

# Knowledge and Readiness for Interprofessional Learning Among Pharmacy and Clinical Nutrition Students at King Saud University

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**Background:** Interprofessional education (IPE) in healthcare specialties is important to optimize patient outcomes and shape professional image toward teamwork and collaboration among healthcare professionals. The aim of this study is to assess the impact of IPE on pharmacy and clinical nutrition students' knowledge in food–drug interactions and readiness for interprofessional learning.

**Methods:** This pre-post study was conducted at King Saud University between February and March 2020. We held an interprofessional workshop for pharmacy and clinical nutrition students. After we introduced the faculty members who would deliver the food–drug interactions session, the students took a seven-question quiz (total score = 7) to assess their knowledge about the basic concept of food–drug interactions before the session. After that, a 45-minute lecture was provided by a clinical pharmacy faculty member. Students from both disciplines worked on three clinical scenarios. After completing the assigned scenarios, the students retook the quiz to assess their knowledge after the workshop. In addition, student readiness was assessed using the 19-item Readiness for Interprofessional Learning Scale (RIPLS).

**Results:** A total of 48 students were included in this study. Overall, students' mean scores in both colleges significantly increased after the workshop ( $p < 0.01$ ). The mean RIPLS total scores (SD) for pharmacy students and clinical nutrition students were 80.6 (7.48) and 81.26 (6.96), respectively, out of a maximum possible score of 95. These scores indicated positive attitudes toward interprofessional learning in both groups.

**Conclusion:** Pharmacy and clinical nutrition students' knowledge regarding food–drug interaction improved after implementing the IPE session. Students also reported higher scores for interprofessional learning. This indicates their willingness to participate in future interprofessional learning activities. Roles and responsibilities domain scores were slightly lower among both groups. Simulation-based activities including profession role exchange can be added to traditional IPE sessions to improve this domain.

**Keywords:** interprofessional education, pharmacy, interprofessional learning, clinical nutrition

## Introduction

Interprofessional education (IPE) defined as “occasions when two or more professionals learn with, from and about each other to improve collaboration and the quality of care.”<sup>1</sup> By implementing IPE, students can share skills and knowledge between professions. This allows for better understanding, shared values, and respect for the roles of other healthcare professionals.<sup>2–4</sup> Introducing IPE into curricula before students begin to practice sets the foundation for and values of working within interprofessional teams.<sup>5,6</sup>

Food–drug interactions are a major hidden issue that concern both pharmacists and clinical nutrition specialists.<sup>7</sup> A study investigated the prevalence of food drug interactions in elderly patients prescriptions found that around 58% contains such interactions.<sup>8</sup>

Food drug interactions might lead to ineffective treatment or toxicity to patients.<sup>7</sup> Moreover, those interaction significantly interferes with absorption, metabolism and excretion process.<sup>9</sup> The collaboration between pharmacy and

nutrition extends beyond hospital settings. In a recently published survey among pharmacists and nutrition specialists found that pharmacists acknowledged the need of nutritional and dietary care in community pharmacies and hoped that certified dietitians would be significantly involved.<sup>10</sup>

Therefore, early introduction of this topic through IPE sessions is crucial to limit the problem in clinical practice and to enhance collaboration among healthcare professionals.

IPE has been implemented in pharmacy programs with students from different professions/disciplines including medicine, dentistry, nursing, and allied health.<sup>11</sup> In a systematic review of 29 studies published in 2018, only one study investigated IPE with clinical nutrition students and other specialties.<sup>12</sup>

Given the value of IPE in healthcare specialties to optimize healthcare outcomes, as well as the importance of previous experience in shaping professional image toward teamwork, the purpose of this study was to assess the impact of IPE on pharmacy and clinical nutrition students' knowledge in food–drug interactions and readiness for interprofessional learning.

## Methodology

### Study Setting and Design

This was a pre-post study conducted at the female campus of King Saud University. Based on the curriculum of both disciplines, the food–drug interaction subject is introduced to fourth year students. Therefore, fourth-year students from the College of Pharmacy (n=65) and College of Applied Medical Sciences' Clinical Nutrition Department (n= 34) were invited using emails between February and March 2020. The email contained information about the study procedure, venue, date, and time. Students who did not attend the food–drug interaction session, their readiness and knowledge will not be assessed and considered excluded from the study.

### Procedure and Data Collection

One-day interprofessional workshop for pharmacy and clinical nutrition students was held in one classroom. After introducing the faculty members who would deliver the food–drug interactions session, the students undertook a seven-question quiz (total score = 7) to assess their knowledge about the basic concept of food–drug interactions before the session ([Appendix 1](#)). The quiz was designed by four teaching faculties from both colleges and underwent face and content validity. After that, a clinical pharmacy faculty member provided a 45-minute lecture. The lecture started with opening remarks, then the main content was provided to the students about the definition of food–drug interactions, types and consequences of such interaction with examples, and recommendation to minimize or resolve the consequences. Finally, a list of useful electronic resources was provided to the students to aid them in solving food–drug interaction clinical scenarios.

Then, groups of pharmacy and clinical nutrition students were formed, ensuring equal distribution from both disciplines. The groups worked on four different clinical scenarios (developed by faculty members from both disciplines) pertaining to food–drug interaction ([Appendix 2](#)). Questions were given to the students after each scenario. Problem based learning was implemented in which the students solve the questions for the scenarios using the provided electronic resources and eventually provide clinical notes, as they would in clinical practice. The session concluded with a short discussion between students and faculty members for further clarification.

After completing the four scenarios, the students retook the quiz to assess their knowledge after the workshop. In addition, we collected data such as disciplines, GPA and responses to the Readiness for Interprofessional Learning Scale (RIPLS)<sup>13</sup> in English language through an electronic Google form. RIPLS is used to assess students' attitudes toward IPE and concerning the roles and responsibilities of other healthcare professionals.

The RIPLS consists of 19 items assessing three domains: teamwork and collaboration (9 statements, score range 9–45), negative (3 statements, score range 3–15) and positive professional identity (5 statements, score range 5–25), and roles and responsibilities (2 statements, score range 2–10).<sup>13</sup> A 5-point Likert scale was used to assess agreement with each item (1 = strongly disagree to 5 = strongly agree)<sup>13</sup> in the teamwork and collaboration, positive professional identity, and roles and responsibilities domains. For negative professional identity, reverse scoring was adopted from McFadyen et al<sup>14</sup> (1 =

strongly agree to 5 = strongly disagree). Higher scores indicated a more positive attitude about interprofessional collaboration and learning, indicating students' readiness for IPE.<sup>13</sup>

## Ethical Considerations

All students were reassured that participation in the study was voluntary and students who do not participate were not affected. Electronic consents was obtained from the students prior to the participation of the study. Ethical approval was obtained from King Saud University and the Medical City Institutional Review Board (E-20-4650).

## Statistical Analysis

The normality test was performed for all main statistical outcomes, and all the normally distributed outcomes were expressed as mean  $\pm$  standard deviation (SD). We used an independent sample *t*-test to compare pharmacy and clinical nutrition students' scores. An alpha value of 0.05 was used for testing statistical significance. All data analysis was performed using SPSS Version 27.<sup>15</sup>

## Results

A total of 48 female students were included in this study, of which 25 (52.1%) were from pharmacy and 23 (47.9%) were from clinical nutrition college. The mean age (SD) was 22 (0.2) and 22 (0.21) years old for pharmacy and clinical nutrition students, respectively. The mean GPA (SD) of the participants was 4.71 (0.28) and 4.41 (0.36) out of 5 for pharmacy and clinical nutrition students, respectively. Previous experience with IPE was reported by 17 (68%) pharmacy students and by 8 (34.78%) clinical nutrition students.

We analyzed students' knowledge of food–drug interactions based on the data from all 48 students who took the quiz before and after the workshop (see Table 1). On the pre-workshop quiz, mean knowledge was statistically higher ( $< 0.001$ ) in pharmacy students compared to clinical nutrition students ( $M_{diff} = 1.46$ ). On the post-workshop quiz, the scores of students from both colleges increased, with no significant difference between groups ( $M_{diff} = 0.25$ ). Overall, students' mean scores in both colleges increased significantly after the workshop ( $p < 0.01$ ; see Table 2).

**Table 1** Impact of the Workshop on Students' Knowledge Scores

	Pre-Workshop Quiz Score (Score 0–7)		Post-Workshop Quiz Score (Score 0–7)	
	Mean	SD	Mean	SD
Pharmacy students	6.17	0.76	6.63	0.58
Clinical nutrition students	4.71	1.10	6.38	0.59
Mean difference	1.46		0.25	
P value <sup>a</sup>	< 0.001		0.168	

Note: <sup>a</sup>Using Independent *t*-test,  $p < 0.05$  regarded as statistically significant.

**Table 2** Students' Knowledge Scores by College

	Pre-Workshop Quiz Score (Score 0–7)		Post-Workshop quiz Score (Score 0–7)		Mean Difference	P value <sup>a</sup>
	Mean	SD	Mean	SD		
Pharmacy students	6.17	0.76	6.63	0.58	0.458	0.018
Clinical nutrition students	4.71	1.10	6.38	0.59	1.667	< 0.001

Note: <sup>a</sup>using paired *t* test,  $P < 0.05$  regarded as statistically significant.

**Table 3** Readiness for Interprofessional Learning Scale Scores by Professional Discipline

Subscales	Pharmacy Students		Clinical Nutrition Students		p values <sup>a</sup>
	Mean	SD	Mean	SD	
Teamwork and collaboration (score range 9–45)	41.12	3.42	42.57	2.79	0.118
Negative professional identity (score range 3–15)	11.24	3.67	10.04	4.47	0.314
Positive professional identity (score range 5–25)	22.36	2.33	23.35	1.85	0.110
Roles and responsibilities (score range 2–10)	5.88	2.20	5.30	1.69	0.318
Total RIPLS score (score range 19–95)	80.60	7.48	81.26	6.96	0.753

Note: <sup>a</sup>p < 0.05 regarded as statistically significant.

RIPLS analysis of total scores and individual domains are presented in Table 3. The mean RIPLS total scores (SD) for pharmacy students and clinical nutrition students were 80.6 (7.48) and 81.26 (6.96), respectively, out of a maximum possible score of 95. This indicated positive attitudes in both groups toward interprofessional learning, with no significant difference between the two groups.

In domain analysis, scores were particularly high for the domains of teamwork and collaboration and positive and negative professional identity. In the roles and responsibilities domain, the average scores (SD) were 5.88 (2.20) for pharmacy students and 5.30 (1.69) for clinical nutrition students, out of a total score range between 2 and 10. We observed no significant difference between the two groups at the domain level.

Our overall analysis revealed no significant differences in students' responses to the RIPLS. However, clinical nutrition students' scores were significantly higher in items related to the value of IPE in understanding clinical problems and maximizing patient benefit.

## Discussion

We conducted this pre-post study to assess the impact of IPE on pharmacy and clinical nutrition students' knowledge and readiness for interprofessional learning. Our results showed that students scored higher on food drug interaction assessment after the IPE session, and further revealed that the improvement in food drug interaction knowledge was significantly greater among pharmacy students compared to clinical nutrition students. We believe that the overall improvement in knowledge was due to the provided lecture and then the interactive discussion between the students from both disciplines and finally the overall discussion with the instructor.

When readiness was compared between pharmacy and clinical nutrition students, all three sub-scale's scores (teamwork and collaboration, professional identity, and roles and responsibilities) were high. This indicated that all students had a positive attitude regarding the importance of interprofessional learning.

Scores in the roles and responsibility domain were slightly lower in both groups. Interprofessional education can take the form of debates on a particular health issue, a grand roundtable discussion on a case in which interprofessional patient competencies are required, reflective sessions, case studies, research, community service, service learning, simulation-based activities or even a simple class or online discussion in which interprofessional expertise is required to facilitate comprehensive discussion of a particular concept.<sup>16</sup>

Wang et al<sup>17</sup> implemented profession-role exchange experiences among medicine, pharmacy and nursing students. Profession-role exchange is an innovative simulation-based experiential learning method in which healthcare students from many professions participate as characters in a role-playing game. Students play each other's roles in a setting comparable to a medical setting. This new positional experience could be beneficial, as students become more conscious and value the possible contributions of future members of a collaborative patient treatment team and objectively perceive

tasks from their colleagues' perspectives. Wang et al found that students who were engaged in profession-role exchange experiences had significantly higher scores in the roles and responsibilities subscale compared to control group students.

Despite the fact that students in our study and in similar studies<sup>18–21</sup> had high readiness for IPE, faculty members reported several barriers to implementing IPE. According to Bashatah et al,<sup>22</sup> IPE implementation is often hampered by a lack of technical assistance; time restrictions; a lack of administrative support and training; a lack of appreciation; and difficulties in forming collaborative partnerships, such as siloed curricula and calendars. In addition, faculty members have limited insight into each other's professions. Mladenovic et al discussed the importance of faculty members training for interprofessional education.<sup>23</sup> This training should brought faculty together in a nonhierarchical setting to learn about one other's professions and programs, as well as to establish new terminology for the shared content on patient safety that students are now expected to study. Professors evaluations of the training and co-facilitation are extremely good, with some faculty experiencing a "IPE revelation" when they meet new people and form new partnerships.<sup>23</sup> This suggests that putting IPE into practice necessitates close collaboration between faculty members from different schools and support from universities' higher authorities.

This feasibility study is important to identify barriers to implementing IPE before embarking on larger studies. Numerous issues related to IPE including coordination between the two groups, topic selection and writing clinical scenarios were revealed during this study.

## Limitations

There are several limitations to this study. For example, we had a small sample size; therefore, our statistical results need to be interpreted with caution. In addition, we could not assess male students' perceptions of these strategies due to practical issues associated with campus segregation.

## Conclusion

Pharmacy and clinical nutrition students' knowledge regarding food–drug interaction improved after implementing the IPE session. Students also reported higher scores for interprofessional learning. This indicates their willingness to participate in future interprofessional learning activities. Roles and responsibilities domain scores were slightly lower among both groups.

For future studies, faculty members training and simulation-based activities including profession role exchange can be added to traditional IPE sessions to improve interprofessional education.

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## Disclosure

The authors declare no conflicts of interest.

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