

Interprofessional education in pharmacogenomics: perspective of pharmacy and nursing students

Dyah Aryani Perwitasari¹, Faridah Baroroh^{1*}, Haafizah Dania¹, Imaniar Noor Faridah¹, Ana Hidayati¹, Deasti Nurmaguphita², Prastiwi Puji Rahayu²

¹Faculty of Pharmacy, University of Ahmad dahlan, Yogyakarta, Indonesia. ²Department of Psychiatric Nursing, University of Aisyiyah, Yogyakarta, Indonesia.

Correspondence: Faridah Baroroh, Faculty of Pharmacy, University of Ahmad dahlan, Yogyakarta, Indonesia. faridah@pharm.uad.ac.id

ABSTRACT

Pharmacogenomics is a course that must be applied in an interprofessional setting. It needs the pharmacist to translate the laboratory results into personalized medicine and other health professionals in disease diagnosis and health care. Our study objective was to explore pharmacy and nursing students' perception of Interprofessional Education (IPE) and to define the improvement of perception after the IPE activities. We recruited 3-year students from pharmacy and nursing undergraduate study programs in two institutions, located in Yogyakarta, Indonesia, for the cross-sectional study. We provided the Perception of IPE and self-reflection questionnaire, before and after the IPE activities. We conducted this study in June-July 2018. We defined the auto- and hetero- stereotypes perception from the questionnaire. We recruited 205 total students. Only 4.87% of pharmacy students and 16.15% of nursing students have not well understood IPE. There is a significant improvement in perception after IPE can be seen in domain 1 of autostereotypes (p-value < 0.01), domain 2, and domain 3 of heterestereotypes (p-value < 0.05) in pharmacy students. The significant improvement of nursing students after the IPE can be seen in domain 3 of autostereotypes and domain 4 of heterostereotypes (p-value < 0.05). The pharmacy students have more self-confidence after the IPE activities in the Pharmacogenomic course and they understand that other health professionals also have significant responsibilities in the pharmacogenomic area. The nursing students have more respect for other professions and realize their role in collaborative work.

Keywords: Interprofessional, Pharmacogenomic, Personalized, Pharmacy, Nursing

Introduction

Pharmacogenetic or Pharmacogenomic or Personalized Medicine is a major which still being progressed in Indonesia. Pharmacogenomic is a study that defines the correlation between inherited genetic differences and drug response. In the concept of precision medicine, the pharmacogenomic results will be supported by other patients' information to make clinical decisions [1]. There is a report that the proportion of schools of

pharmacy which has pharmacogenetics in their curriculum reached 89% in 2010, over the world [2]. Until 2019, there is 87% of 248 schools of health professional study programs over the world implemented Pharmacogenomic in their curriculum, mostly attached to the pharmacology area. This study also suggested the 4h minimum teaching of Pharmacogenetics in health professional study programs [3].

In most of the universities in Indonesia, especially in the school of pharmacy, the learning method used to teach pharmacogenetics is the single-lecture didactic method, blended with discussion and case study. However, the implication of pharmacogenetics in clinical practice is not based on the pharmacist's decision only, the collaboration among some health professionals, such as pharmacists, nurses, and physicians is needed in patient-centered care [4]. Personalized medicine is a multidisciplinary area. This area uses the genotype results to optimize drug effectiveness and minimize harm [5]. Pharmacogenomic based on this situation, we need to arrange the

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Interprofessional Education (IPE) started from the undergraduate program in the multidiscipline area.

A systematic review of the pharmacy perspectives on IPE found that pharmacy students had a positive attitude about IPE and collaborative practice [6, 7]. Even though there was a negative professional stereotype of the IPE, however, some interventions can change into favorable ones [8]. Professional stereotypes must be explored because they can affect the student's attitude toward IPE [9]. Some factors can influence the results of IPE, such as age for the maturity factors and perceived power imbalance among the profession [10]. As mentioned before, pharmacogenomic testing must be embedded in the clinical decision system. Nurses have important roles in discharging planning and care by providing some information to the patients, which is related to the patient's transfer to other hospital settings or from inpatient to the outpatient setting. Thus, nursing students also had a good ability in communicating the pharmacogenomic test results [11]. Our study objective was to explore pharmacy and nursing students' perceptions of IPE and to define the improvement of perception after IPE activities.

Materials and Methods

Study design

We conducted a cross-sectional study in June-July 2018. We delivered the questionnaire to the 3-year pharmacy students as the first group and the 3-year nursing students as the second group.

Material and subject

We recruited 3-year students from pharmacy and nursing undergraduate study programs in two institutions, located in Yogyakarta, Indonesia. We adopted this questionnaire from the previous study [12] and this questionnaire is already implied in the previous study in Indonesia and the Philippines [13]. The questionnaire has two parts, the first part contained open-ended questions and the second part contained a closed-ended questionnaire. All parts are already validated based on the previous study in Indonesia, The open-ended questions cover five questions about the definition of IPE, the activities type of IPE, the benefit of IPE, and the barriers of IPE. The closed-ended questions cover questions related to domains; supported environment, the relevance of IPE topic, lecturer guidance, facilities, time for reflection, professional ability, interprofessional ability, knowledge and competence, knowledge about the role in the community, knowledge about the importance of communication for good quality and save services and collaboration with other health professionals [13]. The questionnaire was given before and after the IPE activities. There are some open-ended questions in the questionnaire, that explored their understanding of IPE, what they will get from IPE, what other professions et after IPE, and their ability to complete the IPE activities. The closed-ended questions were divided into autostereotypes and heterostereotypes based on the definitions

from the previous study. The autostereotype and heterostereotype define what the students perceive about their profession and of other professions, respectively [8, 9], and are defined into 4 domains as core competencies of IPE, such as values and ethics for inter-professional practice; roles and responsibilities for collaborative practice; inter-professional communication practices; and inter-professional teamwork and team-based practice [4].

Technical information

The pharmacy and nursing students were grouped into small subgroups with 5 members, in each study program to participate in IPE activities, which were designed by the teacher. The IPE activities were: 1. General lecture about IPE; 2. Problem-based learning between pharmacy and nursing groups. The case was given by the teacher on the topic of psychiatric disorders; 3. Report of the problem solution. The cases were about psychiatric patients who were hospitalized and had particular phenotypes, which were related to the adverse drug reaction of the psychiatric drugs. The students have to finish this case in 100 minutes. The lecturers were trained as a facilitator in the PBL before the PBL started.

Data analysis

We conducted the quantitative study design, with some statistical tests. Some data were analyzed descriptively to find out the student's characteristics and the proportion of the excellent score in the questionnaire domains. We provide an excellent score (8-10 on a 1-10 scale). Then, the independent sample-T test was used to analyze the different perspectives of pharmacy and nursing students. The Paired -T-test was used to find out the different perspectives before and after IPE. We used a confidence interval of 95% in the statistical analysis.

Results and Discussion

Our study recruited 12.85% male students and 88.16% female students from 205 total students. The age mean was 20.03 ± 0.93 . The number of pharmacy students was 34.28% and nursing students was 66.72%.

Before the IPE activity, we provided the questionnaires about the students' understanding of IPE. Only 4.87% of pharmacy students and 16.15% of nursing students have not understood yet about IPE. With the high proportion of students who understand IPE, only 9.23% of pharmacy students and 2.30% of nursing students did not believe that they can finish their IPE activities properly.

From the open-ended questions, the students had a positive perception of what other professional study programs will get from IPE activities such as new knowledge and different perspective of knowledge. They also had positive perceptions of the lecturer, which were: recognizing the students' ability, improving their innovation for learning methods, and having other knowledge perspectives.

Before the IPE activities, the students were concerned about their lack of knowledge, different perspective of knowledge, different opinion, miscommunication, lack of self-confidence, and unsmooth discussion. They also stated that their counterpart will be concerned about similar things both in students and lecturer side from the open-ended questions in the questionnaire.

After the IPE activities, 57.33% of pharmacy students and 51.33% of nursing students rated excellent scores on the IPE activities they have already done. The students stated that IPE was useful for them, especially in the area of: getting new knowledge, opening the discussion, teamworking, and increasing trust and communication. Their suggestions for the lecturers were innovating the learning method and understanding the student's abilities. The students stated that lack of knowledge, a different perspective, different opinions, miscommunication, lack of self-confidence, and unsmooth discussion can limit their IPE activities. Thus, they suggest some preparations, such as communication practice, teamwork learning, respect, limiting

members, more frequent IPE, and increasing the knowledge before the IPE activities.

Figure 1 shows the self-reflection score results of both study programs students from the closed-ended questions. Almost over all domains, the excellent scores were stated by nursing students, except for their knowledge about their role in the community before and after IPE (negative autostereotype). The proportion of students who rated the excellent score was in the domains of the relevance of the IPE topic for the future and their knowledge about the importance of communication in the good quality and safe services after IPE (positive autostereotype). The increasing number importance of communication was seen from before to after IPE activities, which means that after the IPE, students realize that they need good communication skills to do the IPE in the services area. All domains which compare the excellent scores before and after IPE show an increased proportion of excellent scores. The domains contain knowledge and competence, professional knowledge, knowledge about their roles in the community, the importance of communication, and collaboration with other professions.

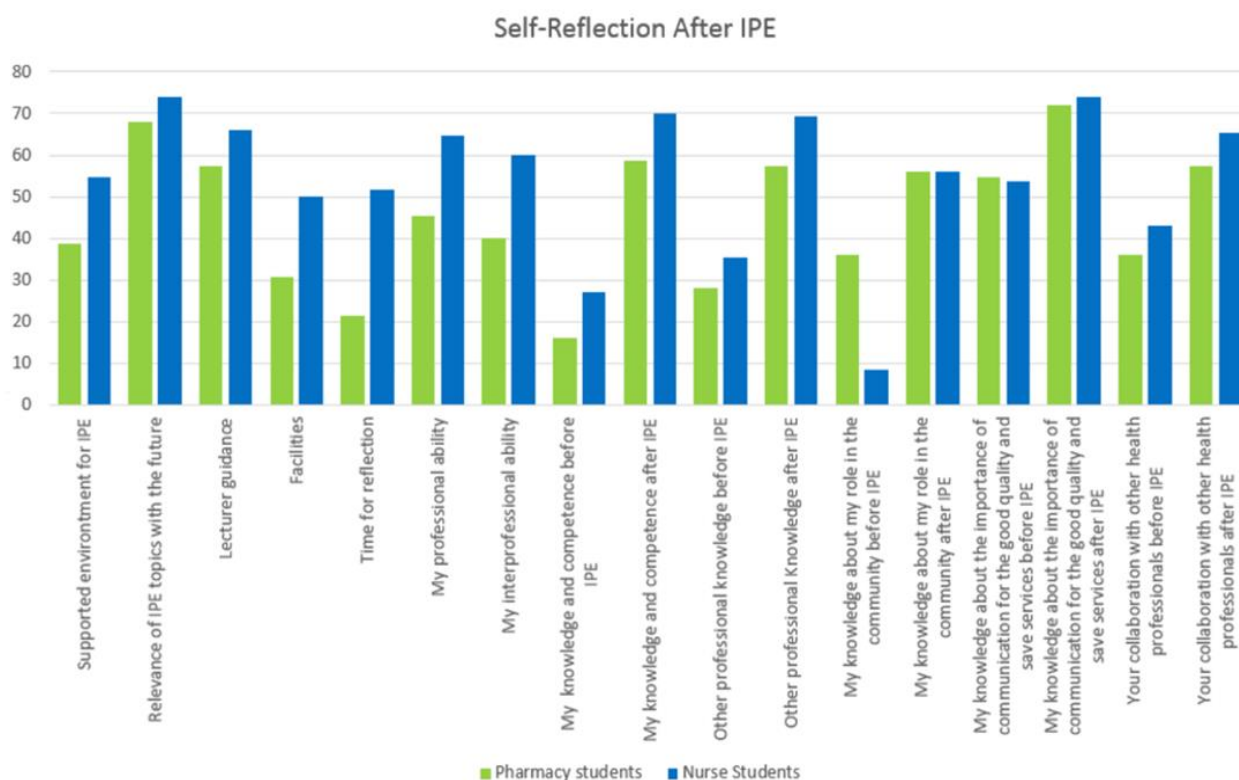


Figure 1. Proportion of Pharmacy and Nursing students who provided the excellent score for the self-reflection after IPE activities

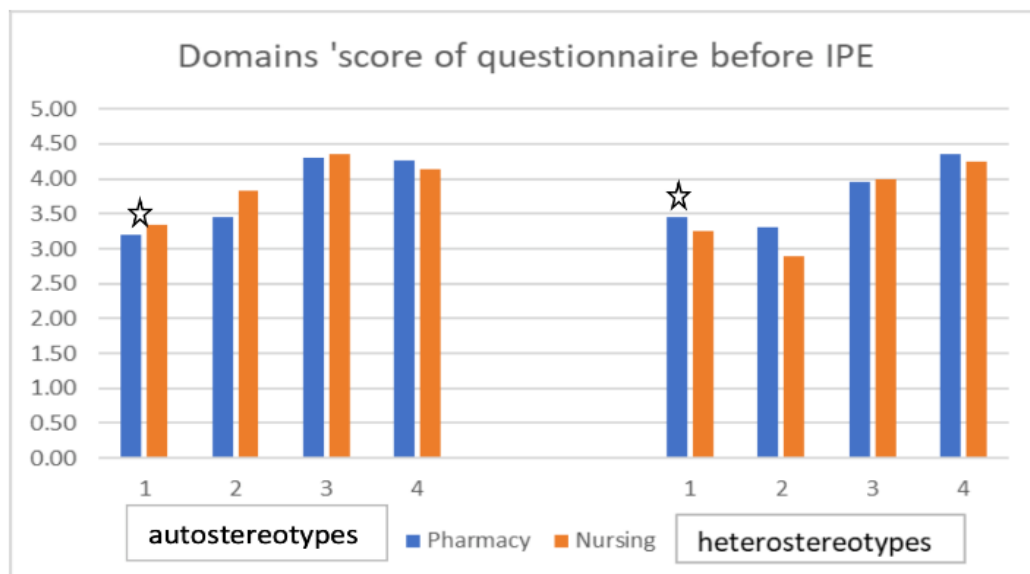


Figure 2. Domains' score of the questionnaire before IPE

1: values and ethics for inter-professional practice; 2: roles and responsibilities for collaborative practice; 3: inter-professional communication practices; 4: inter-professional teamwork and team-based practice; ☆: significant difference

Figure 2 shows the domain's score of pharmacy and nursing students in the baseline condition. In the autostereotypes perception, nursing students have higher scores in domains 1, 2 and 3. However, in the heterostereotypes perception, pharmacy students have higher scores in domains numbers 1, 2, and 4. This description shows that pharmacy students have more respect for

other health professionals. Moreover, nursing students have a more positive perception of their profession. There are no significant differences in perception between the pharmacy and nursing students in the baseline, except for domain 1 of autostereotypes and domain 1 of heterostereotypes (p-value <0.001, p-value <0.05, respectively).

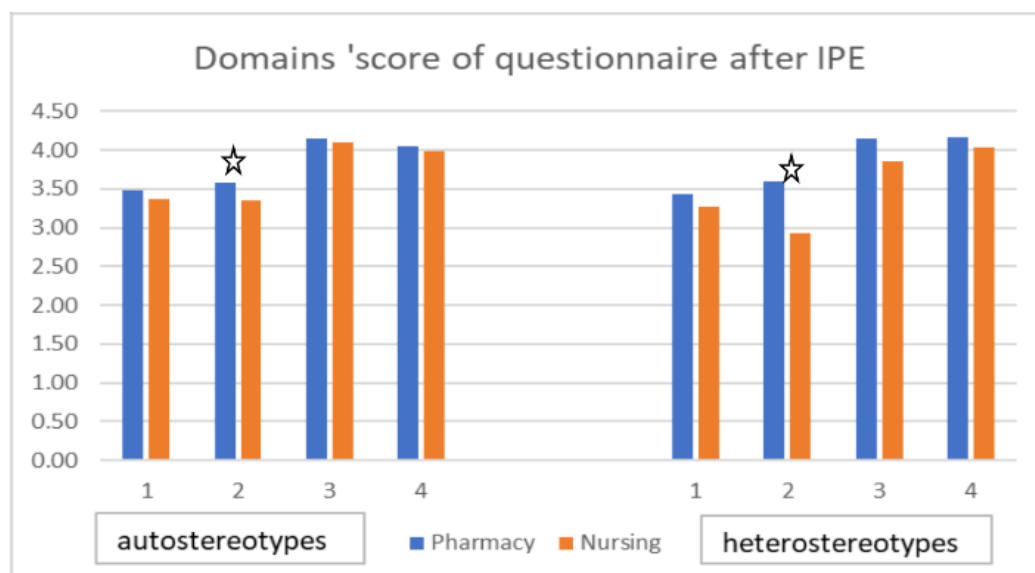


Figure 3. Domains' score of the questionnaire after IPE

1: values and ethics for inter-professional practice; 2: roles and responsibilities for collaborative practice; 3: inter-professional communication practices; 4: inter-professional teamwork and team-based practice; ☆: significant difference

Figure 3 shows the domains' scores of pharmacy and nursing students after the IPE. In the autostereotypes and heterostereotypes perception, pharmacy students have higher scores in all domains. This description shows that pharmacy students have a more positive perception of their profession and

other professions. There are no significant differences in perception between the students of the two study programs, except for domain 2 autostereotypes and domain 2 of heterostereotypes (p-value <0.05).

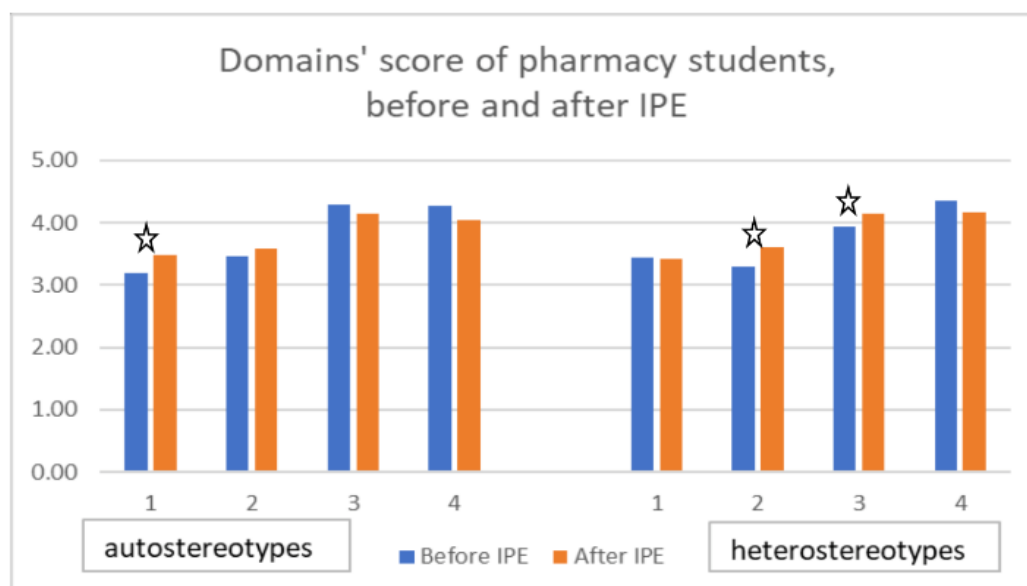


Figure 4. Domains' the score of pharmacy students, before and after IPE

1: values and ethics for inter-professional practice; 2: roles and responsibilities for collaborative practice; 3: inter-professional communication practices; 4: inter-professional teamwork and team-based practice; ☆: significant difference

Figure 4 shows the differences in domains' scores before and after IPE in pharmacy students. There significant improvement in perception after IPE can be seen in domain 1 of autostereotypes (p -value < 0.01), domain 2, and domain 3 of heterestereotypes (p -value < 0.05). However, seeing from the score, in the autostereotypes, pharmacy students have better improvement in value -ethic and role-responsibility domains for

interprofessional and collaborative works. It means that their self-confidence is getting increases after the IPE activities. In the heterostereotypes perception, they give more respect to nursing students in the domains of role-responsibilities and interprofessional communication. It means that the pharmacy students understand that other health professionals also have significant responsibilities in the pharmacogenomic area.

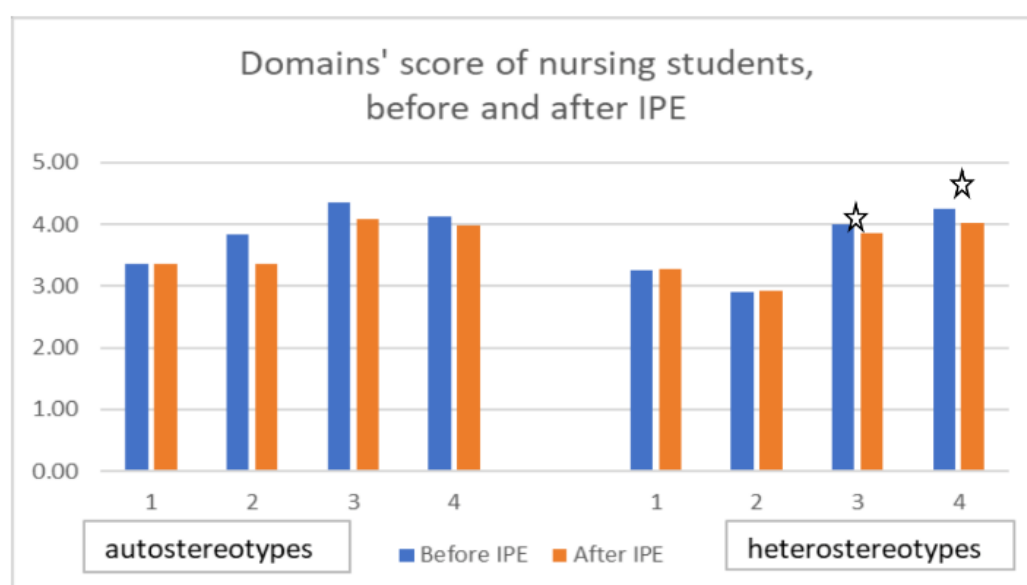


Figure 5. Domains' the score of nursing students, before and after IPE

1: values and ethics for inter-professional practice; 2: roles and responsibilities for collaborative practice; 3: inter-professional communication practices; 4: inter-professional teamwork and team-based practice; ☆: significant difference

Figure 5 shows the differences in domains' scores before and after IPE in nursing students. The significant improvement after the IPE can be seen in domain 3 of autostereotypes and domain 4 of heterostereotypes (p -value < 0.05). In the autostereotypes,

there is no score change in the four domains. In the heterostereotypes perception, the improvement is shown only in value-ethic domains. This situation shows that nursing students

have more respect for other professions from the perspective of values and ethics.

In general, our study presents the positive results of the IPE activities in the personalized medicine topic for students in a health study program. This study also confirms the existence of professional stereotypes in the area of pharmacy and nursing. This finding was supported by the previous study on pharmacy and nursing students as well [8].

After the IPE activities, students got more realize that they have to work together with other health professionals to give good quality health care. Students also realize that they have to enrich themselves with more knowledge before they work with other health professionals. Our findings are also supported by the previous study, which presented that the implementation of pharmacogenetics will be successful with the multidisciplinary approach [5]. Thus, future studies must minimize the gap between education and clinical practice by adopting the implementation at the education level.

We collaborated with Nursing Study Program because, at that particular time, the students in both study programs were in a similar semester which offer clinical practice and included pharmacogenetics as one of the topics. The students in both study programs have enough knowledge about interprofessional education before they start the IPE activities, thus they have enough self-confidence in completing the pharmacogenetic case with other health professionals.

The students rated their competencies for conducting the IPE activities are high, however, after the IPE activities, they reflect to increase some competencies, like professional knowledge, knowledge about their roles in the community, the importance of communication, and collaboration with other professions. This situation is appropriate with the core competencies of the IPE model; values and ethics for inter-professional practice; roles and responsibilities for collaborative practice; inter-professional communication practices; and inter-professional teamwork and team-based practice [4].

In the value of respect, the students in both study programs were still thinking that they cannot do their job by themselves without collaborating with other health professionals. Furthermore, they also thought higher than other health professionals in some domains. The previous study also confirmed these stereotypes about pharmacy and nursing students [8]. Based on the open-ended questions, our study also presents that IPE activities can change the baseline professional stereotype to be more positive, which is supported by a previous study [14]. The students' stereotypes may affect their communication during IPE, thus to minimize the negative professional stereotype, better if the IPE activities can be introduced in the early year of education [15].

We explore the student's auto- and hetero-stereotypes based on the closed-ended questions. On the baseline, the students in both study programs have different perceptions of value and ethics in collaborative work in the autostereotypes and heterostereotypes. The nursing students rated high for their values and ethics, and the pharmacy students rated high for other professional values and ethics in collaborative work. So, we confirmed the stereotypes in this study. The heterostereotypes are their

perception of other health professionals and the autostereotypes are their perception of their profession [9]. This situation could be due to the education culture in each institution. Problem-based learning was recognized earlier in the school of pharmacy when the students already realize the role and responsibilities of other professions [16]. However, pharmacogenomics is not explicitly recognized in the nursing curriculum, thus, the nursing students did not understand the major. They only understand that the outcome of pharmacogenetics is about giving the appropriate treatment to the patients. Thus, they may think that the implications of pharmacogenetics are about caring the patients during hospitalization. Our study results were supported by the previous study, in which nursing students rated high for their profession [9]. Other health professionals hoped that pharmacist know wore about the medicines and have good communication technique skills in order to communicate with other health professionals, including health promotion [17, 18]. By impelementing the IPE, at the end it will promote interprofessional teamwork, enhance the quality of patient care, and improve health outcomes as the positive impact [19, 20].

After the IPE activities, the pharmacy students show good improvement. There is no significant difference anymore about value and ethics both in autostereotypes and heterostereotypes. This situation could be due to the pharmacy students having more self-confidence, and the nursing students having more respect for other professions. However, the pharmacy students rated high for the role and responsibilities of their profession and other professions, meaning that the pharmacy students realize their own and other professional roles in the IPE. Furthermore, nursing students have to increase their self-confidence in the collaborative work of Pharmacogenomic. This situation could be due to the short period of the IPE activities, then the communication and sharing of information among the students is a limiter. The previous study supported that effective communication, sharing of information, mutual respect, and trust during IPE activities result in better improvement of the stereotypes [21]. Pharmacogenomic is new subject in pharmaceutical research that must be introduced since earlier year in the pharmacy education. By providing more knowledge, skills and attitudes related to the future subject, can make the graduates more competitive in the future era [22].

Our study has a limitation, due to the IPE was implicated in the pharmacy and nursing study program, thus the results cannot be generalized. We also applied the IPE activities in a short period, which could affect the IPE core competencies such as communication, respect, and trust. Furthermore, we cannot evaluate the collaboration activities after this session. However, the response rate for the questionnaire is very good, which is 93%. We also develop the cases from the clinical practice, so that the students can translate the case into daily practice in the future. To date of our knowledge, this study is the first time conducted in Indonesia, especially in the Pharmacogenetic or personalized medicine area. Future studies are important to involve other health study programs in the IPE activities. We realize that pharmacists and nurses must have good collaboration during providing health services to patients.

Conclusion

Our study concludes that IPE activities in Pharmacogenomic courses can change students' perception of IPE. The negative auto and hetero-stereotypes in the baseline situation change into positive perceptions. One of the barriers to IPE implementation is time management, which could affect communication, mutual respect, and trust among the participants.

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Conflict of interest: None

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Ethics statement: We proceed the informed consent to the students for participating in this study.

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