPharm	5	Female, Citizens	Public
UoS	Sharjah	2005	BPharm	5	Both	Private
AAU	Abu Dhabi, Al Ain	2006	BPharm	4.5	Both	Private
RAK	Ras Al Khaimah	2007	BPharm	4	Both	Private
FCBS	Abu Dhabi	2012	BPharm	5	Both	Private
CUCA	Ajman	2019	BPharm	4	Both	Private

DPC: Dubai Pharmacy College

AU: Ajman University

GMU: Gulf Medical University

HCT: High Colleges of Technology

UoS: University of Sharjah

AAU: Al Ain University of Sciences and Technology

RAK: Ras Al Khaimah (RAK) Medical & Health Sciences University

FCBS: Fatima College of Health Sciences

CUCA: City University College of Ajman

Two colleges are single-sex schools (for female students only), while the rest 7 are coeducational for both genders either integrated or segregated. In coeducational programs, female students typically represent about 70-80% of the total number of students. Students from all nationalities are allowed to pursue their pharmacy studies in almost all pharmacy colleges in UAE, except Dubai Women College (DWC), which is only for UAE citizens. Colleges are located in six Emirates, three in Ajman, two in Abu Dhabi, two in Dubai, one in Sharjah, one in Ras Al Khaimah, and one branch for Ajman University in Fujairah.

3. Local and International Accreditation

The Commission for Academic Accreditation (CAA), Ministry of Education, which is the local accreditation body of higher education programs in UAE, accredits all BPharm programs in UAE and the accreditation is renewable every five years (11). To date, only two BPharm programs offered by AAU and AU are internationally certified by the US based Accreditation Council for Pharmacy Education (ACPE) (12). No programs are currently accredited by other international accreditation bodies such as Canadian Council for Accreditation of Pharmacy Programs (CCAPP), the German Accreditation Agency in Health and Social Sciences (AHPGS), and the Australian Pharmacy Council (APC) (7).

4. Pharmacy Enrollment Ceiling

Approximately 800 new students enter to the colleges of pharmacy every year to pursue their pharmacy studies. CAA determines the number of admitted new students in BPharm programs for each college. The ceiling ranges from 50 to 150 students per college per year.

5. Teaching and Assessment Methods

English is the language of instruction in all pharmacy colleges. The teaching methods in almost all pharmacy colleges are didactic lecturing that combines problem-based learning (PBL) and outcome-based education (OBE) methods. Pharmacy colleges are also equipped with teaching laboratories to perform experimental sessions. Experiments cover pharmaceuticals, chemistry, pharmacology, and biomedical areas. Clinical courses involve student role-playing a pharmacist using virtual pharmacies and experiential placements. Common assessment tools include exams, quizzes, case studies, and assignments. Recently, the colleges of pharmacy of Ajman University, University of Sharjah, and Al Ain University of

Science and Technology have started implementing objective structured clinical examination (OSCE) as assessment tool for their students.

6. BPharm Program Development

Most of BPharm programs in UAE have recently undergone noticeable developments to accommodate recent changes in the field of pharmacy to incorporate more clinical and social pharmacy courses. This has led to a drastic decrease in the number of credit hours historically allocated to common pharmacy areas such as pharmaceutical chemistry, pharmacognosy, and pharmaceuticals. For instance, the ACPE certified BPharm program offered by Ajman University has been totally updated in 2019 (Figure 1). The percentage of credit hours devoted to clinical/social courses and trainings have been almost doubled from 17% to 32%. This notable increase resulted in a significant cut in chemistry, pharmacognosy, and pharmaceuticals credit hours. Chemistry-related credit hours were decreased from 18% to 12%, whereas pharmaceuticals courses were representing 21% of the previous BPharm curriculum credit hours are now account for 13% of new curriculum credit hours. Pharmacognosy-related courses were also reduced from 5% to 2%, while biomedical courses were negligibly decreased from 19% to 18%. However, general university requirement courses were increased from 16% to 19%. It is worth mentioning that the total program credit hours were increased from 150 into 160 hours.

7. BPharm Program Credit Hours

The total credit hours of BPharm programs ranges from 132 to 170 hours (Figure 2). Dubai Women College (DWC) of High Colleges of Technology (HCT), Fatima College of Health Sciences (FCHS) of the Institute of Applied Technology (IAT), and RAK College of Pharmaceutical Sciences have the lowest number of BPharm program credit hours with 132, 140, and 145 hours, respectively. On the other hand, BPharm programs offered by University of Sharjah and Dubai Pharmacy College have the highest number of total credit hours with 170 and 168 hours, respectively. Ajman University (AU) and Al Ain University of Sciences and Technology BPharm (AAU) programs have the same number of credit hours with 160 hours each (13-19). To date, there are no official regulations that determine the minimum total credit hours for BPharm programs. It would be crucial that CAA set a threshold for minimum credit hours for BPharm programs in UAE that meets the 150 credit hours recommended by Scientific Society of Faculties of Pharmacy in the Arab World.

Figure 1. Credit hour distribution of old (inner circle, in red) and new (outer circle, in green) BPharm curricula offered by Ajman University

Figure 2. Total BPharm credit hours in different Pharmacy Colleges in UAE

8. Credit Hour Distribution

The distribution of credit hours of different BPharm programs offered by UAE universities is shown in Table 4 and Figures 3 through 9. It is obvious that the course distribution of main pharmacy areas is varied from one

college to another. Furthermore, the number of credit hours allocated for general university courses are enormously different from one program to another where it ranges from 0.0% credit hours in FCHS program to 29.5% (39 hours) of the BPharm program offered by HCT.

Table 4. Credit hour distribution of BPharm programs offered by UAE universities

Course	AU n (%)	UoS n (%)	AAU n (%)	DPC n (%)	RAK n (%)	HCT, DWC n (%)	FCHS n (%)
Total Credit Hours	160	170	160	168	145	132	140
Clinical/Social Pharmacy	51 (31.9%)	43 (25.3%)	57 (35.6%)	54 (32.1%)	32 (22.1%)	42 (31.8%)	72 (51.4%)
Pharmaceutics	21 (13.1%)	21 (12.4%)	19 (11.9%)	26 (15.5%)	34 (23.4%)	15 (11.4%)	21 (15.0%)
Chemistry	20 (12.5%)	25 (14.7%)	18 (11.2%)	25 (14.9%)	29 (20.0%)	15 (11.4%)	15 (10.7%)
Biomedical*	29 (18.1%)	37 (21.8%)	22 (13.8%)	25 (14.9%)	25 (17.2%)	12 (9.1%)	32 (22.9%)
Pharmacognosy	3 (1.9%)	4 (2.3%)	5 (3.1%)	11 (6.5%)	2 (1.4%)	3 (2.3%)	0 (0.0 %)
Pharmacy Electives	3 (1.9%)	3 (1.8%)	0 (0.0%)	6 (3.6%)	0 (0.0%)	0 (0.0%)	0 (0.0 %)
General	30 (18.7%)	33 (19.4%)	39 (24.4%)	15 (8.9%)	23 (15.9%)	39 (29.5%)	0 (0.0 %)
Graduation Project	3 (1.9%)	4 (2.3%)	0 (0.0%)	6 (3.6%)	0 (0.0 %)	6 (4.5%)	0 (0.0%)

*Biomedical courses include pharmacology, microbiology, biochemistry, anatomy, and physiology.

Figure 3. Course distribution of BPharm program courses in Ajman University

Figure 4. Course distribution of BPharm program courses in University of Sharjah

Figure 5. Course distribution of BPharm program courses in Al Ain University of Sciences and Technology

Figure 6. Course distribution of BPharm program courses in Dubai Pharmacy College

Figure 7. Course distribution of BPharm program courses in RAK Medical & Health Sciences University

Figure 8. Course distribution of BPharm program courses in Dubai Women College, HCT

Figure 9. Course distribution of BPharm program courses in Fatima College of Health Sciences

9. Clinical/ Social Courses and Training

A good number of credit hours of traditional courses in specialties such as pharmaceuticals, chemistry, and biomedical sciences was replaced with courses related to patient care and counseling as well as some other courses dealing with pharmacoeconomics, management, marketing, pharmacovigilance, and pharmacogenomics. Clinical and social pharmacy courses represent between 22.1% (in RAK)

to 51.4% (FCHS) of the total BPharm credit hours (Figure 10).

Clinical/ social pharmacy courses vary from one program to another (Table 5). Pharmacotherapy course is the only clinical course that is offered by all programs ranging from 7 to 33 credit hours. All the colleges, but FCHS, offer pharmacy law and ethics course. The number of credit hours allocated for clinical training/experiential experience varies from one program to another ranging from 9 to 16 credit hours.

Figure 10. Number of credit hours of clinical/social pharmacy in BPharm programs offered by different pharmacy colleges in UAE

Table 5. Distribution of clinical/social courses in BPharm programs offered by pharmacy colleges in UAE

Chemistry Course	AU	UoS	AAU	DPC	RAK	HCT	FCHS
Pharmacotherapy (Therapeutics)	9	12	11	7	12	9	33*
Non-prescription Drugs (OTC)	4	3	4	-	-	-	-
Drug Information/Literature Evaluation	3	3	3	-	-	-	-
Pharmacy Law and Ethics	2	2	3	1	4	3	-
Management/Economics/Marketing	4	2	3	2	-	3	-
Pharmaceutical Care	3	3	4	3	-	3	-
Pharmacovigilance/Epidemiology	2	-	3	3	-	-	-
Training	16	16	9	12	10	15	14
Others	8	12	20	24	8	9	25
Total	51	43	57	54	32	42	72
BPharm Total Credit Hours	160	170	160	168	145	132	140
Percentage	31.9%	25.3%	35.6%	32.1%	22.1%	31.8%	51.4%

*Integrated courses

10. Non-Clinical/ Social Courses

The increase in the number of clinical/social pharmacy courses of newly revised BPharm curricula offered by UAE universities has led to relatively decrease in the credit hours allocated for “non-clinical/social” courses. The “slow crawl” of clinical courses to replace traditional ones is a controversial topic. Some academicians attributes this trend to the needs of job market, whereas others see it as a negative impact on the role of pharmacists in many areas such as research and development, quality control and assurance, pharmaceutical industry, and natural products industry.

Historically, pharmaceuticals courses used to dominate BPharm programs in most of UAE universities. The recent program developments have led to a remarkable decrease in the credit hours of many pharmaceuticals courses such as pharmaceutical technology and pharmacokinetics and

biopharmaceutics. Pharmaceuticals courses represent range from 11% to 16% in most of BPharm curricula in UAE, except the RAK pharmacy college where the pharmaceuticals courses still dominate the BPharm program with close to 24% of the program total credit hours (Figure 11).

Pharmacy-related chemistry courses were also affected by recent developments in BPharm curricula. Future pharmacists who are also known as chemists, especially in Commonwealth English countries, will be no longer taking the same number of credit hours previously devoted to traditional chemistry courses such as analytical chemistry and instrumental analysis, organic chemistry, and medicinal chemistry. The credit hours of chemistry courses in most BPharm programs in UAE range from 11% to 16%, except in RAK where the percentage is close to 20% (Figure 12).

Figure 11. Number of credit hours of pharmaceuticals courses in BPharm programs offered by different pharmacy colleges in UAE

Figure 12. Number of credit hours of chemistry courses in BPharm programs offered by different pharmacy colleges in UAE

Table 6. Distribution of chemistry courses in BPharm programs offered by pharmacy colleges in UAE

Chemistry Course	AU	UoS	AAU	DPC	RAK	HCT	FCHS
General Chemistry	-	4	3	-	3	3	5
Organic Chemistry	6	9	5	7	6	3	5
Pharmaceutical Analysis	6	-	4	7	12	3	-
Quality Control/Assurance	3	-	-	-	-	-	-
Medicinal Chemistry	5	12	6	11	5	6	5
Inorganic Chemistry	-	-	-	-	3	-	-
Total	20	25	18	25	29	15	15
BPharm total credit hours	160	170	160	168	145	132	140
Percentage	12.5%	14.7%	11.2%	14.9%	20.0%	11.4%	10.7%

Among the common six chemistry courses typically taught in BPharm programs, medicinal chemistry, pharmaceutical analysis (including analytical chemistry and instrumental analysis), and organic chemistry represent the most common chemistry courses that are present in most BPharm curricula, in contrast to quality control/assurance and inorganic chemistry courses that are only offered by two colleges (Table 6). Medicinal chemistry and organic chemistry are the only courses that are offered in all programs.

11. PharmD Program

To date, GMU is the only university that offers a PharmD as an undergraduate-level pharmacy program, and more PharmD programs may be offered in the future by

other universities. Despite the growing interest of offering PharmD in UAE, this program may lack one of its most important components, which is the residency. One of the barriers of PharmD programs in many countries is the unavailability of residency positions in hospitals, including those in United States, to accommodate the demands of PharmD students. For this reason, PharmD programs without residency may not be equated with its counterpart in other countries such as United States. Additionally, PharmD holders should be distinguished from BPharm graduates in terms of job description and employee grade and position levels. BPharm and PharmD holders have the same definition in the professional qualifications requirements (PQR) document of the UAE health authorities, which sets the professional qualification requirements needed for licensing healthcare professionals in the UAE.

12. Integrated Curriculum

Integrative teaching and learning in pharmacy has not been well implemented in the Middle East and North African (MENA) region. Many challenges and barriers may face the development and implementation of integrated BPharm curricula in UAE in particular and other MENA countries in general. First, the implementation requires increasing in the number of faculty members of different specialties of pharmacy. This is a challenging issue since almost all the pharmacy colleges in UAE are private, and hiring large number of faculty may not be a suitable direction from a financial standpoint. Second, since this pedagogical method is uncommon for students and faculty, resistance is likely to happen, especially if it lacks to incentives.

13. Recent Developments

The minimum total credit hours for BPharm programs in UAE and experiential education were among the main topics discussed in the Pharmacy Education Summit held in Ajman in March 2019, with the participation of UAE pharmacy colleges key figures and the Commission for Academic Accreditation (CAA) in UAE Ministry of Education, Accreditation Council of Pharmacy Education (ACPE) in USA and American Association of Colleges of Pharmacy (AACCP). It was decided to set a minimum of 150 credit hours of BPharm programs and at least 960 contact experiential hours with 24 credit hours for training courses. It was also a discussion about the importance for BPharm programs in UAE to offer balanced blend of biomedical, pharmaceutical and clinical sciences, and that incorporating more social courses and experiential learning is important but without negatively affecting pharmaceutical sciences courses that are the backbone of pharmacy (20).

14. Conclusions

Pharmacy education in UAE has recently undergone drastic developments, and more clinical and social pharmacy courses are increasingly replacing the traditional pharmaceutical sciences subjects. Most of pharmacy colleges have developed their curricula toward patient centered pharmacy education. This has led to marked decrease in the number of credit hours dedicated for other courses such as pharmaceuticals, chemistry, biomedical, and basic sciences. PharmD programs are not widespread in UAE, however, there is a growing interest of offering this degree program by a number of UAE universities, but some regulatory affairs need to be adopted.

Conflict of Interest

The author declares no conflict of interest.

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