

EFFECTIVE INTERPROFESSIONAL TRAINING CAN BE IMPLEMENTED WITHOUT HIGH FINANCIAL EXPENSES – A PRE-POST STUDY SUPPORTED WITH COST ANALYSIS

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Abstract

Interprofessional collaboration in the clinical setting is beneficial, but its implementation may be impeded by many factors like conflicts or negative attitudes towards representatives of other professions. Interprofessional education is believed to be crucial to overcome them. However, its broader introduction can be limited by fear of its potential costs. The study aimed to evaluate the educational effectiveness of basic interprofessional education intervention and estimate its potential costs. The course was designed according to basic assumptions of interprofessional education to allow students to overcome existing stereotypes between physicians and pharmacists, increase mutual recognition of their qualifications and facilitate the possibility of their collaboration in further professional work. Data collection was conducted before and after the intervention with two questionnaires, previously described in the literature. Interprofessional classes positively influenced students' perception of pharmacist-physician collaboration and their readiness for participating in interprofessional initiatives in the future. Our results demonstrate that an effective interprofessional education intervention can be implemented without generating high financial costs.

Rezumat

Colaborarea interprofesională în practica clinică este benefică, dar implementarea ei poate fi împiedicată de mulți factori precum conflicte sau atitudini negative între reprezentanții diferitelor profesii. Educația interprofesională este privită ca o necesitate în depășirea acestor probleme. Cu toate acestea, introducerea educației interprofesionale pe o scară mai largă poate fi limitată de costurile asociate. Scopul acestui studiu a constat în evaluarea intervenției educației interprofesionale a estimării costurilor aferente. Cursul a fost conceput în conformitate cu ipotezele de bază ale educației interprofesionale pentru a permite studenților să depășească stereotipurile existente între medici și farmaciști, să sporească recunoașterea reciprocă a calificărilor și să faciliteze posibilitatea colaborării în activitatea profesională ulterioară. Colectarea datelor a fost efectuată înainte și după curs cu două chestionare, descrise anterior în literatură. Cursurile interprofesionale au influențat pozitiv percepția studenților asupra colaborării farmacist-medic și disponibilitatea acestora pentru a participa la inițiative interprofesionale viitoare. Rezultatele noastre demonstrează că introducerea educației interprofesionale poate fi implementată fără a genera costuri financiare ridicate.

Keywords: interprofessional education, medical and pharmacy students, interprofessional collaboration; stereotypes

Introduction

Implementation of educational solutions based on the concept of interprofessional education (IPE) is believed to be crucial for the training of health professionals ready to work together for effective satisfaction of the healthcare needs of the population [13]. El-Awaisi *et al.* [11] underlined that “*Integrating IPE into the healthcare curricula is a huge undertaking and should not be underestimated.*” Among many difficulties standing in the way of its implementation are inter alia, lack of adequately qualified academic teachers, and essential financial resources, which

combined may discourage the decision-makers from taking actions in that field [30].

Existing regulations still make physicians the main decision-makers regarding the choice of pharmacotherapy options with responsibility for the therapeutic process and the sole right to write prescriptions. Despite the efforts of many communities, the role of pharmacists in healthcare systems is still underappreciated [24]. Moreover, interactions between physicians and pharmacists are often limited to purely practical issues (*e.g.*, package size, drug prices) or formal aspects, including areas of potential conflict, like prescription errors [3, 20]. It is, therefore, difficult

for them to build a relation based on mutual trust and respect, essential for collaboration, especially while being exposed to negative professional stereotypes [9]. Noteworthy, their perception of collaboration rules (including the engagement of individual specialists in patient care) may vary already at the stage of pre-graduate education [8].

Sargeant *et al.* [27] indicated that attitudes favouring the formation of partner relations could be built by providing students with formal and informal opportunities for gaining knowledge about other health professionals and interacting with each other. Previously conducted studies not only identified lack of undergraduate preparation of future healthcare forces to build partner relations with members of other professions but also indicated this issue as an important obstacle in the implementation of interprofessional collaboration [8, 23].

Given that previous experiences, educational background and persistent stereotypes are the main factors determining the quality of relations [2], the first step to popularize interprofessional relations should be raising awareness of young adepts of different faculties about the qualifications and intellectual potential of members of other professions and teaching them rules of effective collaboration already at the stage of undergraduate education.

Therefore, this study aimed to design, conduct, and evaluate the educational effectiveness of an intervention focused on unifying students' attitudes and expectations towards the future collaboration of physicians and pharmacists. Another analysis was performed to investigate its costs, which constitute one of the major factors influencing the reality of the introduction of IPE interventions at other universities [15]. Although IPE seems to be a common educational strategy in many institutions around the world, there are still some universities or even countries in which it is rather a novelty. In this paper, we would like to describe how the implementation of basic IPE initiatives may be effective and not more expensive than regular classes.

Materials and Methods

The sample

The criterion of inclusion into the study group was the status of a 4th- or 5th-year pharmacy student or a 5th- or 6th-year medicine student. The reasons for narrowing the sample were the decisions of authorities of Poznan University of Medical Sciences (PUMS) granting permission for launching classes within individual faculties, and the necessity to precise the stage of studies on which given program contents should be realized. The curriculum of both medical and pharmacy students was divided into two years of pre-clinical education, followed by four years of clinical training in the case of medical students and

three years of practical education for pharmacy students. Given the topic of the intervention, it was planned for students of last years. Our previous research also confirmed students' highest readiness for IPE at later stages of their education [6].

Announcements about recruitment to the study were displayed on information boards of PUMS in paper form and within its internal informatics system.

Participation in classes was conditioned on compliance with the aforementioned entrance criteria and the order of registration via the university's informatics system - as it is in the case of regular electives organized at PUMS.

A total of 53 students participated in 3 editions of classes, including 20 medical students and 33 pharmacy students.

The intervention

For the purpose of this study, a 15-hour educational intervention was developed in the form of workshops. It aimed to overcome existing stereotypes on allegedly difficult relations between physicians and pharmacists, increase awareness and mutual recognition of their qualifications, as well as find common grounds on the possibility of establishing collaboration in further professional work.

Its concept was designed according to basic assumptions of IPE [29] defined by the Centre for the Advancement of Interprofessional Education (CAIPE) and was supposed to allow students to: "learn with one another" - Students of both faculties were invited to participate in each edition of classes. They were supposed to gain the same knowledge, skills, and social competences at the same place and time; "learn about one another" - The program of classes was formulated to provide students with knowledge on competencies of graduates of individual faculties and roles they may fulfil in a medical team; "learn from one another" - Didactic methods realized during the classes inclined students to get involved in the seminars individually. The reduction of passive didactic methods in favour of the active approach allowed them to exchange not only opinions but also their knowledge and experiences.

The design of interprofessional classes is a complicated task as it requires establishing learning outcomes relevant to at least two different programs [14]. A detailed curriculum of the intervention was presented in a local professional journal [7] in hopes that providing some "ready recipe" can facilitate the dissemination of IPE solutions in Poland. Its outline was also presented in Table I.

Initially, the study plan assumed realization of the classes in groups consisting of 12 students, but internal regulations of the University imposed the obligation to secure places for at least 20 students in each edition of the seminars. Despite more numerous groups than anticipated, the classes were conducted in accordance with earlier assumed didactic methods.

However, giving classes in smaller groups would probably allow for even stronger interaction between students.

Table I
Outline of the intervention

Module	The topic of the module	Education methods used
MODULE 1 - The image of healthcare workers in Poland.	Disusing and challenging existing stereotypes on physicians and pharmacists among the patients and representatives of both professions.	<ol style="list-style-type: none"> 1. Preparing posters presenting the way in which patients perceive physicians and pharmacists. 2. Making mind-maps on the desired image of both professions. 3. A discussion moderated by the teacher on chosen problems: What can cause such an image of a given profession? Are there, and if so, what are the similarities and differences in the way that physicians and pharmacists are perceived? Can the image of a professional be changed? If so, with which methods? 4. A discussion in pairs or small groups on the way the physicians and pharmacists they know perceive members of the other profession.
MODULE 2 - The curriculum and the knowledge and competencies of healthcare workers	Pharmaceutical and medical curricula. Competences of pharmacists and physicians. The significance of chosen qualifications in the professional practice, potential carrier paths of graduates of both faculties. Common problems among physicians and pharmacists - concurrence on the job market between pharmacists and pharmacy technicians, the financial responsibility of physicians for drug reimbursement, conscience clause.	<ol style="list-style-type: none"> 1. Making the poster with a list of competencies of members of the other profession - students were working in two groups divided according to their faculty. 2. Using the curriculum of the analyzed faculty to add lacking information to the poster. 3. Presentation of posters and discussion on the subject of the module.
MODULE 3 - Models of the physician-pharmacist collaboration in European Union countries and beyond.	Interprofessional collaboration between physicians and pharmacists - the current state in Poland and other countries, its benefits and difficulties. Interprofessional education.	<ol style="list-style-type: none"> 1. A literature review on the existing model of the collaboration between a physician and a pharmacist. 2. A discussion moderated by the teacher on the benefits and difficulties associated with existing solutions. 3. Developing an optimal model of the physician-pharmacist collaboration in Poland - students were working in pairs or small groups with at least one representative of each faculty in every group. 4. A discussion on the idea and assumptions of pharmaceutical care and the significance of IPE in postgraduate education.

Research tools

Two questionnaires were used in the study. The first of them (A-form) was designed at earlier stages of the research project [8] and used to collect data on the way respondents perceive collaboration between physicians and pharmacists and rules governing it. The second questionnaire (B-form) was developed basing on the professional literature [22]. It consisted of nineteen items accompanied by answers formed as a

five-point Likert scale and allowed to characterize students' readiness to undertake interprofessional learning. The internal consistency of the Polish version of the questionnaire was determined using Cronbach's alpha coefficient and was equal to 0.88.

Data collection and analysis

Classes were realized in three subsequent academic years: 2011/12, 2012/13, 2013/14. The study project assumed the collection of data in two-time points -

before and after the intervention. At the initial stages of implementation of IPE based solutions, their evaluation with pre-post testing is believed to be appropriate [1]. Due to the absence of some students on the last day of classes (when the evaluation was conducted) and the voluntary character of the study, data obtained from some respondents were incomplete, and some respondents completed only one of the forms - they were excluded from further analysis.

Respondents filled both forms in paper versions. Data obtained were compared and statistically analysed using Statistica 10.0 software.

Data analysis was initiated with an attempt to describe differences observed between consecutive editions of classes. Based on the results of statistical analysis, the answers of respondents in each edition were recognized as consistent and were further analysed together.

The analysis was performed with Pearson's Chi-square test and Wilcoxon signed-rank test, depending on the nature of the data. Results of tests were analysed at the level of statistical significance $\alpha = 0.05$.

Ethical considerations

The research proposal was designed to ensure its consistency with the Ethical Guidelines for Educational Research [5] and approved by the ethics review committee at Poznan University of Medical Sciences (decision no. 549/11). Prior participation in the study, respondents were informed about its essence, voluntary character, the possibility to resign at every stage, and

signed written consent forms. Data of respondents were immediately encoded to make their identification impossible for a third party.

Results and Discussion

Results obtained seem to confirm the hypothesis that students' participation in IPE classes influences their perception of collaboration between physicians and pharmacists and their roles in the pharmacotherapy process. Additionally, a correlation between participation in IPE electives and students' readiness for taking part in subsequent interprofessional initiatives was observed. Matching the questionnaires completed by respondents in pairs also allowed to highlight the scale of changes and supplement it with a detailed description of their directions, as presented below.

Evaluation of the influence of the intervention on students' perception of collaboration between physicians and pharmacists (results from A-form)

It was confirmed that participation in interprofessional classes influences the perception of roles played by both professionals in the pharmacotherapy process. The percentage of students whose opinions or attitudes were changed ranged between 20 and 74% (Table II). The choice of the most effective active substance for the treatment of a given disease was significantly more often entrusted to the sole decision of a physician (Table III).

Table II

Changes in opinions and attitudes of medical (MD) and pharmacy (PH) students participating in educational interventions

Students' opinions/attitudes towards... n = 35 [11 MD and 24 PH] students	Number of students whose opinions/attitudes were changed [n (%)]		
	MD	PH	Total
possibility to establish a clear division of responsibilities between both specialists	7 (63.63)	11 (45.83)	18 (51.43)
involvement of individual specialist during:			
choice of the active substance	3 (27.27)	10 (41.67)	13 (37.14)
choice of dosage regimen	2 (18.18)	13 (54.16)	15 (42.85)
choice of drug preparation	4 (36.36)	12 (50.00)	16 (45.71)
choice of drug formulation	6 (54.54)	12 (50.00)	18 (51.43)
choice of adjuvant therapy	5 (45.45)	12 (50.00)	17 (48.57)
monitoring of medication use	8 (72.72)	10 (41.67)	18 (51.43)
monitoring of adherence	9 (81.81)	17 (70.83)	26 (74.29)
monitoring of laboratory tests	2 (18.18)	5 (20.83)	7 (20.00)
obtaining information on concomitant diseases	6 (54.54)	10 (41.67)	16 (45.71)
obtaining information on concomitantly used medications	5 (45.45)	7 (29.16)	12 (34.29)
educating patients about drug administration	8 (72.72)	8 (33.33)	16 (45.71)
educating patients about dosage regimen	4 (36.36)	11 (45.83)	15 (42.85)
educating patients about use of self-diagnostic devices	9 (81.81)	7 (29.16)	16 (45.71)
undertaking collaboration initiatives by individual specialists	3 (27.27)	5 (20.83)	8 (22.86)
current collaboration between physicians and pharmacists	3 (27.27)	12 (50.00)	15 (42.85)
possibilities to establish a collaboration	4 (36.36)	3 (12.50)	7 (20.00)
need to establish a collaboration	4 (36.36)	3 (12.50)	7 (20.00)
willingness to establish a collaboration in future work	3 (27.27)	9 (37.50)	12 (34.29)
self-perceived preparedness to establish a collaboration	7 (63.63)	10 (41.67)	17 (48.57)

Table III

Comparison of students' attitudes (prior and after participation in seminars) towards involvement of a physician and a pharmacist in different stages of designing pharmacotherapy.

Stages of designing pharmacotherapy	PRE			POST			p-value
		[n (%)]		[n (%)]			
Choice of ... active substance	doctor	15 (42.86)		18 (51.43)		p = 0.0038	
	collaboration	14 (40.00)		12 (34.29)			
	pharmacist	6 (17.14)		5 (14.29)			
drug preparation	doctor	10 (28.57)		11 (31.43)		p = 0.0065	
	collaboration	11 (31.43)		7 (20.00)			
	pharmacist	14 (40.00)		17 (48.57)			
drug formulation	doctor	9 (25.71)		7 (20.00)		p = 0.0093	
	collaboration	12 (34.29)		12 (34.29)			
	pharmacist	14 (40.00)		16 (45.71)			
dosage regimen	doctor	19 (54.29)		17 (48.57)		ns	
	collaboration	9 (25.71)		11 (31.43)			
	pharmacist	7 (20.00)		7 (20.00)			
adjuvant therapy	doctor	7 (20.00)		4 (11.43)		p = 0.0275	
	collaboration	15 (42.86)		16 (45.71)			
	pharmacist	13 (37.14)		15 (42.86)			

'PRE' column – answers given before the IPE intervention, 'POST' column - answers given after the IPE intervention, ns – no differences of statistical significance

Students' participation in the classes also increased their acceptance of pharmacist's engagement in chosen activities during designing pharmacotherapy (choice of drug formulation, preparation, and adjuvant therapy) and monitoring of the way patients use medications (Table III, Table IV). An increase of positive attitudes towards collaboration was also

observed in the case of the pharmacotherapy monitoring process and education of patients. However, since these activities were already listed as areas of potential cooperation before the classes, the statistical analysis conducted did not show any statistical significance for described differences (Table IV, Table V).

Table IV

Comparison of students' attitudes (prior and after participation in seminars) towards involvement of a physician and a pharmacist in different stages of monitoring pharmacotherapy

Stages of monitoring pharmacotherapy	PRE			POST			p-value
		[n (%)]		[n (%)]			
Obtaining information and monitoring of... medication use	doctor	9 (25.71)		0 (0.00)		p = 0.0314	
	collaboration	16 (45.71)		21 (60.00)			
	pharmacist	10 (28.57)		14 (40.00)			
adherence	doctor	15 (42.86)		4 (11.43)		ns	
	collaboration	10 (28.57)		20 (57.14)			
	pharmacist	10 (28.57)		11 (31.43)			
concomitant diseases	doctor	18 (51.43)		12 (34.29)		ns	
	collaboration	17 (48.57)		23 (65.71)			
	pharmacist	0 (0.00)		0 (0.00)			
concomitantly used medications	doctor	8 (22.86)		2 (5.71)		ns	
	collaboration	25 (71.43)		30 (85.71)			
	pharmacist	2 (5.71)		3 (8.57)			
laboratory tests	doctor	30 (85.71)		30 (85.71)		p = 0.0330	
	collaboration	4 (11.43)		5 (14.29)			
	pharmacist	1 (2.86)		0 (0.00)			

'PRE' column – answers given before the IPE intervention, 'POST' column - answers given after the IPE intervention, ns – no differences of statistical significance

Table V

Comparison of students' attitudes (prior and after participation in seminars) towards involvement of a physician and a pharmacist in different stages of patient education

Stages of patient education		PRE [n (%)]	POST [n (%)]	p-value
Education about: drug administration	doctor	4 (11.43)	1 (2.86)	ns
	collaboration	18 (51.43)	22 (62.86)	
	pharmacist	13 (37.14)	12 (34.29)	
dosage regimen	doctor	4 (11.43)	1 (2.86)	ns
	collaboration	22 (62.86)	24 (68.57)	
	pharmacist	9 (25.71)	10 (28.57)	
use of self-diagnostic devices	doctor	7 (20.00)	2 (5.71)	ns
	collaboration	17 (48.57)	17 (48.57)	
	pharmacist	11 (31.43)	16 (45.71)	

'PRE' column – answers given before the IPE intervention, 'POST' column - answers given after the IPE intervention, ns – no differences of statistical significance

Students were also asked to estimate whether they wish to establish interprofessional collaboration in the future. Although the number of students favourable towards it did not change ($n_{4+5} = 35$; 100%), there was a significant increase in the intensity of their

belief (before classes: $n_4 = 14$, $n_5 = 21$; after classes: $n_4 = 7$, $n_5 = 28$). Another effect of participation in the course was a statistically significant increase in students' self-esteem of their preparedness for collaboration (Table VI).

Table VI

Evaluation of self-perceived preparedness to establish an interprofessional relation

		PRE [n (%)]	POST [n (%)]	p-value
Do you feel prepared content-wise for collaboration between a pharmacist and a physician?	yes			10 (28.57)
	no opinion	10 (28.57)	21 (60.00)	p = 0.0003
	no	15 (42.86)	11 (31.43)	

'PRE' column – answers given before intervention, 'POST' column - answers given after intervention

Evaluation of student readiness for further interprofessional learning (results from B-form)

Results obtained show that taking part in the intervention contributes to a significant increase in students' positive attitudes towards collaboration and teamwork (TC)

as well as readiness for undertaking interprofessional learning (RIPLS) (Table VII). What is more, participating in the classes significantly increased students' positive professional identity (PPI) and simultaneously decreased their negative professional identity (NPI) (Table VII).

Table VII

Comparison of mean RIPLS results of IPE intervention participants in respective subscales

	TC	NPI	PPI	RR	RIPLS
PRE	36.11 ± 3.38	7.28 ± 2.07	15.79 ± 1.87	9.24 ± 1.48	71.87 ± 6.97
POST	38.94 ± 4.27	6.36 ± 1.72	17.37 ± 1.98	9.08 ± 1.55	77.04 ± 7.11
p-value	p < 0.0001	p = 0.0008	p < 0.0001	ns	p < 0.0001

TC - Teamwork and collaboration, NPI - Negative professional identity, PPI - Positive professional identity, RR - Roles and responsibilities, RIPLS - Readiness for Interprofessional Learning Scale factor, ns – no differences of statistical significance

Analysis of intervention costs

The aim of this analysis was to list costs incurred by PUMS as a result of providing a 15-hour seminar course. Different types of costs were estimated using the ingredients method [21] and are presented in Table VIII, along with approximate values provided by PUMS administrative staff. The total estimated cost per student was 104 - 270 PLN (24 - 47 Euros). It can be observed that aforementioned costs seem to be the same whether regular or interprofessional classes are held, especially at PUMS where salaries of academic teachers, administrators, and other

employees (cleaning and security staff) are regulated by internal legislation of competent authorities and are preconditioned only on job position and type of course (full-time, part-time and English Division). Vast opportunities and benefits that interprofessional collaboration provides can be missed if healthcare professionals are not ready or willing to participate in it. As shown by San Martín-Rodríguez *et al.* [26], the collaboration process should be built voluntarily, and the readiness of specialists should be confirmed prior to its formalization. On the other hand, persisting conflicts, misunderstandings, and negative attitudes

can seriously impede the collaboration between representatives of different professions. Interprofessional education is viewed as a way to overcome the

aforementioned difficulties and raise acceptance and quality of collaboration [16].

Table VIII

Approximate ingredients costs of 15-hour seminar course for about 20 students.

Ingredients	Cost per 1 edition of the course	
	PLN	EUR ¹
Personnel		
teachers' salary 49-98 PLN/h ²	735 - 1470	168 - 337
university administration maintenance staff	100	23
Facilities		
classroom 50-200 PLN/h ³	750 - 3000	172 - 688
Equipment and materials		
stationery and flipchart	112	26
Other inputs		
electricity heating Internet	150	34
amortization costs taxes	243 - 558	53 - 128
TOTAL	2090 - 5390	479 - 1236

11 PLN = 4.3619 EUR (exchange rate on 8.11.2011 – initial date of 1st edition), 2 dependent on the job position of the teacher, 3 dependent on the standard of the classroom

It can also help participants to develop coping strategies for potential conflicts that arise during the collaboration between different specialists and occupational stress associated with it [16]. What is more, the lack of IPE was listed by medical and pharmacy students in Kuwait as one of the main barriers hindering the collaboration process [17]. Results of our study seem to confirm that inter-professional interventions influence students' perception and readiness for working together with other specialists. For instance, we observed a significant increase in the number of students feeling prepared for establishing interprofessional relations after the workshops (from 28.59% to 60.01%, $p < 0.001$) (Table VI). Moreover, conducted intervention contributed to a significant increase in students' readiness for participation in future IPE initiatives (RIPLS), and a similar observation was also made by Lie *et al.* [19] in their study of medical and pharmacy students, among others. Statistically significant changes were also found in terms of subscales of RIPLS - increased results in TC and PPI as well as decreased results in NPI subscales. Only the 'Roles and responsibilities' subscale was not influenced, which can be explained by the lack of a clearly defined model of collaboration within the Polish healthcare system. This is mirrored by results of Dabaghzadeh *et al.* [10], who also noted statistically significant changes in students' scores of RIPLS and "Teamwork and collaboration" and "Professional identity" subscales, but not in the scores of "Roles and responsibility" subscale, prior and after participation in the IPE course. Interestingly, analysis of their data broken down by faculties showed that changes in scores of medical students were statistically significant

in all subscales (including "Roles and responsibility"), while changes in pharmacy students' attitudes were not statistically significant neither in the RIPLS scale nor any of aforementioned subscales. In their opinion, it could be caused by their course not being adequately adjusted to pharmacy students' educational needs. Therefore, it is always extremely important to carefully plan such initiatives, something that will be discussed in detail below.

Another interesting aspect that should be mentioned at this point is the noticeable disproportion in data obtained before the intervention between high rates of students willing to undertake interprofessional collaboration in the future and those who declare they feel prepared for it (discussed in the previous paragraph). This may lead to the conclusion that future representatives of both professions generally have positive attitudes towards working together, but lack of adequate preparation could have an inhibitory effect on the process.

Participation in the interprofessional classes also changed student's perceptions of roles that should be assigned to individual specialists, and this applies especially to the increase of their awareness and acceptance of the pharmacist's role. Similar experiences were reported by Rotz and Dueñas [25], with students' opinions shifting from pharmacists being 'just pill counters' to a deeper appreciation of their clinical roles after participation in interprofessional practice experience. Moreover, in our study, we tried to thoroughly analyse Polish students' attitudes towards the involvement of both specialists in different aspects of patient care and potential changes in them, resulting from IPE classes. In regards to pharmacotherapy design,

students' participation in the classes increased their acceptance of pharmacist's engagement in almost all proposed activities. When it comes to pharmacotherapy monitoring, we also found that the intervention increased students' acceptance of pharmacist's involvement. However, these were not always statistically significant. Finally, it should be kept in mind that "bringing faculty members from different health care programs into the same classrooms would not necessarily lead to a successful IPE activity" [12], and many different aspects have to be taken into account when introducing it. The syllabus of any proposed intervention should be carefully planned to fit into already extensive curricula of medical and pharmacy faculties, an honest evaluation of potential pros and cons has to be performed, and the specificity of each country should be taken into deep consideration [18, 28]. It is also extremely important to precise roles that individual specialists should play in an interprofessional team [4], and the specificity of the local healthcare system should also be acknowledged. It should be therefore emphasized that it is not possible to randomly use already existing interventions [18]. Costs of inter-professional classes and local conditions that influence them should always be taken into account when such educational interventions are planned [15, 18, 28]. In the presented study, the authors followed the ingredients method [21] to estimate the costs of the intervention and discussed whether they are any different from regular classes. Costs collated in Table VIII are mainly related to the teacher's job position and educational method used. For instance, the use of simulation methods would be more expensive due to increased costs of personnel, classroom, and equipment. In the presented intervention, educational methods mainly involved discussion and working in pairs or small groups using stationery. It seems, therefore, that the costs of the presented intervention seem to be comparable with the costs of regular seminar classes held at PUMS. Thus, contrary to some popular beliefs, IPE initiatives, especially the first steps to its implementation, do not necessarily have to be expensive. However, the situation may differ among different countries and institutions as academic teachers' salaries may vary depending on the given institution's policies. In the case of PUMS, salaries are related only to the teacher's job position and type of program. However, other universities may differentiate them based on other factors, including whether classes involve students from different faculties.

Limitations

We acknowledge that our study had some limitations. First of all, students in our study presented positive attitudes, which could be at least partially a result of selection bias as students who voluntarily decided to participate in elective classes could be more interested in the topic and more open towards interprofessional collaboration. Secondly, we only examined medical

and pharmacy students in this study as it would be much more difficult logistically to organize joined classes for representatives of more than two faculties. Moreover, our results were presented from the perspective of the University with both medical and pharmacy departments. As a result, they might not be applicable to institutions offering only medical or pharmacy departments, in which case, the costs of the intervention could be higher. We believe that it is worth exploring in further studies. Other big limitations are the small number of students and the unbalanced ratio of MD and PH students.

Furthermore, it is possible that students surveyed answered the questions in order to meet the expectations of the teacher. Therefore, it would seem reasonable to collect more data in the next time points, as suggested by Anderson [1]. Finally, monitoring IPE outcomes is also essential to assess the effectiveness of implemented interventions [14], and it seems valuable to follow the careers of graduates participating in IPE classes.

Conclusions

The introduction of first/basic IPE interventions dedicated to shaping favourability towards IPC does not have to be more expensive than regular seminars. Implementation of basic IPE solutions may reinforce readiness for collaboration in students already favourable towards it. Participation in interprofessional classes can modify students' perception of physician-pharmacist collaboration, including rules governing it and roles each specialist should play in the process of patient care. Students' participation in IPE initiatives raises their readiness for undertaking similar educational activities in the future.

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Conflict of interest

The authors declare no conflict of interest.

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