Has Interprofessional Education Changed Learning Preferences? A National Perspective

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Objective. To assess how changes in curriculum, accreditation standards, and certification and licensure competencies impacted how medical students and physician residents value interprofessional team and patient-centered care.

Primary Data Source. The Department of Veterans Affairs Learners' Perceptions Survey (2003–2013). The nationally administered survey asked a representative sample of 56,569 U.S. medical students and physician residents, with a comparison group of 78,038 nonphysician trainees, to rate satisfaction with 28 elements, in two overall domains, describing their clinical learning experiences at VA medical centers.

Study Design. Value preferences were scored as independent adjusted associations between an element (interprofessional team, patient-centered preceptor) and the respective overall domain (clinical learning environment, faculty, and preceptors) relative to a referent element (quality of clinical care, quality of preceptor).

Principal Findings. Physician trainees valued interprofessional (14 percent vs. 37 percent, $p < .001$) and patient-centered learning (21 percent vs. 36 percent, $p < .001$) less than their nonphysician counterparts. Physician preferences for interprofessional learning showed modest increases over time (2.5 percent/year, $p < .001$), driven mostly by internal medicine and surgery residents. Preferences did not increase with trainees' academic progress.

Conclusions. Despite changes in medical education, physician trainees continue to lag behind their nonphysician counterparts in valuing experience with interprofessional team and patient-centered care.

Key Words. Health workforce training, survey research and questionnaire design, interprofessional care, patient-centered care, VA health care system

Health policy makers, practitioners, and educators generally accept the propositions that collaborative, interprofessional-based practice leads to better patient health outcomes, improved quality, and safer care (Institute of Medicine 2000; Reeves et al. 2010; World Health Organization 2010; Nielsen et al. 2014), while the absence of collaboration can lead to lower provider and patient satisfaction, more medical errors, and higher costs (Lindblom et al. 2007; Zwarenstein, Goldman, and Reeves 2009).

In response, leaders in medical education have incorporated interprofessional education (IPE) into both the medical education curriculum and clinical care teaching model. However, if IPE is to transform health care and promote wider changes in how physicians behave in actual clinical practice, such education initiatives must go beyond merely imparting knowledge and skills (Zwarenstein, Goldman, and Reeves 2009; Cox and Naylor 2013). Specifically, education programs must change the "... attitudes or perceptions regarding the value and/or use of team approaches to caring for a specific client group." Such was the conclusion reached in a recent Institute of Medicine Report on IPE (Institute of Medicine 2015), citing both Reeves et al.

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(2015) and Kirkpatrick and Kirkpatrick (2006) learning models of medical education.

Yet few studies have examined the extent to which IPE initiatives have collectively changed the perceptions and values of physician trainees. This article uses an inferred preferences approach to quantitatively measure the importance that physician trainees place on interprofessional teams as one of the 15 elements that comprise their clinical learning environment during rotations through VA medical centers. IPE is often viewed not as an end but as a means to achieve other health system goals, in particular, patient-centered care (ACTPCMD 2012). Thus, for comparison purposes, we also examine the importance that physician trainees place on patient-centered care as one of the 13 elements comprising their experience with faculty and preceptors who supervised them during their VA rotations. Specifically, we test if physician trainee preferences for interprofessional and patient-centered learning: (1) are comparable to nonphysician trainees, (2) have increased between 2003 and 2013, and (3) have increased as trainees progress through their academic programs.

Background: Motivation for IPE

Motivation for IPE has grown with mounting scientific evidence of associations between favorable outcomes and interprofessional team care. These outcomes include improved collaborative behaviors and communication skills (Morey et al. 2002; Remington, Foulk, and Williams 2006), better patient outcomes (Grumbach and Bodenheimer 2004), fewer medical errors (Varpio et al. 2008), lower mortality in elderly patients with chronic conditions (Wieland et al. 1996), better technical quality and shorter stays in intensive care units (Shortell et al. 1994), and higher patient satisfaction both in primary care (Campbell et al. 2001) and in the treatment of chronic conditions (Shortell et al. 2004).

Background: Interprofessional Education

The teaching of interprofessional communication and collaboration in medical education has been a focus of discussion for many years. Since 2000, however, policies designed to promote interprofessional learning among physician trainees began to focus not only on the medical curriculum and clinical care training models but also on program accreditation, licensing and certification requirements, and education testing.

For example, IPE has been incorporated into the curricula of U.S. medical schools (Baker et al. 2005; Interprofessional Education Collaborative Expert Panel 2011). In 2000, only a few schools offered IPE to its students. By 2008, over half of all U.S. medical schools required IPE experiences for medical students (American Medical Association 2012). By 2010, 92 percent of all U.S. academic health centers offered IPE courses and 89 percent offered IPE clinical training experiences (Greer et al. 2014). However, IPE curricula vary by requirement (mandatory or elective), setting (classroom or practice based), clinical conditions (specific illnesses or primary care), duration (1- to 2-hour sessions, 1 month, to a full academic year), and scope (specific interprofessional relationships or entire models of care) (Meyer, Potter, and Gary 1997; Reeves et al. 2012; Gilman et al. 2014; Rugen et al. 2014).

First adopted in 1999, the Accreditation Council for Graduate Medical Education (ACGME) and the 24 American Board of Medical Specialties (ABMS) Member Boards require trainees to demonstrate six competencies, including “interpersonal and communication skills” by “working effectively as a member or leader of a health care team,” and “systems-based practice” by “working in interprofessional teams to enhance patient safety and improve patient care quality.” By 2007, ACGME began requiring programs to demonstrate that trainees mastered these competencies by reaching education milestones during their clinical training. These milestones were defined by joint initiatives between ACGME and each ABMS Member Board to trace a resident’s progress in “knowledge, skills, attitudes” for each ACGME competency that is expected from beginning through unsupervised practices (ACGME 2013a,b; ACGME and American Board of Internal Medicine 2014).

USMLE Steps 1–3 have been expanded to cover social sciences, including (1) communication and interpersonal skills and (2) interprofessional and provider–patient communication listed as teamwork under strategies to reduce error within the category of patient safety (FSMB and NBME 2015).

Federal initiatives promoting IPE include the Health Resource Services Administration chartered advisory committees charged with promoting IPE. Beginning in 2001, the Advisory Committee on Interdisciplinary, Community-based Linkages under Title VII, Part D, Section 757 of the Public Health Service Act (42 U.S.C. 294f), as amended by the Patient Protection and Affordable Care Act of 2010 (P.L. 111-148), has emphasized IPE to increase diversity and cultural competence of practitioners (Wilson, Rozensky, and Weiss 2010; ACICBL 2013). Established in 1998, the Advisory Committee on Training in Primary Care Medicine and Dentistry recommended in 2012 that

training grants under the Affordable Care Act should favor programs that focus on interprofessional collaborative practice core competencies (ACTPCMD 2012). Since 2011, the Department of Veterans Affairs (VA) has funded Centers of Excellence in Primary Care to offer IPE to trainees to work alongside VA's patient aligned care teams, or PACT, as the model of care for veterans (Rugen et al. 2014).

Estimating the individual impacts these efforts have had on medical education and health care is challenging. This article searches for evidence of a global impact by first computing scores that describe how physician trainees value interprofessional team care as part of their clinical learning. For comparison purposes, we also computed preferences scores for a related item: patient-centered care. Next, we compare physician scores with those computed for nonphysician trainees, examine if scores have changed between 2003 and 2013, and determine if scores change as physician trainees progress from undergraduate medical school through a postgraduate medical education program.

METHODS

Setting

The setting is Department of Veterans Affairs (VA) health care facilities. Since 1946, health professions education has been a statutory mission for VA (Cohen 2009; Gilman et al. 2012). By 2013, 142 VA medical centers had active affiliation agreements with 152 of the nation's 170 medical schools (including 29 osteopathic) and over 1,800 other education programs involving annually 40,420 physician residents, 21,541 medical students, and 56,585 nursing, dental, and associated health trainees. The setting is appropriate since VA emphasizes a patient-centered medical home, known as the Patient Aligned Care Team (PACT) model of care (Rosland et al. 2013; Rugen et al. 2014).

Learners' Perceptions Survey Data

Data from July 2002 to June 2013 come from VA's Learners' Perceptions Survey (LPS) (Keitz et al. 2003; Kashner, Burnett, and Wicker 2015), an anonymous, voluntary, national, web-based survey, administered annually by VA's Office of Academic Affiliations (OAA). Respondents included students, interns, residents, and fellows of all professions engaged in VA clinical care as part of an accredited education curriculum. Physician trainees are classified

according to the ACGME categories into medicine, surgery, and hospital-based (ACGME 2013a,b), with medicine subdivided into internal medicine, internal medicine subspecialties, psychiatry, and other medicine (e.g., family medicine and neurology) (see first footnote in Table 1). Nonphysician trainees are classified into nine professions representing nursing, dentistry, and associated health professions (see second footnote in Table 1).

The LPS contains 130 questions that can be completed in 15–20 minutes. The survey begins with five questions about the clinical training program, followed by 84 satisfaction questions where trainees rate their VA training experiences, 30 fact questions describing trainee experiences with interprofessional team and patient-centered care, psychological safety, and overall care quality, and 16 questions covering respondents' characteristics, including demographic information, mix of patients seen, and whether respondents would recommend VA for future training and professional employment.

Satisfaction questions are divided into learning, working, and clinical experiences. Each experience is further subdivided into 2–4 domains. Each domain includes from 6- to 15-element questions followed by an overall summary question that asks respondents to rate satisfaction with the entire domain. Trainees rate satisfaction on five-item Likert scales as “very dissatisfied,” “somewhat dissatisfied,” “neither satisfied nor dissatisfied,” “somewhat satisfied,” or “very satisfied.” Trainees must answer all element questions before answering the summary question. Spatially clustering element questions into domains provides respondents context to answer the summary domain question.

Satisfaction questions begin with the two learning experience domains that are the focus of this study: the clinical learning domain and faculty and preceptor domain. The clinical learning domain contains “interdisciplinary approach” as the fifth among 15-element questions followed by a domain summary question (see third footnote in Table 1). “Patient-oriented” is the 11th among 13-element questions plus domain summary question comprising the faculty and preceptor domain (see fourth footnote in Table 1). In addition, working experience includes the 9-element working, 7-element personal, and 8-element physical environment domains. Clinical experience includes the 7-element clinical environment, 13-element availability and timeliness of staff and services, 6-element quality of staff and services, and 6-element systems and processes dealing with medical error domains.

Element questions were initially assigned to each domain by a focus group (Keitz et al. 2003) and confirmed by subsequent empirical analyses

(Kashner, Burnett, and Wicker 2015). For example, an analysis of over 15,000 completed responses in 2014–2015 (Kashner, Burnett, and Wicker 2015) found interdisciplinary approach responses factor loaded at 0.826 on the first

Table 1: Characteristics of LPS Study Sample

	<i>Physician Trainees*</i>	<i>Nonphysician Trainees[†]</i>
Sample size	56,569	78,038
Gender		
Male	30,280 (57.1)	15,616 (20.4)
Female	22,762 (42.9)	61,012 (79.6)
Medical school		
United States	39,947 (82.1)	0 (0.0)
Non–United States	8,701 (17.9)	0 (0.0)
Mix of patients seen		
≥65 years	65%	66%
Mental illness	41%	42%
Medical illness	78%	70%
Multiple illness	78%	72%
Alcohol/substance dependent	45%	42%
Low income/status	51%	49%
Lack social support	41%	40%
Facility		
Least complex	1,392 (2.5)	7,579 (9.7)
Medium complexity	5,977 (10.6)	12,030 (15.4)
Complex	12,056 (21.3)	15,144 (19.4)
Very complex	14,177 (25.1)	13,997 (17.9)
Most complex	22,967 (40.6)	29,288 (37.5)
Academic level		
Pre-baccalaureate	0 (0.0)	27,317 (35.0)
Baccalaureate	0 (0.0)	19,060 (24.4)
Masters	0 (0.0)	11,480 (14.7)
Doctoral	17,473 (30.9)	15,444 (19.8)
Postdoctoral	39,096 (69.1)	4,737 (6.1)
PGY 1	10,277 (18.2)	0 (0.0)
PGY 2	8,867 (15.7)	0 (0.0)
PGY 3	9,052 (16.0)	0 (0.0)
PGY 4	5,886 (10.4)	0 (0.0)
PGY 5	2,949 (5.2)	0 (0.0)
PGY 6+	1,997 (3.5)	0 (0.0)
Learning environment [‡]		
Very satisfied	22,482 (39.7)	51,251 (65.7)
Somewhat satisfied	25,517 (45.1)	21,994 (28.2)
Neither	4,784 (8.5)	2,386 (3.1)
Somewhat dissatisfied	2,775 (4.9)	1,701 (2.2)
Very dissatisfied	1,011 (1.8)	706 (0.9)

Continued

Table 1 Continued

	Physician Trainees*	Nonphysician Trainees†
Faculty and preceptors§		
Very satisfied	29,978 (53.0)	54,339 (69.6)
Somewhat satisfied	21,099 (37.3)	18,344 (23.5)
Neither	2,711 (4.8)	2,077 (2.7)
Somewhat dissatisfied	1,923 (3.4)	2,202 (2.8)
Very dissatisfied	858 (1.5)	1,076 (1.4)
Response bias¶	-0.08 ± 0.75	0.05 ± 0.70

*Physician trainees number, percent in parentheses. Includes *medical student* ($n = 17,473$), *internal medicine* ($n = 14,173$), *internal medicine subspecialties* ($n = 4,443$) (cardiology, critical care medicine, endocrinology, diabetes, and metabolism, gastroenterology, geriatric medicine, hematology, infectious disease, nephrology, oncology, pulmonary disease, rheumatology, sleep medicine, transplant hepatology), *other medical* ($n = 5,130$) (allergy and immunology, dermatology, family medicine, neurology, physical medicine, and rehabilitation), *hospital based* ($n = 4,581$) (anesthesiology, emergency medicine, medical genetics, nuclear medicine, pathology—*anatomic and clinical*, preventive medicine, radiation oncology, radiology—*diagnostic*, transitional year, and their respective subspecialties), *surgery* ($n = 6,712$) (colon and rectal surgery, neurologic surgery, ophthalmology, orthopaedic surgery, otolaryngology, plastic surgery, surgery, thoracic surgery, urology), and *psychiatry* (4,057) (including addiction, geriatric, and psychosomatic medicine).

†Nonphysician trainees number, percent in parentheses. Includes *nursing* ($n = 44,360$) (pre-baccalaureate, baccalaureate, masters, and doctoral), *dental* ($n = 2,660$) (dental assistants, dental hygienists, dental students, and post-doctoral residency program in dental specialty), *psychology* ($n = 4,475$), *social work* ($n = 4,017$), *podiatry* ($n = 1,191$), *optometry* ($n = 2,337$), *pharmacy* ($n = 8,682$), *medical technician* ($n = 2,593$) (laboratory, medical imaging, medical surgical support, radiation therapy technician trainees), *other associated health* ($n = 7,723$) (audiology and speech pathology, chaplaincy, chiropractic, marriage and family therapy, licensed professional mental health counseling).

§Elements comprising clinical learning environment domain are time working with patients, degree of supervision, degree of autonomy, amount of noneducational “scut” work, interdisciplinary approach, preparation for clinical practice, for future training, for business aspects of clinical practice, time for learning, access to specialty expertise, teaching conferences, quality of care, culture of patient safety, spectrum of patient problems, and diversity of patients.

¶Elements comprising faculty and preceptors domain are clinical skills, teaching ability, interest in teaching, research mentoring, accessibility and availability, approachability and openness, timeliness of feedback, fairness in evaluation, being role models, mentoring by faculty, patient-centered care, quality of faculty, and evidence-based clinical practice.

¶¶Mean index ± index standard error.

principal component to the 15 elements comprising the clinical learning domain, explaining 64 percent of the total variance, consistent ($\alpha = 0.96$), and a second component Eigenvalue of 0.87, suggesting that the domain elements were one dimensional. Similarly, patient-oriented responses factor loaded at 0.86 on the first principal component to the 13 elements comprising the faculty and preceptor domain. The first component explained 73 percent of the total element variance, consistent ($\alpha = 97$ percent), and a second component Eigenvalue of 0.53. Overall, LPS data show good internal consistency

across professions (Cannon et al. 2008, 2009; Kaminetzky et al. 2011; Lam et al. 2012) and predictive construct validity (Kashner et al. 2010).

An Associate Chief of Staff for Education or Designated Education Officer at each medical center used e-mails, spoken word, and posters to encourage trainees to complete the LPS. Confidentiality was assured through a national administration from a single website maintained by OAA's Data Management and Support Center, under licensing agreements with the Office of Management and Budget (OMB Information Collection #2900-0691, VA Form #10-0439), and with data accounting that emphasized respondent anonymity (Kashner et al. 2007).

Preference Score

Trainee satisfaction surveys are often subject to "response" biases that occur when respondents exhibit different thresholds when classifying their latent satisfaction intensity to a discrete response group comprising a Likert scale. In addition, education trainees are also subject to a "correct answer" bias (trainees respond in ways they think will please their faculty and program directors). To avoid such biases, we computed preference scores to reflect the extent trainees valued the importance of an element as a driver to further their learning goal. Derived from production theory in econometrics, preference scores are computed as the independent associations between how trainees rated a given element in a domain with their overall rating of the domain. Arithmetically, these scores are the independent change in the likelihood that overall satisfaction with a domain will increase by one level on the five-point Likert scale for each time the responder rates the given element at a higher level of satisfaction. Thus, trainees with positive, negative, or zero associations are said to perceive the given element as contributing positively, negatively, or nothing to enhance the overall satisfaction with the domain.

To be comparable over time and across professions, element-summary associations must be computed as *independent* associations, that is, adjusted to reflect variation in other domain elements, as well as response biases, respondent gender, year, and facility service complexity. Complexity was taken from the Department of Veterans Affairs ratings of each of its medical centers on a five-item scale (most complex, 1a; very complex, 1b; complex, 1c; medium complexity, 2; and least complex, 3). Classification is based on patient volume, types of services offered, patient complexity, teaching status, the number of training programs, and research activities. A response bias index was computed for each respondent by taking the difference between the respondent's

actual ratings for three facility-specific elements and the mean ratings across all respondents at the respondent's facility and academic year. Facility-specific elements are "computerized medical record system," "convenience of facility location," and "facility parking." Response bias is positive, zero, or negative, depending on whether the respondent rated facility-specific elements higher, the same, or lower than their peers who rotated through the respondent's facility during the same academic year.

Finally, preference scores are computed to be relative to a referent. That is, the estimated independent association between a given element of interest and domain summary is divided by the estimated independent association of a referent element. The referent was selected as the element with the largest association to the domain: quality of care for the learning environment domain and quality of faculty for the preceptor domain. As relative risks are ratios of probabilities, relative preferences are ratios of log odds ratios. Thus, a preference score of 50 percent means that higher satisfaction for the given element will enhance overall domain satisfaction by 50 percent of the referent element. Higher percentages mean higher perceived value. Zero percent means the element has no value to further trainee satisfaction with the overall domain.

Analyses

Associations on which preference scores are based were calculated using generalized linear models with cumulative logistic linking functions and multinomial logit distributions to account for ordinal satisfaction ratings. Independent variables included all element ratings within the domain, plus gender, facility complexity, and response bias indices covariates. Interaction terms were used to compare differences in associations between trainee groups, over time, and across academic levels.

RESULTS

Study Sample

A total of 146,980 trainees initiated the LPS online between 2003 and 2013, with 134,607 (91.6 percent) providing complete responses. Completion rates varied slightly by facility complexity, with 52,255 completed of 57,497 attempts (90.9 percent) at most complex facilities and 8,971 of 9,645 (93.0 percent) at least complex facilities. Completion rates varied only slightly across

VA's regional networks, with the highest completion rate reported at 10,316 of 10,934 (94.3 percent) and lowest at 5,029 of 5,637 (89.2 percent). Only those with completed responses were analyzed for this study.

Table 1 describes trainees as representing a wide range of academic levels, facility complexities, mix of patients seen, medical school status, and gender. Overall, nonphysician trainees offered higher ratings than physician trainees for both clinical learning environment ($\chi^2(4) = 9415, p < .0001$) and faculty preceptors ($\chi^2(4) = 4037, p < .0001$). Subsequent analyses showed that the response bias index did not vary significantly across professions, suggesting that trainees with either high or low biases do not appear to cluster by profession.

LPS physician resident convenience sample ($n = 39,096$) demographics compare well with all residents enrolled in U.S. ACGME-accredited programs in 2012–2013, exclusive of OB-GYN and pediatrics ($n = 100,440$) (ACGME 2013a,b). Compared with 2012–2013 U.S. GME residents, the LPS sample overrepresented internal medicine (36 percent vs. 25 percent) and psychiatry (10 percent vs. 6 percent) trainees, underrepresented hospital-based trainees (12 percent vs. 23 percent), and had comparable representation for internal medicine subspecialties (11 percent vs. 11 percent), surgery (17 percent vs. 19 percent), and other medicine (13 percent vs. 16 percent). These differences are consistent with VA's emphasis on primary care, mental health, and outpatient care. The LPS physician resident sample had comparable rates of international graduates in internal medicine subspecialties (45 percent vs. 43 percent), hospital-based (13 percent vs. 17 percent), surgery (11 percent vs. 10 percent), and psychiatry residents (33 percent vs. 33 percent), but underrepresented in internal medicine (28 percent vs. 42 percent) and other medicine (20 percent vs. 31 percent) residents. The LPS sample had comparable proportions of residents by gender and academic level within each specialty. For instance, 40.0, 30.5, and 30.0 percent of 2012–2013 GME internal medicine residents ($n = 23,597$) were at PGY-1, PGY-2, and PGY-3, compared with the LPS sample of 40.0, 27.8, and 32.2 percent, respectively.

Preference Scores

Table 2 shows preference scores, by element of interest and profession. The 95 percent confidence intervals are reported in brackets. Physician trainees valued interprofessional approaches at 14 percent [10,18] of the importance they placed on their most favored learning element, quality of care. Interprofessional scores ranged from 6.5 percent for internal medicine to 21.9 percent for surgery and 24.2 percent for medical students.

Physician trainees valued patient centeredness at 21 percent [16,26] of the value they placed on their most favored preceptor element, quality of preceptor. Patient-centered scores varied between 13.7 percent for internal medicine and 26.6 percent for other physicians and 26.0 percent for medical students.

Nonphysician Trainees

Nonphysician trainees valued interprofessional-approach learning environments at 37 percent [33,42], exceeding their physician counterparts by 23 percent [18,28] ($p < .001$). Interprofessional approaches were most favored by social work at 60 percent [43,77] and pharmacy at 56 percent [43,69], while least favored by nursing students at 30 percent [24,35] and podiatry residents at 20 percent [−2,43].

Nonphysician trainees valued patient-centered preceptors at 36 percent [32,41], exceeding physician trainees by 15 percent [10,21] ($p < .001$). Patient-centered preceptors were most favored by optometry (61 percent [36,85]) and pharmacy (55 percent [41,69]) and least favored by nursing (31 percent [25,37]) and podiatry (17 percent [−9,44]).

We also compared scores between related professions. Psychology had higher preference scores than psychiatry for both interprofessional clinical learning environments (44 percent vs. 8 percent, $\Delta = 36$ percent [20,52], Wald = 18.4, $p < .001$) and patient-centered preceptors (46 percent vs. 17 percent, $\Delta = 29$ percent [11,48], Wald = 9.4, $p = .002$). Optometry trainees scored higher than their surgery counterparts for both interprofessional clinical environments (46 percent vs. 22 percent, $\Delta = 24$ percent [2,47], Wald = 4.5, $p = .034$) and patient-centered preceptors (61 percent vs. 22 percent, $\Delta = 39$ percent [13,65], Wald = 8.5, $p = .003$). On the other hand, no statistically significant differences ($\alpha = .05$) were observed between optometry trainees and ophthalmology residents or between podiatry and orthopedic surgery residents.

Change over Years

Table 3 describes how preference scores for physician trainees changed by year. Overall, interprofessional scores rose by 2.5 percent/year [2,3] ($p < .001$), driven mostly by increases among internal medicine residents at 3.6 percent/year [2,5] ($p < .001$) and from surgery residents at 3.2 percent/

year. [1,6] ($p = .009$). No significant changes over time were found for patient-centered scores.

For nonphysician trainees, interprofessional scores did not significantly change by year. However, modest increases were found over time for patient-centered preceptors for nursing (1.7 percent/year [0.3, 3.1], $p = .019$), pharmacy (6.9 percent/year [2.5, 11.2], $p = .002$), and other health (4.9 percent/year [0.9, 8.8], $p = .017$) trainees.

Table 2: Preference Scores* for Interprofessional Care and Patient-Centered Preceptors among U.S. Health Professions Trainees Rotating through a VA Medical Center from FY2003 to 2013, by Profession

	<i>Preference Score</i>		<i>Nonphysician minus Physician Trainees</i>		<i>Wald χ^2</i>	<i>p</i>
	<i>v*</i>	<i>95% CI</i>	<i>$\Delta v^\dagger$</i>	<i>95% CI</i>		
Interprofessional care						
Physician trainees	14.3%	[10.5, 18.3]				
Medical students	24.2%	[17.6, 30.8]				
Internal medicine	6.5%	[0.4, 12.7]				
Medicine subspecialties	19.0%	[7.4, 30.7]				
Other	7.3%	[−3.1, 17.6]				
Hospital based	18.9%	[8.0, 30.0]				
Surgery	21.9%	[13.0, 30.8]				
Psychiatry	8.2%	[−3.3, 19.6]				
Nonphysician trainees	37.3%	[33.0, 41.5]	23.0%	[18.2, 27.8]	86.5	<0.001
Nursing	29.7%	[24.2, 35.3]	15.4%	[9.5, 21.2]	27.4	<0.001
Dentistry	30.7%	[10.5, 50.9]	16.4%	[−3.9, 36.7]	2.5	0.111
Psychology	43.9%	[31.7, 56.1]	29.6%	[17.0, 42.1]	21.7	<0.001
Social work	60.4%	[43.4, 77.3]	46.1%	[28.8, 63.3]	27.5	<0.001
Podiatry	20.2%	[−2.2, 42.7]	5.9%	[−16.6, 28.4]	0.3	0.599
Optometry	45.5%	[24.4, 66.5]	31.1%	[10.0, 52.4]	8.3	0.004
Pharmacy	55.6%	[42.8, 68.5]	41.2%	[28.2, 54.4]	38.1	<0.001
Technician	52.3%	[31.0, 73.6]	38.0%	[16.6, 59.5]	12.2	<0.001
Other associated health	41.1%	[30.3, 52.1]	26.8%	[15.6, 38.1]	22.2	<0.001
Patient-centered preceptors						
Physician trainees	20.9%	[16.1, 25.6]				
Medical students	26.0%	[18.7, 33.4]				
Internal medicine	13.7%	[5.8, 21.6]				
Medicine subspecialties	23.9%	[9.3, 38.5]				
Other	26.6%	[13.6, 39.6]				
Hospital based	19.0%	[7.5, 30.4]				
Surgery	21.7%	[11.9, 31.6]				
Psychiatry	16.6%	[2.8, 30.4]				

Continued

Table 2 Continued

	Preference Score		Nonphysician minus Physician Trainees		Wald χ^2	<i>p</i>
	<i>v</i> *	95% CI	$\Delta v^\dagger$	95% CI		
Nonphysician trainees	36.3%	[31.5, 41.2]	15.5%	[10.1, 20.8]	32.9	<0.001
Nursing	30.9%	[25.1, 36.5]	10.0%	[4.0, 16.1]	11.1	0.001
Dentistry	47.8%	[24.7, 70.8]	26.9%	[3.9, 50.0]	5.3	0.021
Psychology	46.0%	[32.4, 59.6]	25.1%	[11.3, 38.9]	12.9	<0.001
Social work	45.0%	[24.5, 65.3]	24.1%	[3.6, 44.7]	5.4	0.020
Podiatry	17.4%	[−8.9, 43.7]	−3.5%	[−29.9, 22.8]	0.1	0.807
Optometry	60.8%	[36.3, 85.2]	39.9%	[15.4, 64.5]	10.3	0.001
Pharmacy	54.8%	[40.5, 69.1]	34.0%	[19.5, 48.6]	21.2	<0.001
Technician	40.6%	[17.4, 63.9]	19.8%	[−3.6, 43.2]	2.8	0.093
Other associated health	46.6%	[32.4, 60.9]	25.7%	[11.2, 40.1]	12.4	<0.001

*Preference scores for element *i* to the trainee’s learning experience are calculated by $v_i = \frac{\ln \hat{u}_i}{\ln \hat{u}_r}$, where index *i* refers to the element “interdisciplinary care” from the clinical learning domain, and patient-centered preceptor from the faculty and preceptor domain. ($\ln \hat{u}_i$) is the log of the odds ratio that trainees rate the respective domain by one higher satisfaction level for each level increase in satisfaction trainees rate element *i*, independent of changes in all other elements within the same domain, and *adjusted* for responder biases, facility complexity, respondent gender, and year. ($\ln \hat{u}_r$) is the independent and adjusted association between rating the overall domain and the respective referent element: “quality” of care for the clinical learning domain ($\ln \hat{u}_r = 0.851 \pm .017$) and quality of preceptor for the faculty and preceptor domain ($\ln \hat{u}_r = 1.007 \pm .022$).

†Difference for each nonphysician trainee profession is computed as the mean score for the given nonphysician profession minus the mean score for all physician trainees.

Change over Academic Level

Table 3 also describes how scores changed according to academic level. Overall, neither interprofessional nor patient-centered scores were significantly associated with the progress trainees made through medical school or GME. In fact, medical students had higher interprofessional scores than their GME resident counterparts (*p* < .001) (from Table 3).

DISCUSSION

This study used VA’s 11-year, national survey data of a representative sample of health professions trainees to compute preference scores that quantifies how much they value learning about interprofessional care. Our findings suggest that despite U.S. academic policies emphasizing IPE, physician trainees tended to place less importance on interprofessional learning and

Table 3: Change in Physician Trainee Preference Scores over Years from 2003 to 2013, and across Academic Level, by Profession

	<i>Year*</i>			<i>Academic Level†</i>		
	<i>Δv/yr.</i>	<i>95% CI</i>	<i>p</i>	<i>Δv/yr.</i>	<i>95% CI</i>	<i>p</i>
Interprofessional						
Physician trainees	2.5%	[1.6, 3.3]	<0.001	−0.7%	[−2.2, 0.7]	0.325
Medical students	1.4%	[−0.5, 3.2]	0.131	−2.6%	[−12.8, 7.8]	0.626
Internal medicine	3.6%	[2.1, 5.1]	<0.001	4.0%	[−1.9, 10.0]	0.181
Medicine subspecialties	0.2%	[−3.2, 3.6]	0.886	−8.5%	[−16.9, 0.1]	0.053
Other	2.8%	[0.0, 5.8]	0.054	−4.2%	[−12.5, 3.8]	0.303
Hospital based	2.7%	[−0.4, 5.8]	0.083	3.2%	[−4.3, 10.7]	0.282
Surgery	3.2%	[0.8, 5.6]	0.009	4.9%	[−0.4, 10.2]	0.064
Psychiatry	0.9%	[−2.1, 4.0]	0.543	1.8%	[−0.7, 4.2]	0.573
Patient centered						
Physician trainees	0.6%	[−0.6, 1.7]	0.312	−0.6%	[−2.6, 1.4]	0.549
Medical students	0.5%	[−1.7, 2.7]	0.649	−1.5%	[−14.8, 11.8]	0.826
Internal medicine	1.0%	[−1.3, 3.3]	0.379	−3.6%	[−11.7, 4.5]	0.385
Medicine subspecialties	−3.8%	[−8.2, 0.6]	0.088	−10.9%	[−22.3, 0.5]	0.060
Other	1.1%	[−2.7, 4.9]	0.586	−0.4%	[−11.9, 11.1]	0.951
Hospital based	1.0%	[−2.5, 4.5]	0.577	−3.6%	[−13.0, 5.9]	0.454
Surgery	1.3%	[−1.7, 4.3]	0.387	4.9%	[−1.1, 10.8]	0.108
Psychiatry	2.3%	[−1.8, 6.4]	0.269	9.7%	[−4.1, 23.5]	0.166

*Mean annual change in preference score by year from 2003 to 2013.
†Mean change in preference score per year of progress in medical school year 1–4, and PGY1-9 in a graduate medical education residency or fellowship program.

patient-centered preceptors than their nonphysician counterparts, especially when compared with optometry, pharmacy, and social work trainees. While these data show some improvements were achieved from 2003 to 2013, scores did not seem to improve as trainees progressed through medical school and residency training. These findings suggest that academic policies emphasizing IPE in physician education since 2000 have been insufficiently successful, lending credibility to the theory that lack of exposure to well-articulated and high functioning care models and the presence of “hidden curricula” will lead trainees to develop moral and empathic calluses toward interprofessional and patient-centered care.

Trainees who place little value on interprofessional learning experiences may be less likely to engage in interprofessional activities after they enter independent practice or to change their behavior through continuing professional development programs (Asch et al. 2009). Our findings demonstrate the need to explore new ways to emphasize interprofessional learning and patient-centered care, as called for by the Coordinating Center for

Interprofessional Education and Collaborative Practice under the Patient Protection and Affordable Care Act (P.L. 111-148) (2010), the Department of Veterans Affairs redesign of graduate medical education in primary and specialty care settings that specifically emphasize team-based, patient-centered care (Rugen et al. 2014), and the recently released Institute of Medicine (2015) report on the impact of IPE on collaborative practice and patient outcomes.

Our inferred approach to compute scores is in contrast to other methods that (1) examine direct responses to attitudinal surveys (Luecht et al. 1990; Parsell and Bligh 1999; Hawk et al. 2002; Lindqvist et al. 2005; Hansson, Foldevi, and Mattsson 2010) that ask respondents to value directly the given element; (2) analyze free text to compute the number of times respondents mention an element as a program strength or weakness (Thrush et al. 2007); and (3) describe how an independent panel or group of residents used elements to rank programs and their supervisors (Wright et al. 1998; O'Busari et al. 2005; Byrne et al. 2012). Consistent with our findings, these studies reported that physicians and nurses tended to value teams and collaboration, but less so compared with other program elements such as faculty quality, preceptor availability, teaching devotion, teaching ability, patient diversity, and autonomy. None of these studies, however, examined how preferences varied across professions, over time, or academic level after adjusting for response biases.

Our finding that medical students scored higher preferences for interprofessional environments than their resident counterparts is consistent with prior studies that showed readiness for IPE is highest when students first enter professional education (Coster et al. 2008) when professional stereotyping may be high and lowest at the end of their academic program when professional identity emerges. Our findings are also consistent with studies that directly surveyed students, showing physician trainees valuing IPE less than their nursing and pharmacy counterparts (Aziz, Teck, and Yen 2011).

There are reasons why trainees may not highly favor interprofessional clinical learning environments. Collaboration may be discounted due to differences in content (Thomas, Sexton, and Helmreich 2003), communication styles (Stein-Parbury and Liaschenko 2007), or perceived need (Sexton et al. 2006). Multidisciplinary teams (Mollenman et al. 2008) and interprofessional collaboration (Rose 2011) may interfere with the development of professional identity and autonomy. Such concerns are often raised about nursing education (Baggs et al. 1997; Sexton 2000; Miller 2001), as our findings showed nursing students ranking interprofessional clinical learning environments

lower than other nonphysician trainees. Finally, trainees may not think that interprofessional team and patient-centered care will factor heavily in course grades, student evaluations, or licensing and board certification examinations, suggesting a “hidden” curriculum (Hafferty 1998).

There are study limitations. Findings are based on trainee perceptions. Responses to perceptions surveys, however, have been shown to change when interdisciplinary approaches and interspecialty clinical experiences are introduced into medical school curricula (Reuben et al. 2009). How respondents from different professions interpreted the meaning of “interdisciplinary approach” may have varied. Efforts to minimize response bias included (1) national administration to ensure confidentiality and uniform response conditions, (2) adjusted estimates to account for response bias index, and (3) relative scores computed as ratios of satisfaction ratings to cancel rating biases.

Finally, it is unclear if differences in preferences between physician and nonphysician trainees are due to differences in curriculum, exposure to interprofessional learning, IPE models of care delivery, or how students are selected.

CONCLUSION

Despite some progress since 2003, U.S. physician residents continue to lag behind their nonphysician counterparts in the value they place on learning about interprofessional team and patient-centered care. It remains unclear if differences in how IPE is valued are products of how trainees are selected, their education curriculum, exposure to interprofessional learning environments, or to IPE models of care delivery in clinical teaching facilities. Consistent with the recommendations by federally chartered advisory groups on health professional education, continued efforts are warranted to incorporate IPE, collaborative practice, and patient-centered care into both the curriculum and clinical care teaching models for both undergraduate and graduate medical education.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: Sincere gratitude is expressed for the support from the Office of Academic Affiliations (OAA), the OAA National Evaluation Workgroup (Sheri A. Keitz, M.D., Ph.D., Chair), Christopher T.

Clarke, Ph.D., Terry V. Kruzan, George E. McKay, and Laura Stefanowycz of the OAA Data Management and Support Center in St. Louis, Missouri, and to the network of Designated Education Officers and Associated Chiefs of Staff for Education at VA Medical Centers. This study was supported, in part, by the Office of Academic Affiliations, Veterans Health Administration, Department of Veterans Affairs, Washington, DC. All statements and descriptions expressed herein do not necessarily reflect the opinions or positions of the Department of Veterans Affairs or its affiliated institutions.

Disclosures: The listed first author, T. Michael Kashner, and co-authors, data statistician Annie B. Wicker and program analyst David Burnett, had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analyses.

Disclaimers: None.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.