

Views and Attitudes of Pharmacy and Medical/Dental Students Towards Inter-Professional Education and Collaboration in the United Arab Emirates

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Abstract

Background: Inter-professional collaboration (IPC) is necessary for the provision of patient care. Poor IPC has a negative impact on the delivery of healthcare services and patient care.

Objective: The purpose of this study is to assess and evaluate the knowledge and attitude of final years' medical students toward IPC.

Methods: A cross-sectional study was designed, pre-piloted, and distributed to final years' pharmacy and medical/dental students at the University of Sharjah and Ajman University of Science and Technology (UAE).

Results: A total of 212 (70.7%) surveys were received out of 300 (target); 3 of them were excluded due to incomplete data (209). The majority of the respondents were females (155; 75.2%), Arabs (156; 75.7%), medical and dental students (129; 61.7%), senior students (104; 51.5%), and were living with their families (133; 63.6%). More than half of the participants were between 21-23 years old (158; 76%) and were self-sponsored (155; 74.9%). Among the 209 students, 80 (38.3%) of them were pharmacy students, and the rest were medical and dental students (129; 61.7%). In general, students' attitudes towards inter-professional collaboration seem to be positive. The majority of students in both groups agreed that they share common goals and objectives when caring for the patient, their roles are complementary to one another, and an introductory IP experience would have a positive impact on their understanding of collaboration and teamwork. Again, there was a general agreement among all students about the present barriers to effective inter-professional education and collaboration.

Conclusion: We conclude that some professional classes need to be common among the different colleges. In addition, a workshop or series of workshops should be implemented for pharmacy, medical, dental, and nursing students as a sort of practical circular extracurricular activity or can be projected as a theatrical play.

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Introduction

A plethora of studies clearly revealed the remarkable improvement in the delivery of healthcare services and consequently healthcare outcomes that can be achieved through interprofessional (IP) collaboration (Swarenstin, Goldman, and Reeves, 2009). In the light of the wise change in the role of the pharmacist from drug dispensing to patient

care, the inclusion of the pharmacist as an essential member of the healthcare team becomes a necessity. The pharmacist can significantly contribute to the efforts of other healthcare professionals by counseling patients on their prescribed medications, the importance of drug adherence, advising on lifestyle, and proper drug storage conditions. The pharmacist can also advise the prescribing physician on the availability of equally effective generic drugs, drug interactions, and other aspects of the prescribed drug regimen. The pharmacist's contribution to the management of chronic diseases such as diabetes and hypertension has also been the subject of several studies that showed a positive impact for the pharmacist-led interventions (Hatah, Braund, Tordoff, Duffull, 2014; Machado, Bajcar, Guzzo, Einarson, 2007; Cheema, Sutcliffe, Singer, 2014; Tan, Stewart, Elliott, George, 2014; Santschi et al., 2014; Nkansah et al., 2010).

Appropriate IP collaboration between healthcare team members requires a positive attitude, respect, and trust among members of various disciplines. These can be fostered through IP education. Interprofessional learning through undergraduate courses has been frequently reported to influence the knowledge of students and their appreciation of the roles and contributions of each other to the benefit of patients (Finch, 2000; Cooper, Carlisle, Gibbs, Watkins, 2001; Leaviss, 2000; Hall and Weaver, 2001; Parsell, Stewart, Bligh, 1998).

In the University of Sharjah, United Arab Emirates (UAE), the educational environment is ready to heavily embark on IP learning. Four colleges, namely the medical, dental, pharmacy, and health sciences, are situated in one complex, and the students share many elective courses and scientific and extracurricular activities. The objective of the present study was to evaluate the knowledge and attitude of pharmacy, medical, and dental students regarding various aspects of IP education and also to explore their views about IP collaboration.

Methods

Study Area

The University of Sharjah was established in 1997. However, the colleges of pharmacy (B. Pharm.), medicine (M.B.B.S.), and dentistry (B.D.S.) were established in the Medical and Health Sciences Complex in the year 2004 and were affiliated with the colleges of Pharmacy and Medicine-University of Monash and the college of Dentistry-University of Adelaide, Australia. The colleges adopt Problem-Based Learning, Team-Based Learning, in addition to traditional lecturing and tutorials. In 2004, students of the three colleges had to enroll in a foundation year with common courses. However, later the system changed, and the pharmacy study plan was modified to include a separate first year of pharmacy instead of the foundation year. The common courses that are usually shared by students of the three colleges are principally elective courses. The three programs are accredited by the Commission for Academic Accreditation (CAA) of the Ministry of Higher Education of the United Arab Emirates (UAE).

The study plan of the College of Pharmacy extends over 5 years and includes basic and pharmaceutical sciences in addition to pharmacy practice and clinical pharmacy courses and experiential training. The college is, at present, applying for initial accreditation for a Pharm. D. program. Fourth-year students of the Faculty of Pharmacy and Health Sciences at

Ajman University were included in the study. At Ajman University, the pharmacy program extends over 4 years. Ajman University was chosen because of its geographic location, accreditation, medium batch size, and the approval to conduct the survey that was granted by the university's administration and the dean of the Faculty of Pharmacy.

Study population

The study population consisted of two student cohorts: 1) fifth-year pharmacy students and 2) fifth-year medical and dental students.

The study was conducted during the period of January-April 2018 using a self-administered questionnaire that was developed by modification of a survey instrument designed and used in Kuwait [13]. Prior to its administration, the questionnaire was pre-piloted for face validity by distributing it to 3 fifth-year dentistry students, 3 fifth-year pharmacy students, 2 fifth-year medical students, and 4 pharmacy professors at the University of Sharjah, and their comments and recommendations were considered in the final version of the questionnaire. The questionnaire consisted of 4 sections; the first dealt with questions covering demographic characteristics of the participants, including age, gender, college, year of study, ethnicity, accommodation, and type of sponsorship. The second section covered questions on whether the students shared any common courses, collaborated on research projects or graduation projects, and their knowledge with regard to the prescription as a legal document and the meaning of the term polypharmacy. The third section covered questions that assessed students' views of each other as healthcare professionals and their attitudes towards future inter-professional collaboration. Separate questions were directed to and answered by each student's cohort. Some of the questions examined the views of students on some ethical issues such as their willingness to associate themselves with the advertisement of pharmaceutical products and publicly criticizing other healthcare professionals. The last section questioned participants' views of the various barriers to their IP collaboration.

The questionnaire was distributed after class times with the supervision of a faculty member after taking his/her permission. Two members of the research group, who conducted the study, were always present to distribute the questionnaire, clarify any misunderstood points as needed, ensure the confidentiality of the participants' information, and collect the returned filled-in surveys. The participants' consent was verbally obtained after a brief explanation of the nature of the survey. The average time required to fill the questionnaire was estimated to be a maximum of 15 minutes.

Ethical approval

All participants were assured of confidentiality and the survey was anonymous. Ethical approval was obtained from the Ethical Committee of the University of Sharjah

Statistical analysis

Responses of the participants were encoded, and the data were analyzed using the Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, version 20.0, Armonk, NY, IBM Corp). Three categories of relevant

responses (agree, neutral, and disagree) were used. Descriptive analysis was used to calculate the proportion of each group of respondents who agreed, disagreed, or were neutral with each statement in the questionnaire. A Chi-square test was used to identify any significant differences among the participants' demographics and responses regarding certain statements in the questionnaire with a significance level of $p\text{-value} < 0.05$.

Results

A total of 250 students were approached and invited to participate in the study, but only 209 students voluntarily participated and filled in the questionnaire, producing a response rate of 83.6%. The questionnaire was filled out by 80 pharmacy (P) and 129 medical/dental (MD) students. Females (155) outnumbered male (51) participants, and 156 (75.2%) were Arabs living with their families (133, 63.6%) and were self-sponsored (155, 74.9%). The majority of students were in the age range of 20-24 years (Table 1). Responses of P students to questions on their competency to provide information on drugs and pharmaceutical products to other healthcare professionals, whether they have more expertise on drugs than MD students, and whether they will consult the prescriber before making changes to the prescription are shown in Table 2. More than two-thirds of P students agreed to such questions, but slightly less than 50% admitted to trusting the physicians, and only about 20% think that counseling is the responsibility of physicians/dentists. Surprisingly, about 20% answered yes to whether they would publicly criticize other healthcare professionals. On the other hand, about 50% of MD students did not accept the pharmacist changing their prescribed trade by generic drug

Table 1. Demographic Characteristics of Participants

Criteria	Frequency (%), N= 209
College	
• Pharmacy	80 (38.3%)
• Medicine/ Dentistry	129 (61.7%)
Year of Study	
• Fifth Year	104 (51.5%)
• Fourth Year	98 (48.5%)
Missing Values	7 (3.3%)
Gender	
• Female	155 (75.2 %)
• Male	51 (24.8 %)

Missing Values	3 (1.4%)
Ethnicity	
• Arab	156 (75.7%)
• Non- Arab	50 (24.3%)
Missing Values	3 (1.4%)
Age	
• 20	27 (13%)
• 21	42 (20.2%)
• 22	69 (33.2%)
• 23	47 (22.6%)
• 24	16 (7.7%)
• ≥ 25	7 (3.4%)
Missing Values	1 (0.5%)
Accommodation	
• Dorms	67 (32.1%)
• With Family	133 (63.6%)
• Other	9 (4.3%)
Tuition fees	
• Self-Sponsor	155 (74.9%)
• Grant	52 (25.1%)
Missing Values	2 (1%)

without consulting them first, but were willing to accept the change after consultation. Again, MD students admitted a willingness to seek pharmacists' help with drug interactions and advice on various aspects of drug regimens. In addition, about two-thirds have confidence in the pharmacists, trust their opinion, and think collaboration with them is beneficial to the patient. With regard to inter-professional learning and research collaboration, about 50% of the participants answered yes to the question on whether they had any shared common courses. However, the majority of P (69; 88.5%) and MD (91, 71.7%) students admitted not having any collaborative research together. Similar high percentages of P (74; 92.5%) and MD (119, 92.5%) students believe that the prescription is a legal document, but the term polypharmacy was identified by more P (58, 72.5%) than MD (67, 51.9%) students.

Table 2. Responses of pharmacy and medical /dental students to questions on inter-professional collaboration

Questions to pharmacy students	Frequency (%), N=80		
	Agree	Neutral	Disagree
Do you think you have more drug expertise than Medical/Dental practitioners?	59 (73.6%)	19 (24.2%)	2 (2.2%)
Do you accept changing your trade name prescribed drug with a generic by the pharmacist after consulting you?	69 (53.4%)	36 (27.8%)	24 (18.8%)
Will you be willing to consult a pharmacist for the best treatment schedule for your Patient?	72 (55.6%)	36 (27.8%)	21 (16.5%)
Will you be willing to seek the help of the Pharmacist on decisions regarding drug interactions that can affect the patients?	93 (72.2%)	23 (18%)	13(9.8%)
Will you accept the pharmacist's advice on?			
Dosage regimen	74 (57.4%)	26 (20.1%)	18 (14%)
Polypharmacy	72 (55.8%)	39 (30.6%)	18 (14%)
Drug Interaction	94 (72.9%)	20 (15.7%)	15 (11.6%)
Changing brand to generic drug	89 (69%)	26 (20.1%)	14 (10.9%)
Two drugs of the same therapeutic class	75 (58.1%)	32 (24.6%)	22 (17.1%)
Do you have confidence in the pharmacist?	83 (64.2%)	43 (33.6%)	3 (2.2%)
Do you trust the pharmacist's opinion?	85 (65.7%)	42 (32.8%)	2 (1.5%)
Do you think collaboration with the Pharmacist is beneficial to the patient?	111 (86.4%)	15 (11.4%)	3 (2.3%)
Do you think counseling on drug treatment is the responsibility of the Physician/Dentist?	20 (25.3%)	27 (34.1%)	33 (40.7%)
Are you competent to provide unbiased, scientifically-based information related to drugs and pharmaceutical products to other health care professionals?	56 (70.3%)	20 (25.3%)	4 (4.4%)
Will you publicly criticize the ability or performance of other health care professionals?	16 (20%)	33 (41.1%)	31 (38.9%)
Will you consult the Physician/Dentist before making any change in a prescription?	60 (74.7%)	18 (23.1%)	2 (2.2%)
Do you trust the physician's/ dentist's decision?	38 (47.3%)	38 (47.3%)	4 (5.5%)
Questions to medical/dental students	Frequency (5), N=129		
	Agree	Neutral	Disagree
Do you accept changing your trade name prescribed drug with a generic by the pharmacist without consulting you?	22(17%)	42(32.6%)	65(50.4%)

Table 3 shows that almost similar percentages of both P and MD groups agree that research collaboration, IP relationships between them as students, and an introductory IP experience are beneficial since they share common goals and objectives and their roles are complementary to each other.

Table 3. Responses of participants on their attitude towards inter-professional collaboration

Statement	Frequency (%)					
	Pharmacy N= 80			Medicine/Dentistry N= 129		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Research collaboration among Medical, Dental and Pharmacy students is beneficial	58 (72.5%)	17 (12.3%)	5 (6.3%)	98 (76%)	28 (21.7%)	3 (2.3%)
IP relationships between Medical, Dental and Pharmacy students should be included in their professional educational programs	59 (73.8%)	20 (25%)	1 (1.3%)	87 (67.4%)	36 (28%)	6 (4.6%)
Physicians/ Dentists are superior to Pharmacists	10 (12.5%)	18 (22.5%)	52 (65%)	31 (24%)	33 (25.6%)	65 (50.4%)
Pharmacists are more experienced in drugs than physicians/ Dentists	72 (90%)	6 (7.5%)	2 (6.5%)	81 (62.8%)	36 (28%)	12 (9.3%)
Pharmacists are qualified to assess and respond to patients' drug treatment needs	68 (85%)	9 (11.3%)	3 (3.8%)	55 (42.6%)	53 (40.1%)	21 (16.3%)
The Pharmacist is responsible for counseling patients on their drug treatment	72 (90%)	6 (7.5%)	2 (6.5%)	59 (45.7%)	42 (32.6%)	28 (21.7%)
The pharmacist should only dispense the drugs the doctor prescribes	18 (22.5%)	25 (31.3%)	37 (46.3%)	82 (64.1%)	30 (23.4%)	16 (12.5%)
The pharmacist can help in achieving the best therapeutic outcomes	64 (82.1%)	12 (15.4%)	2 (2.6%)	86 (69.4%)	31 (25%)	7 (5.6%)
A prescription by a Physician/Dentist should be filled as it is	23 (28.8%)	36 (45%)	21 (26.3%)	83 (65.4%)	36 (28.3%)	8 (6.3%)

In addition, a large number of P (52, 65%) and MD (65 (50.4%) disagree with the statement that physicians and dentists are superior to pharmacists but agreed with the latter being more experienced in drugs than physicians and dentists and can help in achieving the best therapeutic outcomes. More MD than P students disagreed with the statement on whether it is ethically acceptable to associate oneself with the advertisement of pharmaceutical products. A mutual agreement of reasonable percentages of P (45-68%) and MD (34-56%) on pharmacist-related barriers to IP collaboration (Table 4).

Table 4. Responses of Participants to pharmacist-related barriers to inter-professional collaboration

Barrier	Frequency (%)					
	Pharmacy N= 80			Medicine/Dentistry N= 129		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree
The inability of pharmacists to document patient care recommendations in the medical record due to laws prohibiting this practice	51 (64.6%)	22 (27.8%)	6 (7.6%)	64 (49.6%)	46 (35.7%)	19 (14.7%)
Physicians/ Dentists are concerned that pharmacist-patient care recommendations will conflict with their care plan for patients, causing patient harm or poor patient outcomes	47 (58.8%)	27 (33.8%)	6 (7.5%)	58 (45.3%)	47 (36.7%)	23 (18%)
Organizational obstacles such as lack of support from the administration or absence of healthcare policy defining the pharmacist's direct patient care role	55 (68.8%)	20 (25%)	5 (6.3%)	63 (49.6%)	50 (39.4%)	14 (11%)
Inadequate education and clinical training about direct patient care in the pharmacy curriculum	53 (66.3%)	18 (22.5%)	9 (11.3%)	73 (56.6%)	36 (27.9%)	20 (15.5%)
Physicians'/ Dentists' fear of being criticized by other members of the healthcare team during collaborative practice	45 (56.3%)	27 (33.8%)	8 (10%)	59 (46.1%)	47 (36.7%)	22 (17.2%)
Lack of incentives for pharmacists to change their practice, such as increased salaries or more professional prestige	39 (48.8%)	33 (41.3%)	8 (10%)	51 (39.8%)	60 (46.9%)	17 (13.3%)
Lack of pharmacists' desire or willingness to change from medication dispensing to direct patient care practice	36 (45%)	36 (45%)	8 (10%)	44 (34.4%)	61 (47.6%)	23 (18%)

Regarding lack of knowledge and regulation-related barriers, almost similar percentages (less than 50%) of both groups agreed to bylaws and regulations, fear of inability to provide unbiased scientifically based information, and fear of being accused of association with the advertisement of pharmaceutical products, as well as fear of being publicly criticized for poor performance (Table 5).

Table 5. Responses of participants to knowledge and regulatory barriers to inter-professional collaboration

Barrier	Frequency (%)					
	Pharmacy N= 80			Medicine/DentistryN= 129		
	Agree	Neutral	Disagree	Agree	Neutral	Disagree
Bylaws and Regulations	38 (47.5%)	34 (43%)	7 (8.9%)	51 (39.5%)	60 (46.6%)	18 (14%)
Fear of inability to provide unbiased, scientifically-based information	37 (46.35%)	35 (43.8%)	8 (10%)	60 (46.9%)	46 (35.9%)	22 (17.2%)
Fear of being accused of association with the advertisement of pharmaceutical products	32 (40%)	33 (41.3%)	15 (18.8%)	55 (42.6%)	45 (34.9%)	29 (22.5%)
Fear of being publicly criticized for poor ability and performance	43 (55.1%)	24 (30.8%)	11 (14.1%)	55 (42.6%)	47 (36.4%)	27 (20.9%)
Poor general knowledge of your field of specialty	44 (55%)	22 (27.5%)	14 (17.5%)	50 (39.1%)	39 (30.5%)	39 (30.5%)
Lack of pharmacists' access to the patient's medical record and the medical history, laboratory data, and other information	53 (66.3%)	18 (22.5%)	9 (11.3%)	63 (49.6%)	39 (30.7%)	25 (19.7%)
The professional culture and tradition of physicians/ dentists assuming total responsibility for clinical decision-making	52 (65%)	24 (30%)	4 (5%)	63 (50%)	46 (36.5%)	17 (13.5%)
Lack of both physician and pharmacist education and training in inter-professional collaboration and teamwork	56 (70%)	19 (23.8%)	5 (6.3%)	73 (57.5%)	36 (28.3%)	18 (14.2%)

Regarding lack of knowledge and regulation-related barriers, almost similar percentages (less than 50%) of both groups agreed to bylaws and regulations, fear of inability to provide unbiased scientifically based information, and of being accused of association with advertisement of pharmaceutical products, and of being publicly criticized for poor performance (Table 5). However, more P (55-70%) than MD (40-57%) students agreed to barriers related to lack of pharmacists' access to medical records, the traditional culture of physicians and dentists assuming total responsibility for clinical decision making, and lack of IP education and training on IP collaboration. Regarding lack of knowledge and regulation-related barriers, almost similar percentages (less than 50%) of both groups agreed to bylaws and regulations, fear of inability to provide unbiased scientifically based information, and of being accused of association with advertisement of pharmaceutical products, and of being publicly criticized for poor performance (Table 5). However, more P (55-70%) than MD (40-57%) students agreed to barriers related to lack of pharmacists' access to medical records, the traditional culture of physicians and dentists assuming total responsibility for clinical decision making, and lack of IP education and training on IP collaboration.

Table 6 shows views of physicians and dentists on the abilities of the pharmacist, where they believed he is more experienced with drugs than them, he can assess patient treatment, run patient counseling, dispense what they prescribe, can help achieve the best therapeutic outcomes, and can advise on self-medication. However, there are barriers to the pharmacist hindering him from playing his/her full role. These include bylaws that prevent him/her from accessing patient records and recording recommendations on patient records. In addition, some physicians and dentists do not trust the pharmacist's expertise and have a concern that his/her recommendations on patient care may conflict with their care plan.

Table 6. Views of medical and dental students on abilities of pharmacistson and barriers to IP collaboration

Statement	Frequency (%)						Chi- square test P value
	Pharmacy N= 80			Medicine/Dentistry N= 129			
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	
Pharmacists are more experienced in drugs than physicians/ Dentists	72 (90%)	6 (7.5%)	2 (2.5%)	81 (62.8%)	36 (28%)	12 (9.3%)	0.001
Pharmacists are qualified to assess and respond to patient's drug treatment needs	68 (85%)	9 (11.3%)	3 (3.7%)	55 (42.6%)	53 (41.1%)	21 (16.3%)	> 0.001
The Pharmacist is responsible for counseling patients on their drug treatment.	72 (90%)	6 (7.5%)	2 (2.5%)	59 (45.7%)	42 (32.6%)	28 (21.7%)	> 0.001
The pharmacist should only dispense the drugs the doctor prescribes.	18 (22.5%)	25 (31.3%)	37 (46.2%)	82 (64.1%)	30 (23.4%)	16 (12.5%)	> 0.001
The pharmacist can help in achieving the best therapeutic outcomes.	64 (82.1%)	12 (15.4%)	2 (2.5%)	86 (69.4%)	31 (25%)	7 (5.6%)	0.03
A prescription by a Physician/Dentist should be filled as it is.	23 (28.7%)	36 (45%)	21 (26.3%)	83 (65.4%)	36 (28.3%)	8 (6.3%)	> 0.01
Pharmacists can screen, monitor, and advice for self-treatment with over-the-counter (OTC) products sold without a prescription.	65 (81.2%)	12 (15%)	3 (3.8%)	64 (50.4%)	36 (28.3%)	27 (21.3%)	> 0.01
Lack of trust and confidence in the competency of each other.	56 (43.4%)	18 (14%)	6 (4.6%)	60 (46.5%)	42 (32.5%)	27 (21%)	0.005
Lack of pharmacists' access to the patient's medical record and the medical history, laboratory data, and other information.	53 (66.3%)	18 (22.5%)	9 (11.2%)	63 (48.8%)	41 (31.8%)	25 (19.4%)	0.04
Lack of physicians' trust in pharmacists' clinical abilities and their ability to provide direct patient care.	57 (71.3%)	16 (20%)	7 (8.7%)	67 (52%)	37 (28.7%)	25 (19.4%)	0.03
Inability of pharmacists to document patient care recommendations in the medical record due to laws prohibiting this practice.	51 (64.6%)	22 (27.8%)	6 (7.6%)	64 (49.6%)	46 (35.7%)	19 (14.7%)	0.03
Physicians'/ Dentists concern that pharmacist-patient care recommendations will conflict with their care plan for patients, causing patient harm or poor patient outcomes.	47 (58.8%)	27 (33.8%)	6 (7.5%)	58 (45.3%)	47 (36.7%)	23 (18%)	0.03
Organizational obstacles such as lack of support from the administration or absence of healthcare policy defining the pharmacist's direct patient care role.	55 (68.8%)	20 (25%)	5 (6.3%)	63 (49.6%)	50 (39.4%)	18 (14%)	0.03
Physicians/Dentists fear being criticized by other members of the healthcare team during collaborative practice.	45 (56.2%)	27 (33.8%)	8 (10%)	59 (46.1%)	47 (36.7%)	22 (17.2%)	0.03

The only variable that influenced IP collaboration was ethnicity (Table 7) where significantly more Arab than non Arab pharmacists believed that barriers to IP collaboration include lack of time, lack of trust in physicians/dentists, poor knowledge of IP collaboration, fear of inability to provide unbiased, scientifically-based information, and fear of being publicly criticized of poor ability and performance

Table 7. Association between ethnicity and barriers to IP collaboration

Statement	Frequency (%)						Chi- square test P value
	Arab N= 156			Non-Arab N= 50			
	Agree	Neutral	Disagree	Agree	Neutral	Disagree	
Lack of time (busy clinic, busy pharmacy).	89 (57%)	46 (29.5%)	21 (13.5%)	39 (78%)	8 (16%)	3 (6%)	0.03
Poor knowledge of appropriate inter-professional relationships.	92 (59.3%)	43 (27.7%)	20 (13%)	39 (78%)	9 (18%)	2 (4%)	0.04
Lack of trust and confidence in the competency of each other.	75 (48.1%)	50 (32%)	31 (19.9%)	39 (78%)	2 (4%)	28 (21.7%)	>0.001
Fear of inability to provide unbiased, scientifically-based information	59 (38%)	68 (44%)	28 (18%)	36 (72%)	13 (26%)	1 (2%)	> 0.001
Fear of being publicly criticized of poor ability and performance	62 (40%)	62 (40%)	31 (20%)	35 (71.4%)	8 (16.3%)	6 (12.2%)	>0.001

Discussion

The remarkable impact of including pharmacists as healthcare team members in the management of chronic diseases, with particular emphasis on hypertension and diabetes, has been clearly demonstrated by a large number of studies (Hatah, Braund, Tordoff, Duffull, 2014; Machado, Bajcar, Guzzo, Einarson, 2007; Cheema, Sutcliffe, Singer, 2014; Tan, Stewart, Elliott, George, 2014; Santschi et al., 2014; Nkansah et al., 2010). Pharmacist, medical, and dental inter-professional collaboration is foundational to the implementation of proper and effective healthcare services (Swarenstein, Goldman, Reeves, 2009). In everyday practice, that kind of attitude and competence may not always be there (Hatah, Braund, Tordoff, Duffull, 2014), which can be ascribed to multiple personal and workplace barriers. Several studies have been published about the attitude towards inter-professional collaboration. In this study, we assessed the knowledge and attitude of final-year pharmacy, medical, and dental students towards inter-professional collaboration to discover the factors that hinder their collaboration in the future. Female participants in our study far exceeded males. This is a usual trend in all medical and health sciences colleges in the UAE. In addition, most participants were Arabs aged 21-23 years. This age range is expected as our inclusion criteria focused on final year students who are about to graduate. About half of the respondents from the three colleges claimed that they shared common courses. Here, it must be mentioned that participants in our survey were not asked to list the courses they shared. However, going through the study plan and time schedule for each college, it became clear that the only courses that some students may have shared were elective courses taught by healthcare and non-healthcare faculty. Inter-professional learning through undergraduate courses has been frequently reported to influence the knowledge of students and their appreciation of the roles and contribution of each other to the benefit of patients (Finch, 2000; Cooper, Carlisle, Gibbs, Watkins, 2001; Leaviss, 2000; Hall and Weaver, 2001; Parsell, Stewart, Bligh, 1998).

According to the World Health Organization (WHO), inter-professional education is an experience that “occurs when students from two or more professions learn about, from, and with each other” (WHO, 2010). Inter-professional education has also been defined as “learning together to promote collaborative practice” (Hammick, 1998). A principal aim of inter-

professional education is to foster the environment and to nurture and enhance the personal initiative of each member of the healthcare team to willingly and professionally accept with respect the advice, consultation, and opinion of other members of various health disciplines. This necessitates knowledge and appreciation of the expertise, role, and contribution of the other members of the healthcare team. In this respect, sharing common undergraduate courses and collaboration in research, such as that conducted through graduation projects, would certainly help in breaking the barriers and building bridges of mutual collaboration built on trust and respect.

In general, the results of the present study demonstrated a reasonable level of knowledge and a positive perception among participants of the three colleges towards inter-professional education and collaboration. It has been pointed out earlier that among the obstacles to inter-professional learning, attitude remains the main factor (Katoue, et al., 2017). Moreover, some studies demonstrated a tendency of medical students to not favor sharing knowledge with other healthcare students (Horsburgh, Lamdin, Williamson, 2001; Reid, Bruce, Allstaff, McLernon, 2006). It has also been suggested that students admitted with negative attitudes towards inter-professional learning usually do not perform well in the shared courses, and this further enhances their negative attitudes (Coster et al., 2008).

Our results are in good agreement with the results of studies conducted in Iraq (Ahmed, 2008) and Malaysia (Aziz, Teck, Yen, 2011) that showed encouraging results where medical and pharmacy students illustrated positive attitudes toward inter-professional learning and recognized the advantages of shared learning.

Attitudes of participants of various healthcare disciplines were, in general, positively rated based on their responses. However, some misconceptions persist and can be eliminated through inter-professional education. An interesting example of differences in knowledge and views of students from various healthcare disciplines is represented in the present study by the unfamiliarity of a large number of medical and dental students with the term polypharmacy. On the other hand, the majority (90%) of pharmacy students knew the term. Again, a sizable number of medical and dental students did not agree that the pharmacist is responsible for counseling patients on their drug treatment. Such a misconception must change, especially in the light of the global progressive evolution in the role of the pharmacist. Another misconception is that about two thirds of medical and dental students agreed to the notion that pharmacists should only dispense drugs prescribed by a physician or dentist. Surprisingly, only less than 50% of pharmacy students disagreed with this, while about 30% were neutral. This can be attributed to the fact that many other healthcare professionals do not have a clear understanding of the pharmacists' range of practice and competence. It has been correctly advocated that since knowledge, skills, and professional attitudes of healthcare professionals are mostly complementary and overlapping, it is rather logical to learn together to promote future collaborative practice (Pirrie, Wilson, Harden, Elsegood, 1998). This is further enhanced by the fact that patients seeking health care are bound to interact with more than one healthcare professional (Headrick, Wilcock, and Batalden, 1998).

There is also a need to stress in undergraduate courses on professional ethics, as our results on whether it is ethically acceptable to associate oneself with the pharmaceutical industry and products showed that the responses were not encouraging. Knowledge of the responsible and ethical handling of the pharmaceutical industry should be dealt with through common courses such as, among others, professional ethics, rational prescribing, and dispensing. Most medical

and dental students agreed to the question of whether they would consult a pharmacist regarding the best treatment schedule and drug interactions. This implies that medical and dental students have confidence in pharmacists, trust them, and appreciate the pharmacist's knowledge and skills (Coster et al., 2008; WHO, 2010).

It must be pointed out that even though medical and dental students believed that they are not superior to pharmacists, our results indicate that a sense of superiority still lingers. Yet, when the same question was directed to pharmacy students, the majority (75%) believed they would be more cooperative. However, responses of the medical and dental students were positive when it came to accepting the pharmacist's opinion on dosage regimen, drug interactions, and prescribing two drugs of the same therapeutic class in the same prescription.

Contrary to our results, other studies (Horsburgh, Lamdin, Williamson, 2001; Coster et al., 2008; Reid, Bruce, Allstaff, McLernon, 2006) reported that medical students have the least favorable attitude towards a willingness to share knowledge with other healthcare groups. It is worth noting that results of many studies clearly indicated that females have a more positive attitude towards inter-professional collaboration as compared to male students (Horsburgh, Lamdin, Williamson, 2001, Wilhelmsson et al., 2011).

Pharmacy students believed that counseling on drug treatment is not the responsibility of the physician or the dentist. They also feel competent enough to provide other healthcare professionals with unbiased, scientifically-based information related to drugs and pharmaceutical products. This may reflect confidence in what they have learned in their courses about evidence-based practice and drug literature. However, an interesting result comes up when pharmacy students were asked if they trust the physician's and dentist's opinion. Half of them (47.3%) answered "yes," yet the other half (47.3%) were uncertain. Again, trust among members of the healthcare team must be enhanced through daily practice-proved competence and enhanced communication skills.

It must be mentioned here that there are obstacles to inter-professional learning that is based on sharing common specialized courses. These obstacles include the different organization of the study plans of various healthcare colleges, course contents, and timetables of courses to be shared. Moreover, inter-professional collaboration in real practice may be learned better and enhanced through active workshops where medical, dental, pharmacy, and possibly students of other disciplines such as nurses and non-healthcare students play the roles of physicians, dentists, pharmacists, nurses, and patients, respectively. Various scenarios can be prepared to represent examples that warrant interaction between various healthcare team members. Such scenarios should include scenes representing both positive and negative attitudes and practices of all members. We at present are planning for such an activity, and such an educational strategy would be our future research project.

A study conducted among National University of Singapore students displayed that overall, students had a high readiness for inter-professional education, but when the readiness of medical students was compared to that of pharmacy and dentistry students, the results indicated that pharmacy and dentistry students have lower readiness (Ahmad et al., 2013). Students' readiness has been the subject of many studies in Indonesia (Tyastuti, Onishi, Ekayanti, Kitamura, 2014), the United Arab Emirates (El-Zubeir, Rizk, Al-Khalil, 2006), and Saudi Arabia (Al-Eisa et al., 2016). It must be mentioned here that there are obstacles to inter-professional learning that is based on sharing common specialized courses. These

obstacles include different organization of the study plans of various healthcare colleges, course contents, and timetabling of courses to be shared. Moreover, inter-professional collaboration in real practice may be learned better and enhanced through active workshops where medical, dental, pharmacy, and possibly students of other disciplines such as nurses and non-healthcare students play the roles of physicians, dentists, pharmacists, nurses, and patients, respectively. Various scenarios can be prepared to represent examples that warrant interaction between various healthcare team members. Such scenarios should include scenes representing both positive and negative attitudes and practices of all members. We at present are planning for such an activity, and such an educational strategy would be our future research project.

Our results are in general agreement with several studies in which most healthcare undergraduate students have been reported to have positive perceptions of inter-professional learning (Coster et al., 2008; Cooper, Carlisle, Gibbs, Watkins, 2001; Hind et al., 2003). Both knowledge and attitudes of our students towards inter-professional education and learning are encouraging, and efforts are needed to organize educational activities between authorities in various healthcare disciplines to establish a center for inter-professional education.

Limitations

A major limitation of this study was that we did not include nurses, even though nurses are important members of the healthcare team. Another limitation is the sample size, which was relatively small due to time constraints. As our study covered only final year students, the inclusion of students of all years of study in each college may prove better.

Conclusions

We propose that in the future, there should be some academic classes common among the different colleges, such as pharmacology, pathophysiology, microbiology, and biochemistry. However, the schedule times of each college and study plans organization should be considered because in many previous instances, there was an intention to do it, but due to the above constraints, it was hindered. In the Sharjah medical campus, students may share elective courses like languages, social studies, statistics, physics, Islamic studies, history, etc. In addition, a workshop or series of workshops should be designed and implemented for pharmacy, medical, dental, and nursing students as a sort of practical extracurricular activities or can be projected as theatrical plays showing positive and negative scenarios of IP collaboration. A more practical intervention could be through IP sessions in which students of various health and medical disciplines are distributed in groups, with each including students of various disciplines to discuss a scenario that covers the roles of each member.

Statements and Declarations

Conflict Of Interest

The authors declare that they have no conflicts of interest to disclose.

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