Interprofessional Education: What Measurable Learning Outcomes Are Realistic for the Physician Assistant Profession?

Kevin Lohenry, PhD, PA-C; Désirée Lie, MD, MSED; Cha-Chi Fung, PhD; Sonia Crandall, PhD; Reamer L. Bushardt, PharmD, PA-C

Purpose To compare physician assistant (PA) students' attitudes regarding interprofessional education by students' seniority, gender, age, and previous experience with interprofessional education.

Methods The validated 19-item Readiness for Interprofessional Learning Scale and the 12-item Interdisciplinary Education Perception Scale were administered to matriculating and graduating PA students from 2 US institutions (N = 186). Primary outcomes were score differences by subgroup and institution using independent sample t-tests. We also examined scale validity measured by Cronbach's alpha (internal consistency) and Pearson correlation coefficients (concurrent validity).

Results Student demographics at both institutions were similar. Initial comparisons did not demonstrate significant institutional differences. Consequently, data were combined for subsequent analyses. Matriculating students had significantly higher mean Readiness for Interprofessional Learning Scale scores than did graduating students. No significant differences were found by gender, age, or previous interprofessional education exposure for either scale. Both scales demonstrated high internal consistency (Readiness for Interprofessional Learning Scale α = 0.93; Interdisciplinary Education Perception Scale α = 0.84).

Conclusions Physician assistant student attitudes regarding interprofessional education are very positive at matriculation and are less positive at graduation. Physician assistant student attitudes do not vary by gender, age, or previous interprofessional education exposure. Physician assistant educators should ensure that students' interprofessional education exposure makes full use of the students' initial positive attitudes and focuses on skill development for interprofessional education competencies.

INTRODUCTION

Founders of the physician assistant (PA) profession focused on the roles of the physician and the PA when working as a team, but formal interprofessional curricula that highlight the importance of role recognition with professions other than medicine were not consistently included in most PA programs. The *Accreditation Standards for Physician Assistant Education* (2nd edition) of the Accreditation Review Commission on Education for the Physician Assistant (ARC-PA) required programs to incorporate interpersonal communication, but the importance of communication with other team members was not emphasized as a requirement until the 3rd edition was released in 2007.[1,2] The introduction of the 4th edition of the ARC-PA *Standards* in 2010 was the first indication that interprofessional education (IPE) was required in PA education.[3] Physician assistant programs are beginning to incorporate IPE curricula that promote successful collaboration with the entire health care team. Physician assistant students are often selected in the admissions process for their strong interpersonal skills and positive team attitudes.[4,5] The recent surge of interest in IPE to promote team function in health care teams has mixed implications for the PA profession.[6–8] If PA students are often selected for their positive attitudes toward teamwork, are those attitudes maintained throughout training? Although no studies have documented the long-term effects of early exposure to IPE, some evidence indicates that well-placed IPE curricula, particularly during clinical training, are associated with greater receptivity toward IPE and collaborative care.[9,10] Should programs introduce more IPE curricula to reinforce and maintain these positive attributes to avoid the decline in attitudes that has been seen in other studies of nursing and other health professions?[10,11]

On average, PA programs in the United States have smaller class sizes than medical schools, and little has been reported about differences in interprofessional learning attitudes among PA students.[12–14] We conducted a combined study at 2 US institutions' PA programs using 2 commonly administered IPE attitude scales, the Readiness for Interprofessional Learning Scale (RIPLS)[15] and the Interdisciplinary Education Perception Scale (IEPS),[16] to examine similarities and differences in student attitudes within and across the 2 programs. We hypothesized that PA student attitudes would decline between program matriculation and graduation, regardless of the students' exposure to IPE curricula. We also hypothesized that the 2 scales would exhibit high internal consistency and concurrent validity for discriminating attitudes among different subgroups of PA students.

METHODS

The study was conducted by 2 geographically distant programs. The Wake Forest University Physician Assistant Program at the Wake Forest School of Medicine (Wake Forest) is located in Winston-Salem, North Carolina. The Primary Care Physician Assistant Program in the Keck School of Medicine of the University of Southern California (Keck) is located in the Los Angeles area.

The PA program at Wake Forest is an accredited, graduate-level program that awards a master of medical science degree after 24 months of study. The first year of training is preclinical and composed of facilitated, small-group, inquiry-based learning with supplemental didactic instruction and laboratory-based activities. The second year is comprised of supervised clinical experiences and a graduate project. Wake Forest PA students participate in an interprofessional student-run clinic. Students also participate—in collaboration with other students from medicine, nursing, and divinity studies and physician residents in training—in interprofessional activities within a family house focused on caregiving for acutely ill patients.

The Primary Care Physician Assistant Program at Keck is an accredited, graduate-level program that awards a master of PA practice degree after 33 months of study. The first 3 semesters are largely preclinical, covering basic and clinical medicine, physical diagnosis, and behavioral health sciences. The last 3 semesters are largely clinical and include a graduate project. Interprofessional additions have included a half-day IPE experience, an interprofessional geriatric pilot program, and 2 student-run clinics that provide care to the medically underserved of the greater Los Angeles area.

The institutional review boards of the host institutions approved this study for both PA programs.

Survey Scales and Administration

The online Qualtrics (Qualtrics Labs, Inc. Software, Survey Research Version of the Qualtrics Research Suite, Provo, UT) survey comprised the 19-item RIPLS[15] and the remodeled 12-item IEPS.[16] The World Health Organization definition of IPE was given in the survey to enable the participants to have uniform understanding of IPE as differentiated from team-based care.[17] The survey also asked for the students' gender (male [M] or female [F]); age (<25, 25–30, and >30 years); stage of training (year 1 for matriculating vs year 2 at Wake Forest or year 3 at Keck for graduating class, respectively); and previous experience with or exposure to IPE (0, 1, 2–5 occasions, and >5 occasions). Previous experience with IPE was categorized as no exposure, slight (1 occasion), moderate (2–5 occasions), and high (more than 5 occasions) exposure. The RIPLS contains 4 subscales addressing students' own attitudes: Teamwork and Collaboration, Negative Professional Identity, Positive Professional Identity, and Roles and Responsibilities.[15] The remodeled IEPS contains 3 subscales—Competency and Autonomy, Perceived Need for Cooperation, and Perception of Actual Cooperation—addressing perceptions of students about their profession's attitude toward interprofessional work.[16] The RIPLS was designed to assess each student's own attitude toward interprofessional learning, whereas the IEPS assesses perceived attitudes about team collaboration for the students' profession and requires the opportunity to observe members of their professions working with other professions.[18]

The RIPLS[15] has a score range of 1–5 with higher mean scores representing a more positive attitude toward IPE learning, a reported Cronbach's alpha of 0.90, and an intraclass correlation coefficient of 0.76. The 12-item IEPS uses a 6-point Likert scale with a score range of 1–6 (from "strongly disagree" to "strongly agree"), with higher mean scores indicating more positive attitudes. The IEPS has a test–retest reliability of 0.6 and a Cronbach's alpha of 0.80.[16]

Data Collection

The survey was administered in spring 2013 at both institutions over a 6-week period to first-year and graduating PA student classes at each program. Participation in the survey was voluntary.

Data Analysis

The scores on each scale were summed to generate a scale score that ranged between 5 and 95 for the RIPLS and between 6 and 72 for the IEPS. The primary outcomes were differences in attitude scores for the 2 scales by subgroup and by program using independent sample t-tests. Secondary outcomes were psychometric properties of the 2 scales as measured by Cronbach's alpha for internal consistency. To adjust for multiple comparisons made on the same data, we set the alpha level a priori at the 0.01 level. The analyses were performed using SPSS version 21 (SPSS IBM, Armonk, NY).

RESULTS

Response Rates and Respondent Demographics

The online survey was administered at baseline with 2 subsequent weekly reminders to nonrespondents. The final combined (first- and graduating years) response rate was 72% (88/123) for Wake Forest students and 92% (98/106) for Keck students. Respondents were equally distributed among first-year and graduating students for both institutions. Most respondents were women (78.4%). Of all respondents, two-thirds were between 25 and 30 years of age. One-third reported moderate previous exposure to IPE, and one-third reported high previous exposure to IPE (Table 1).

Subgroup Analysis

In the comparison of mean total scores by institution (Table 2), neither scale showed any significant differences between the 2 institutions at the 0.01 level. These comparisons were stratified by level of student training (first-year or graduating). These results supported the assumption that students from both institutions were similar. Thus, all subsequent analyses were performed in the aggregate.

The combined dataset from the 2 institutions is shown in Table 3. A comparison of performance by seniority revealed that the first-year class (mean = 80.27, SD = 6.54) scored significantly higher than the graduating class (mean = 75.80, SD = 7.64) on the RIPLS (t = 4.218, df = 181, P < .01). This pattern of performance comparison was also detected by the IEPS (t = 2.456, df = 184, P < .05): the first-year class (mean = 66.61, SD = 4.87) scored significantly higher than the graduating class (mean = 64.63, SD = 5.99). The differences between the 2 levels of seniority reached a moderate level of

Table 1: Descriptive Statistics of Physician Assistant Student Demographics: Gender, Age, Seniority, and Exposure (Wake Forest and Keck Schools of Medicine, Physician Assistant Studies Programs, 2013)

Demographics	Wake Forest (N = 88), n (%)	Keck (N = 98), n (%)	Total
Gender			
Male	19 (21.8)	21 (21.4)	40 (21.6)
Female	68 (78.2)	77 (78.6)	145 (78.4)
Age group, y old			
<25	25 (28.4)	14 (14.3)	39 (21.0)
25–30	51 (58.0)	72 (73.5)	123 (66.1)
>30	12 (13.6)	12 (12.2)	24 (12.9)
Level of training			
First-year class	36 (40.9)	51 (52.0)	87 (46.8)
Graduating class	52 (59.1)	47 (48.0)	99 (53.2)
Exposure to IPE in the past 3 y			
No exposure	15 (17.0)	23 (23.5)	38 (20.4)
Slight exposure	9 (10.2)	17 (17.3)	26 (14.0)
Moderate exposure	27 (30.7)	34 (34.7)	61 (32.8)
High exposure	37 (42.0)	24 (24.5)	61 (32.8)

Levels of training: first-year class = year 1 students at both institutions; graduating class = year 2 students at Wake Forest School of Medicine; year 3 students at Keck School of Medicine.

Exposure to IPE: no exposure = 0 occasion; slight exposure = 1 occasion; moderate exposure = 2 to 5 occasions; high exposure = more than 5 occasions.

One respondent from Wake Forest did not report a gender.

Table 2: Independent Sample t-Tests Comparing Mean Total Scores for RIPLS and IEPS Between Institutions (Wake Forest vs Keck Physician Assistant Studies Programs, 2013)

Class, Scale, and Institution	N	Mean (SD)	t
First-year class			
RIPLS			
Wake Forest	36	78.46 (6.99)	Not statistically significant
Keck	51	81.37 (6.29)	
IEPS			
Wake Forest	36	65.92 (4.44)	Not statistically significant
Keck	51	67.10 (5.14)	
Graduating class			
RIPLS			
Wake Forest	52	75.10 (7.81)	Not statistically significant
Keck	47	76.34 (7.22)	
IEPS			
Wake Forest	52	63.63 (6.27)	Not statistically significant
Keck	47	61.14 (5.59)	

Graduating class = year 2 students at Wake Forest; year 3 students at Keck.

RIPLS, Readiness for Interprofessional Learning Scale; IEPS, Interdisciplinary Education Perception Scale.

effect as measured by Cohen's *d* on both measures (RIPLS: *d* = 0.63; IEPS: *d* = 0.36).

In the comparison of scores for self-reported IPE exposure by gender and age (Table 4), the combined data suggested no score differences between the respondents who reported no exposure and any other category of respondents (slight, moderate, or high exposure). When the combined data were analyzed, comparison by gender and age also showed no significant score differences for either the RIPLS or the IEPS.

Scale Properties

Both the RIPLS and the IEPS demonstrated high internal consistency, as measured by Cronbach's alpha (RIPLS [19 items]: α = 0.93; IEPS [12 items]: α = 0.84). The significant correlation coefficients between the 2 scales showed that the RIPLS and the IEPS shared only 26% of the score variance in measuring an underlying construct (r = 0.51, P < .01). The divergence in the variance was sufficient to suggest that the 2 scales measured 2 distinct constructs.

DISCUSSION

We conducted this study to examine PA student attitudes toward IPE by seniority, gender, age, and previous self-

reported IPE exposure. In exploring the hypothesis, we found that scores for one scale, the RIPLS, were lower for graduating students than for first-year students and that PA student attitudes toward IPE declined over the training period. This decline occurred despite some (limited) exposure to IPE settings during training. We also found that each scale (RIPLS and IEPS) showed high internal consistency and limited concurrent validity. This finding suggests that the 2 scales measure nonoverlapping constructs. Interestingly, 23% of Keck and 17% of Wake Forest students reported no previous exposure to IPE, although the sampling occurred after the time when IPE activities were required for all students. This finding reveals a key opportunity to affect student perception about the concept of interprofessional learning.

Our study findings confirm and extend the preliminary findings of another study from a single program that reported significantly higher attitude scores among first-year PA students in comparison with pharmacy and medicine students, with score differences of up to +0.33 (RIPLS) and +0.55 (IEPS), respectively.[18] Our finding of lower scores among graduating PA students than among first-year students is comparable with findings in other professions with varying levels of statistical significance.[11,19]

The RIPLS and IEPS measure attitudes toward professions other than medicine. The finding of a decline in attitude toward working with other professions suggests a need to address the importance of working with the entire health care

Table 3: Independent Sample *t*-Tests Comparing Mean Total Scores for RIPLS and IEPS by Seniority (Combined Data From Wake Forest and USC Physician Assistant Studies Programs, 2013)

Seniority by Class	N	Mean (SD)	T	Cohen's *d*
RIPLS				
First-year class	86	80.27 (6.54)	*t* = 4.218, *df* = 181, *P* < .01	0.63
Graduating class	97	75.80 (7.64)		
IEPS				
First-year class	87	66.61 (4.87)	*t* = 2.456, *df* = 184, *P* < .05	0.36
Graduating class	99	64.63 (5.99)		

RIPLS, Readiness for Interprofessional Learning Scale; IEPS, Interdisciplinary Education Perception Scale; *df*, degrees of freedom.

team (other than physicians) during PA training. Perhaps the small amount of exposure to interprofessional teams at the 2 programs is insufficient to maintain the positive IPE attitudes seen at matriculation, but additional studies are needed to

Table 4: Analysis of Variance and Independent Sample Test Comparison of Mean Total Scores in RIPLS and IEPS Between Levels of IPE Training Exposures, Gender, and Age (Combined Sample of Wake Forest and Keck Physician Assistant Studies Programs, 2013)

IPE Training Exposure, Gender, and Age	N	Mean (SD)	Results
RIPLS			
No exposure	38	77.18 (6.93)	Not statistically significant
Slight exposure	25	81.48 (6.71)	
Moderate exposure	61	77.27 (7.52)	
High exposure	61	77.50 (7.79)	
Female	143	78.36 (7.18)	
Male	39	76.44 (8.41)	
<25 y old	38	79.11 (7.45)	
25–30 y old	212	77.46 (7.51)	
>30 y old	24	78.21 (7.35)	
IEPS			
No exposure	38	64.45 (6.73)	Not statistically significant
Slight exposure	26	66.46 (5.21)	
Moderate exposure	61	65.59 (4.98)	
High exposure	61	65.82 (5.51)	
Female	145	65.59 (5.27)	
Male	40	65.65 (6.53)	
<25 y old	39	66.10 (4.73)	
25–30 y old	123	64.99 (5.71)	
>30 y old	24	67.54 (5.76)	

No exposure = 0 occasion, slight exposure = 1 occasion; moderate exposure = 2–5 occasions; high exposure = >5 occasions.

One respondent from Wake Forest did not report a gender.

RIPLS, Readiness for Interprofessional Learning Scale; IEPS, Interdisciplinary Education Perception Scale.

test that possibility. A previous study soliciting PA student views on IPE curricula suggested that IPE is most effective when delivered within clinical settings involving direct patient care in which faculty observation and feedback are provided.[18–20] The measurement of outcomes of IPE should be matched to the learning objectives and may involve team Objective Structured Clinical Examinations or observation feedback from trained faculty.[21,22]

Additional studies have suggested that the use of standardized patients in the implementation of IPE curricula also has a positive effect from students' perspectives. Increasing use of standardized patients throughout the didactic component of program curricula and clinical experiences that involve team-based practice might maintain the positivity that accompanies matriculating students.[23]

Strengths of this study include simultaneous administration and data collection from 2 independent yet comparable PA programs, high response rates, and use of 2 validated scales. Limitations include the cross-sectional nature of the study, which therefore does not reflect attitude change in the same cohort of students. Our study also highlights the importance of conducting multi-institutional studies within the PA profession, because the class size of most programs is limited to 50, making sample size and subgroup analysis a challenge. Future multi-institutional studies that incorporate a larger sample size and additional professions would be beneficial.

Our findings challenge the assumption that PA students have an innate capacity for applying interprofessional skills and retaining positive attitudes toward IPE during training. The significant decline in RIPLS scores between the different first-year and graduating cohorts was seen in both institutions despite consistent IPE curricular exposure hours for first-year and graduating students, respectively, at both the Wake Forest and Keck programs. Numerous factors likely contributed to this finding. For example, faculty who taught graduating students may not have been adequately prepared to teach in IPE settings, or the graduating class of students may have been exposed to negative role modeling of team behaviors. Graduating students may have rotated in clinical environments in which practice contradicted IPE principles or values, so that their perceptions about IPE could be negatively influenced, while the first years had not yet been exposed to clinical rotations or role models.[24] Future studies should examine longitudinal change in IPE attitudes over time in the same (vs a different) cohort of PA students, focusing on appropriate timing, dosage, and quality of IPE experiences. Attention to skill acquisition and assessment of team skill development

over time may provide a more complete picture of how well educators help PA students achieve IPE competencies.

Kevin Lohenry, PhD, PA-C, is program director of the Primary Care Physician Assistant Program at the University of Southern California Keck School of Medicine in Alhambra, California.

Désirée Lie, MD, MSED, is a clinical professor of family medicine at the University of Southern California Keck School of Medicine in Alhambra, California.

Cha-Chi Fung, PhD, is the assistant dean of Educational Affairs and an associate professor at the University of Southern California Keck School of Medicine Physician Assistant Primary Care Program in Alhambra, California.

Sonia Crandall, PhD, is a professor and the director of Medical Education at the Wake Forest Baptist Medical Center, Wake Forest School of Medicine, Department of Physician Assistant Studies, in Winston-Salem, North Carolina.

Reamer L. Bushardt, PharmD, PA-C, is a professor and chair of the Department of Physician Assistant Studies at the Wake Forest Baptist Medical Center, Wake Forest School of Medicine, Winston-Salem, North Carolina.

Correspondence should be addressed to: Kevin Lohenry, PhD, PA-C, Primary Care Physician Assistant Program at the University of Southern California, 1000 S Fremont Avenue, Building A11, Room 11150, Alhambra, CA 91803. Telephone: (626) 457-4262; Email: lohenry@usc.edu

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