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Impact of Advanced Pharmacy Practice Experiential Student-Led Seminars on Competencies of Retail Pharmacy Students Enrolled in Introductory Pharmacy Practice Experience

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Abstract

Objectives: To evaluate the impact of Advanced Pharmacy Practice fourth-year student-led seminars (APPE) by comparing first-year students' knowledge, self-confidence, and competence before and after completing Introductory Community Pharmacy Practice Experience (IPPE) program.

Design: Pre-posttest, quasi-experimental design. The program included classroom seminars and hands-on learning sessions in three general topics including blood pressure, asthma and respiratory health, and women's health. Pre-post test instruments measured students' knowledge, confidence, and competence. Besides self-assessment of competency provided by first-year students, post intervention assessment was performed by fourth-year students; performing correlation was done between the first- and fourth-year students' competency assessment.

Assessment: Students' knowledge, confidence, competency in three topics including overall mean score significantly improved after completing the program ($p<0.001$). Correlation of self-rated and peer-rated competence assessed by first- and fourth-year students instructors was also highly significant ($r=0.72$, $p<0.001$).

Conclusion: The APPE fourth- year student-led seminar was an effective and efficient approach to training first-year students enrolled in community pharmacy IPPE. The program improved students' knowledge, confidence, and competence.

Keywords: Community pharmacy; APPE; IPPE; Pharmacy seminar

Introduction

Colleges and schools of pharmacy realize the importance of preparing pharmacy students to master his/her knowledge and skills necessary to provide pharmaceutical care and education in the community pharmacy setting. Introductory pharmacy practice experiences (IPPE) were most recently redefined in the Accreditation Council for Pharmacy Education (ACPE) 2007 standards requiring community pharmacy experiences in both the Introductory and Advanced Pharmacy Practice levels [1,2]. The ACPE standards also state that pharmacy practice experiences should integrate, apply, reinforce and advanced knowledge, skills, attitudes and values with other components of the curriculum [2].

The University of Hawaii at Hilo, Daniel K. Inouye College of Pharmacy (DKICP), was founded in 2007 and is located in a small rural town of Hilo on the largest island of Hawai'i (population 35,000). Instruction for the first three years of this four-year Doctor of Pharmacy program is held at the main Hilo campus. However, both Introductory and Advanced Pharmacy Practice (IPPE, APPE) experiences are also held on the three other major islands of Oahu, Maui and Kauai. From 2007-2011, the IPPE Community Pharmacy rotations were held during the first academic year in community retail sites in Hilo. By fall 2012, with the four years of pharmacy classes filled, the Hilo pharmacist preceptors wanted to include fourth year APPE community retail rotations in their practice sites. In order to better utilize available retail sites across the entire state, the IPPE retail rotation was moved to the summer following the P1 academic year and spread to the other three major islands of Oahu, Maui and Kauai. Similar to preceptors situations described in an article by Dugan et al, most community pharmacy practice preceptors may lack dedicated time to hold more formal discussions while at the site, [3] thus a weekly classroom seminar was held for more formal discussions. Fourth year (P4) pharmacy students who were concurrently on their community pharmacy APPE rotation also attended seminar. The first summer's seminar sessions (2012) were held without formal topic discussion or assignment and facilitated by a faculty member. Evaluations from this first year's summer seminar indicated that seminar could be more productive and educational with assigned topics and presentations especially in areas that had not been covered in the P1 didactic curriculum. These areas included skills training such as glucose finger sticks, asthma inhaler education, manual blood pressures, and administrative techniques of various dosage forms such as eye, ear and nose drops and suppositories. Seminar changes were also made to address the four broad domains [1-4] for the Center for the Advancement of Pharmaceutical Education (CAPE) [4]. These domains range from integrating foundation knowledge, essentials for practicing pharmacy and patient-centered care, health and wellness,

problem solving, educating all audiences and personal and professional development [4].

This paper describes the components of this newly tooled P1/P4 seminar (2013) with the objectives to determine the performance gain of the P1 students by comparing the pre- and post-seminar led by the P4 APPE students on knowledge, competencies and confidence in their ability to counsel patients in three general topics and related areas of blood pressure, asthma and respiratory health, and women's health. Besides self-assessment of competency provided by P1 students, post intervention assessment by P4 students mentors (peer assessment) was also measured followed by performing correlation between the first- and fourth-year students' competency assessment.

Design

The study was submitted to the University of Hawaii Human Subjects Research Committee and was deemed exempt. Students were asked to sign a consent form for participation. Experiential rotations are graded Pass/Fail but the seminar was not graded. There was no textbook for the seminar or course. The study was a pre-post test, quasi-experimental design. The program consisted of classroom and hands-on learning seminar sessions, which was held only for the students on the island of Oahu where two different four -week blocks of the rotation were held. A two-hour seminar was held each week for the last three weeks of the four-week rotation. Each of the 16 APPE students was assigned a group of IPPE students. For each seminar, two to three teams were assigned for each week's seminar topic(s). The faculty coordinator/instructor held a preparatory and training seminar with the APPE students in the first week of the month long IPPE rotation. General topics were decided in this meeting for each of the three seminars. The P4 student's were responsible to meet with their P1 students to explain the seminar program, topics and to help the P1students to prepare the presentations. The P4 students were encouraged to mentor the IPPE student's decisions format presentation for topic and as opposed to deciding the presentation format for the IPPE student. This helped P4 students to begin developing teaching and organization skills to construct a seminar. Groups met on their own time for an average of two preparatory sessions for an average of three hours each session. When scheduling and site space allowed, P4 and P1 students in the same chain or independent store chain were paired so the P4 could help the earlier level student on store philosophy, mission, computer technology and workflow.

Topic areas were selected based upon topics presented in the P1 Other the Counter (OTC)/Culture class, feedback from the prior summer's seminar and the upcoming topics in the second year curriculum that had some overlap in the community pharmacy setting. Major topics included adult use of cough and cold products especially with concurrent hypertension, pediatrics (use of electrolyte replacement solutions) and women's health education topics including Plan B updates, home pregnancy test demonstration, and a discussion of the use of OTC products for morning sickness during pregnancy. Pharmacist skills training and patient counseling topics included manual blood pressure measurement, instillation of eye drops, ear drops, nose drops, insertion of rectal and vaginal suppositories, proper application of ointments and creams, proper asthma inhaler technique, and blood sugar finger sticks. The P1 students presented their specific topic(s) in a Power Point presentation that also included patient education, and then had to demonstrate the skill and technique to their fellow P1 students. The other P1 students were then able to practice the skill(s). Informal critique and discussion from the P1 and P4 students and the faculty instructor followed the student's presentations.

Assessment of the impact of seminar program included 3 areas: knowledge, confidence, and competence.

P1 Pre- and Post-Intervention Surveys

P1 students' knowledge, competence and confidence surveys were assessed before and after the seminar program. These surveys were created by the course coordinator/instructor. For each seminar week, pre and post quizzes were created by each respective student group(s) presenting the topics and consisted of 10 identical questions.

P4 Pre- and Post-Intervention Surveys

P4 students were given pre- and post-intervention surveys with questions that addressed leadership and organization skills before and after the entire rotation. The P4 students were asked to assess their assigned P1 student's competence at the end of the rotation. The faculty course coordinator created both pre and post surveys. Pre and post questionnaires were matched via a four-digit code determined by the student that was not linked to any student's identification.

Data analysis

Descriptive statistics were summarized for characteristics of student participants in terms of their age, gender, ethnicity, cumulative grade point average, prior community experience, and prior college degree. Then, for each survey item related to knowledge of disease management, the percentage who answered the question correctly was calculated, pre- and post-seminars, as was the change score. For each area of disease management (blood pressure, asthma, woman's health), we then calculated a summary scale of the mean number of correct answers, the change score, and their effect sizes. Paired T-tests were used to examine whether there was a significant difference in knowledge pre- and post at the 0.05 significance level.

Self-confidence of P1 students was measured using a 5-point rating scale (1=Not at all confident; 3=Moderately Confident; 5=Completely Confident). Mean and standard deviation of self-confidence scores were calculated pre- and post- seminar for each survey item. In addition, we combined the 11 survey items into total self-confidence scores. Chronbach's alpha of self-confidence pre-test was 0.80 and post-test was 0.86. We also used a paired t-test to determine whether there was a significant change of pre- and post-test seminars.

Analysis of the P1 student self-assessment of competence was similar except that this assessment also included P4 ratings of P1 student competence. Cronbach's alpha for the competence scale for P1 students was 0.86 pre-test, and 0.87 post-test, and 0.86 for the P4 instructors. Pearson Product-Moment Correlation coefficient between P4 instructor and P1 students' self-assessment for competency was calculated. All statistical analyses were performed using the SPSS for Windows (version 22).

Results

A total of 43 P1 students and 16 P4 students were enrolled in the two rotation blocks. Table 1 describes the demographic data from the 43 P1 students. Demographic data was not available for the P4 students. Male and females were evenly matched. Asian American

students comprised 84% of the students. P1 students were queried as to the amount of retail pharmacy experience coming into the seminar. A good portion of students (43%) had had no prior retail experience, with 33% having more than one year of experience. The rest of the P1 students had experience in a range from one to 11 months.

Characteristics	First-year students (n=43)
Gender, n (%)*	
Male	20 (46.51)
Female	21 (48.84)
Age, years	
Mean (SD)	
Range (min-max)	33-21, 1980-1992
Ethnicity, n (%)	
African-American	1 (2.33)
Asian-American	36 (83.72)
Caucasian	4 (9.30)
Hispanic	1 (2.33)
Native American/Alaska Native	0
International (non-USA)	0
Hawaiian/Pacific Islander	5 (11.63)
Other	2 (4.65)
Cumulative GPA	
Mean (SD)	3.46 (0.35)
Range (min-max)	2.66-3.97
Prior experience related to community retail pharmacy, n (%)	
0 days/months	20 (46.51)
Less than 1 month	2 (4.65)
1-2 months	5 (11.63)
3-4 months	0
5-6 months	2 (4.65)
7-12 months	2 (4.65)
More than 12 months	14 (32.56)
Prior College Degree, n(%)	38 (88.37)

Table 1: Demographic Characteristics of First Year Pharmacy Students.

Thirty four (34) P1 students completed all of the pre and posttests for each of the seminar topics. Pre and post scores and amount of change is depicted in Table 2. In the blood pressure seminar, the purpose of pulse obliteration showed greatest change followed by correct placement of the stethoscope diaphragm. For cough and cold, identifying appropriate number of days of persistent cough and fever before physician referral demonstrated the largest percent knowledge change, followed by identifying appropriate self-management of cough and then the appropriate distance the asthma inhaler should be held from the mouth.

Knowledge of instillation of eye drops, eye ointments, and eardrops in both adults and children showed good improvement.

In the area of women's health, learners improved mostly in the understanding the updates in Plan B and in the understanding the accuracy of the home pregnancy test.

Three areas showed a negative knowledge change and included knowing the closeness of lancet placement to the nail bed, the use of a diet drink to off-set hypoglycemia and the appropriate time between instillation of sequential eye drops.

Table 3 summarizes the changes in knowledge of the three seminar areas. All three seminar topics were statistically significant change in effect sizes. Women's health topics showed the largest average change and effect size.

	Pre-test %	Post-test %	% Change
Blood Pressure			
Q1: What is the definition of systolic blood pressure?	91	91	0
Q2: What is considered a normal blood pressure reading?	59	79	35
Q3: What is the purpose of pulse obliteration?	47	82	75
Q4: When taking a manual blood pressure, the stethoscope should be placed on ...	74	97	32
Q5: All of the following may cause a falsely elevated blood pressure reading except	91	94	3
Q6: In a patient with nasal congestion, cough and a history of hypertension, what are appropriate questions to ask before recommending a product?	97	100	3
Q7: Which side should a patient lay on when inserting a suppository into themselves?	97	100	3
Q8: Patients should see their physician if cough persists for more than __ days.	18	29	67
Q9: Patients should see their physician if fever persists more than __ days.	62	85	38
Q10: In a 5-year-old child with a fever and a drug allergy to Advil, what would be an appropriate recommendation to treat the fever?	82	100	21
Asthma			
Q1: For patients who are having difficult expelling thick secretions from lungs, what is drug of choice?	97	97	0
Q2: Non pharmacologic therapy for a patient who is complaining of coughing includes:	94	100	6
Q3: Exclusions of self-treatment for cough include?	67	94	41

Q4: The brand name for guaifenesin is Delsym.	88	97	10
Q5: Fasting blood glucose goal for a patient with diabetes should be:	79	84	7
Q6: When using a lancet device to prick your finger, you should place the device as close to your nail bud as possible	94	91	-4
Q7: When a patient experiences signs and symptoms of hypoglycemia, they should drink ½ can of diet soda, wait for 15 min, then check their blood glucose again in 5 min	85	75	
Q8: How far away should a meter dose inhaler be held in front of your mouth	58	94	63
Q9: Which of the following inhalers require you to rinse your mouth w/ water after each use to reduce risk of thrush	85	100	18
Q10: How long should you wait between multiple doses of a short acting inhaler?	24	81	235
Women's health			
Q1: Home pregnancy test is most accurate at_____	61	83	36
Q2: Generally, the best time to administer a pregnancy test is during_____	89	94	6
Q3: Choose the false statement Plan B and Next Choice are emergency contraceptives (EC) that prevent pregnancy up to 72 hours after unprotected intercourse The earlier an EC is started, the higher the efficacy Emergency contraceptive is used to interrupt an established pregnancy The most common side effect of EC is nausea and vomiting			
Q4: If multiple eye drops are indicated, you should wait at least __ minutes before instilling the next drop	17	8	-50
Q5: If both an eye drop and ointment is indicated, how should they be administered?	39	81	107
Q6: When administering eardrops in an adult, how should the ear be positioned?	44	86	94
Q7: When administering eardrops in a child less than 3 years old, how should the ear be positioned?	33	81	142
Q8: Which of the following would be inappropriate for self-treatment of vulvovaginal candidiasis?	78	89	
Q9: The 340B Pricing Program allows eligible institutions to purchase which of the following at a discount?	17	31	
Q10: Which of the following OTC products can be recommended as a pharmacologic treatment option for nausea in pregnancy?	67	94	

Table 2: Comparison of First-year Student Knowledge in Disease Management Before and After Completing an Introductory Community Pharmacy Practice Experience Program (n=34).

	Mean number of correct answers out of ten (SD)				p-value
Topic Area	**Pre-test**	**Post-test**	**Change**	**Effect Size**	
Blood pressure	7.18 (1.42)	8.59 (0.89)	1.41	0.51	<0.001
Asthma	7.72 (1.31)	9.28 (0.92)	1.55	0.57	<0.001
Women's health	5.24 (1.69)	7.68 (0.91)	2.44	0.67	<0.001

Table 3: First Year Students' Overall Summary of Change In Knowledge by Topic Area (n=34).

Table 4 compares the P1 students' self-confidence pre and post seminar means on the various techniques that were taught, demonstrated and then practiced.

Table 5 compares the P1 students' self-assessed competence pre and post to the P4 students that mentored them. Interestingly, average means for both P1 pre and post confidence and competence scores were identical and the P4's post-competence mean was the same as the P1 post-competence mean.

Table 6 compares the P4 student's self-assessment pre and post means for various skills of leadership and organization. Overall, P4 students' improvement of their skills was statistically significant before and after the seminar program. The ability to manage seminar time effectively and have P1 students include all necessary and pertinent points showed the most improvement from pre to post intervention.

Pearson Product-Moment Correlation between P4 students mentor and P1 students' self-assessment for competency was 0.72 ($p<0.001$).

Statement	**First-year students**[b]	
I am confident in my ability to:	Pre-intervention Mean (SD)	Post-intervention Mean (SD)
Accurately perform a manual blood pressure	2.30 (1.28)	4.28 (0.70)
Accurately demonstrate use of dry powder inhaler (i.e., Advair Diskus)	1.84 (1.13)	4.26 (0.82)
Accurately demonstrate the use of asthma aerosol inhaler (i.e., Ventolin)	2.07 (1.33)	4.33 (0.84)
Accurately perform a simple blood sugar finger stick check	2.19 (1.20)	4.44 (0.67)
Appropriately counsel a patient on how to:		
use an OTC pregnancy test	2.51 (0.98)	4.35 (0.87)
insert of a rectal suppository	3.17 (1.16)	4.42 (0.76)
instill eye drops	3.53 (0.93)	4.56 (0.67)

instill ear drops	2.93 (0.90)	4.44 (0.73)
instill nose drops	2.00 (0.90)	3.09 (1.19)
apply thick creams and ointments to affected area	2.95 (1.09)	4.02 (1.01)
insert a vaginal suppository	2.49 (1.05)	4.23 (0.81)
Overall Self-Confidence[b]	2.54 (0.63)	3.66 (0.55)

Table 4: First-Year Students' Self-Confidence Assessment Before and After Completing Introductory Community Pharmacy Practice Experience Program (n=34) [a].

[a] Rating scale used (1 to 5): 1 (Not at all confident), 3 (Moderately Confident), 5 (Completely Confident)

[b] All Paired t-tests p<0.001. Chronbach's alpha of self-confidence pre-test = 0.80 and post-test=0.86; Effect size =0.69.

Discussion

The placement of the rotation in the summer post P1 didactic year helped to correct some perceived curricular deficits that included: 1) reinforcing didactic materials from the P1 OTC/Culture class; 2) continuing to improve presentation skills, patient education skills; 3) enhancing the data base and 4) encouraging interaction and mentorship from APPE students. Our IPPE seminar reinforced first year curriculum from our two semester courses of OTC/Culture course and a pharmaceutical compounding lab course. In the academic year prior to this newly tooled 2013 seminar, the OTC/ Culture course was transitioning to a small group learning environment so this IPPE seminar would also function as a continuation of the small group work to reinforce didactic knowledge, teach basic patient education skills, and give P1 level students additional opportunity to practice presentation skills.

Demonstrates competence in:	**Pre-intervention Self-Assessment Mean(SD)**	**Post-intervention Self-Assessment Mean(SD)**	**Post-intervention Assessment by 4th Year Student Instructors Mean (SD)**
Use of asthma aerosol inhaler (Ventolin)	2.33 (1.29)	4.33 (0.84)	4.28 (0.70)
Use of dry powder inhaler (Advair Diskus)	2.09 (1.27)	4.33 (0.84)	4.26 (0.82)
Performing blood sugar stick intervention	2.28 (1.14)	4.40 (0.76)	4.33 (0.84)
Performing manual blood pressure check	2.26 (1.26)	4.37 (0.69)	4.44 (0.67)
Application of nose drops	1.95 (0.95)	3.07 (1.24)	4.35 (0.87)
Application of eye drops	3.35 (1.21)	4.51 (0.67)	4.42 (0.76)
Application of ear drops	2.65 (1.15)	4.35 (0.75)	4.56 (0.67)
Application of rectal suppository	2.91 (1.06)	4.47 (0.70)	4.44 (0.73)
Application of vaginal suppository	2.51 (1.14)	4.21 (0.94)	3.09 (1.19)
Appropriate use of a pregnancy test	2.63 (1.05)	4.40 (0.82)	4.02 (1.08)
Application thick creams and ointments to the affected area	2.95 (1.02)	4.02 (1.06)	3.23 (0.81)
Overall Competence[b]	2.54 (0.75)	3.66 (0.56)	3.66 (0.55)

Table 5: First-Year Students' Self-Competence Assessment Before and After Completing Introductory Community Pharmacy Practice Experience Program and Post-intervention Evaluation by 4th Year Instructor [a].

[a] Rating scale used: 1 (Unsatisfactory/Remediation Required), 2 (Below Average/Needs Improvement), 3 (Average/Satisfaction), 4 (Competent/Above Average), 5 (Excellent).

[b] Difference between pre and post competence p<0.001; Chronbach's alpha pre-test=0.86, post-test=0.87, assessment by 4th Year instructors=0.86. Correlation between 4th year instructor and student self-assessment for competency = 0.72.

Statement	Fourth-year Student Instructor (n = 16)		
	Pre-Seminar Self-Assessment	Post-Seminar Self-Assessment	p valueb
	Mean (SD)	Mean (SD)	
Manage the seminar time effectively and include all necessary and pertinent teaching points (i.e., goal/objectives, content, background, relevant litearture)	3 (0.82)	3.93 (0.80)	0.005
Creative and effective preparation and use of materials/technology e.g., power point, printed materials	3.13 (0.64)	3.67 (0.72)	0.06
Clearly explain the content in the seminar	3.20 (0.77)	3.80 (0.56)	0.045
Clear pattern of organization, format, facilitate the audience understanding	3.33 (0.82)	3.93 (0.70)	0.045
Responds accurately and effectively to questions	3.47 (0.83)	3.80 (0.77)	0.29

Appropriate eye contact with audience during presentation	3.13 (0.52)	3.73 (0.70)	0.02
Appropriate verbal skills; proper enunciation/pronunciation; avoid distracting mannerisms	3.20 (0.68)	3.47 (0.64)	0.26
Demonstrates confidence during presentation	3.27 (0.59)	3.47 (0.64)	0.27
Comfort level with interacting and communicating with a P1 student	3.53 (0.83)	4.07 (0.80)	0.06
Ability to teach a technique to a P1 student so they can teach their colleagues	3.60 (0.63)	3.93 (0.80	0.14

Table 6: Fourth-Year Students' Self-Assessment of the Fourth-Year-Student-Led IPPE Retail Seminar Before and After Completing Introductory Community Pharmacy Practice Experience Program for the First-Year Students [a].

[a] Rating scale used: 1 (Needs Significant Improvement), 2 (Needs Some Improvement), 3 (Acceptable/Satisfactory), 4 (Above Average), 5 (Superior)

Cronbach's α for Fourth-year students pre-seminar = 0.92, post-seminar = 0.96.

The higher the students' score from the self-assessment of instrument, the more satisfactory in the performance in the statements.

[b] Paired t-test used for pre-seminar vs. post-seminar scores, statistical significance set at $\alpha \leq 0.05$.

The purpose of the seminar demonstrated that small group work will help to improve foundation community pharmacy skills and that demonstration of competence level is then mirrored in confidence scores. The items that showed minimal improvement were in areas/topics that had been covered in previous didactic courses. Topics that showed substantial improvement were in areas that needed repetition and practice.

Post course evaluation comments from the P1's stated that they favored the seminar content and found value in the P4's leadership and helpfulness to prepare each of the topics, help organize tasks, and stay within the designated time frame for presentation. Other pharmacy programs have utilized P4 students in various exercises in IPPE rotations since these students have had experience in the same course and come from a student's perspective. 5 Utilizing a P4 student to facilitate patient-student interactions in younger students also reduces faculty time to conduct the IPPE seminar with positive results [6]. Upper level students can help lead discussions about disease states and therapeutics. With their knowledge and experience level they can guide questions, thereby also enhancing their own understanding of the topics [7].

P1 student feedback suggested that they would like to see their presentations videotaped for self-review; have an informal critique before the final presentation; have more formal critique with some type of scoring system for their final presentations; and that it would have been helpful to color-code the numerous pre and post surveys and tests.

Course evaluations from the P4 students stated that they enjoyed working with the P1 students and that the activities helped to reinforce materials that they had learned in the earlier years of their education.

Outcomes show that the chosen topics showed an appropriate array of knowledge. The two topics of asthma and women's health aren't presented until the second year Integrated Therapeutics course. A follow up on whether or not students who participated in this summer seminar perform better in theses two topic areas in the subsequent semesters would be interesting and help validate the summer seminar work. Topic areas related to basic blood pressure measurement and cough and cold preparations showed an appropriate degree of improvement. Although covered in the P1 OTC/culture class, the amount of improvement seen in the instillation and administration of various dosage forms such as the various eye, ear and nose drops, ointments and suppositories, reiterates that these skills require repetition and practice and reinforcement in seminar may be helpful. Follow up and verification of correct technique education in the practice setting would add to a follow up study.

The correlation between P1 students' self-rated competence and P4 students instructor rating was statistically significant and highly positive and went into the same direction of peer and self-rated competency assessments.

Conclusion

This study demonstrates that advanced APPE students led seminar can impact the knowledge, competence and confidence of IPPE students in the retail community setting rotation. This partnering begins the development of fourth year students in skills such as organization and teaching earlier level students. Early level students may be more open to learning and reinforcing their knowledge with student mentors and not feel as intimidated with a faculty teacher. This seminar allows for active learning in a small group environment that encourages discussion and interaction. Although the study focused mainly on the P1 student's improvement, the P4 student's role recognized their responsibility as a role model and the challenges in becoming more on the level of precepting, something they may begin to do soon after graduation. The interaction and mentoring partnership between the P1 and P4 students is invaluable. Subsequent study may be helpful to see if in those sites where a P4 and P1 are placed together on rotation, is there improvement in patient outcomes from patient-student interactions.

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