Value of Occupational Medicine Board Certification

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Objective: To assess the impact of occupational medicine board certification and career stage on practice characteristics. **Methods:** Two hundred sixty occupational medicine physicians completed a questionnaire and 25 activity log descriptions about 72 items in 9 major domains. For each item, the percentage of activities involving the item and the percentage of physicians conducting the item at least once were calculated. Results were analyzed by board certification status and career stage. **Results:** Board-certified physicians had more-diverse practice activities and skills. They were more involved in management and public health–oriented activities, with greater emphasis on toxicology and less on musculoskeletal disorders. The noncertified physicians received more payment from workers' compensation. Early-career physicians spent more time in direct injury/illness treatment, being paid by workers' compensation, and addressing musculoskeletal problems. **Conclusions:** Formal training confers advantages in practice diversity and population medicine orientation.

Occupational medicine (OM) is a diverse field, with activities ranging from public health and workplace prevention to injury treatment.[1,2] In the United States, although a physician may practice in the field without formal training, many complete a 3-year postgraduate residency program and pass a board certification examination. Only 40% members of the major US professional organization American College of Occupational and Environmental Medicine are board certified in OM.[3] This process is somewhat analogous to the comparable registrarships and other postdoctoral training programs in Europe.

To characterize this specialty, we conducted a study of a diverse national sample of OM physicians. The occupational medicine practice (OMP) study used questionnaires, focus groups, and activity logs to characterize the activities and skills. Other reports summarize the overall results.[4,5] The OMP study and other studies[3,6,7] have documented the variability of practice activities within OM. This report examines two personal factors—board certification and career stage—that affect the types of activities and skills used.

METHODS

In the OMP project, a national sample of US OM physicians was recruited to assess their activities and the specific skills they used.[4,5] Each participating physician completed a baseline questionnaire about education, board certification status, and general activities. Participating physicians also completed activity logs, in which they described the specific activity they were conducting and the skills used for 25 specific times (five times a day for 5 days over approximately 1 to 2 weeks). Details of the method and overall results are described in an earlier publication.[5]

The research was funded by the National Institute for Occupational Safety and Health. The University of California at Los Angeles and the University of Arizona institutional review boards approved and periodically reviewed the research project. The physicians received a small fee for participation ($100 for the entire project). The participants were recruited by Web announcements, multiple e-mail recruitments, and exhibit booths at several national and regional OM meetings. In addition, several national and regional professional organizations notified their members of the availability of the project. Several major national health care corporations operating national networks of OM clinics also shared the information with their occupational health care providers.

Physician practice type was classified into three categories on the basis of baseline questionnaire responses: "Injury care" physicians treat high volume of patients with particular emphasis on workers' compensation relating care for injuries and occasional illnesses, "clinical specialist" physicians have lower volume and greater emphasis on illnesses, and "management/population" physicians have greater emphasis on population medicine. Criteria were previously described.[4]

Board certification in OM and career stage were the two key characteristics of primary interest in this study. Board certification in OM was grouped into certified, eligible, and not eligible on the basis of self-report. (Eligible physicians completed residency training but either did not take the board examination or failed it.) On the basis of the year of graduation from medical school, career stage was classified into four groups—early (graduation after 1996), mid (graduation in 1986 to 1995), senior (graduation in 1976 to 1985), and late (graduation before 1975).

Diversity of practice was assessed by the following two criteria:

1. How many activity items were performed at least once by a significant proportion (at least 25%) of participants? The overall data set included 72 subitems organized into nine major domains. The analysis determined how many subitems within each domain were performed by at least 25% of the physicians, according to certification status. (The number of possible subitems per domain differed among the domains).
2. How many different activity items were performed by each physician? For each of several activity domains, the number of different subitems conducted by each physician was determined. Within each domain, the minimum score was 1 (ie, no activity in domain) but the maximum was dependent on the number of items potentially included in the domain. In addition, a diversity summary score for each participant was calculated as a weighted sum of diversity scores for each of a priori selected domains. Domains were weighted by dividing each subject's score for the domain by the possible range prior to summation for the individual.

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Statistical Analyses

Data were managed using a relational database system (Microsoft Access, Redlands, WA), spreadsheet program (Microsoft Excel, Redlands, WA), and statistical analysis software (SAS for PC, version 9.1; SAS Institute, Cary, NC). Statistical analyses were conducted for descriptive purposes and to test differences among groups. Descriptive statistics of participants characteristics were compared between groups (by board certification status or career stage) by either chi-squared (for nominal variables) or Mantel-Haenszel (for ordinal variables) test as appropriate (Table 1). Activity log data were summarized using two metrics. The first metric was the percentage of activity logs that reported each specific activity (number of logs with activity divided by number of logs returned). The means of these percentages for each characteristic of interest were then compared across groups with the Kruskal-Wallis test (Table 2). The summarization metric was whether or not the physicians carried out an activity at least once during the observation times (termed "ever," see Table 3). The proportion of physicians ever performing activities was compared across groups, using the chi-squared test (certification status) or the Mantel Haenszel test (career stage). The diversity score results for individual domains and for the diversity summary score were analyzed by analysis of variance, with certification status and career stage as class variables. Analyses were then repeated including an interaction term for certification and career stage.

RESULTS

The analysis is based on the study of 260 physicians who successfully completed the activity logs. Table 1 summarizes the characteristics of the participants. All regions of the United States were represented in the sample. There were differences in characteristics, according to the board certification status. For example, board-certified physicians were more likely to be American College of Occupational and Environmental Medicine members ($P < 0.0001$). One third of board-certified physicians are involved in management duties, while eligible/non–board-certified physicians predominantly practiced injury care ($P < 0.0001$). Board-certified physicians more frequently work in consulting companies and academic fields but less frequently work in corporate settings than their eligible/non–board-certificated counterparts ($P = 0.021$). Personal characteristics and career stage were not significantly related, except sex (older groups had fewer women, eg, 47% of early-career physicians were women versus 4% in the late stage; $P = 0.002$). The number of logs submitted did not differ by certification status or by career stage (range of group means was from 22.1 to 23.0).

Board Certification Status

As shown in Table 2, board certification status had statistically significant effects on the proportion of time spent in several practice activities. Workers' compensation care accounted for more time for noncertified than certified physicians (41% vs 27%, $P = 0.0012$), and noncertified physicians had a greater proportion of time devoted to care for injured/ill patients (53% vs 40%, $P = < 0.0001$). In addition, the noncertified physicians spent more time on general musculoskeletal problems (25% vs 19%, $P = 0.0008$) and devoted considerably more time to diagnosis (38% vs 25%, $P = 0.0004$) and treatment (21% vs 13%, $P < 0.0001$).

In contrast, board-certified physicians spent more time dealing with the workplace environment (4% vs 2%, $P = 0.0017$) and conducting activities for the benefit of an employer/company (21% vs 13%, $P = 0.0014$). Board-certified physicians activities were more likely to be oriented to the needs of industry (14% vs 5%, $P < 0.0001$). They also gave greater emphasis on toxicologic conditions (6% vs 1%, $P < 0.001$). They used management, legal, and hazard-assessment skills more frequently than the noncertified physicians

TABLE 1. Characteristics of Study Participants[a]

	Board Certification							Career Stage								
	Yes		Eligible		No			Early		Mid		Senior		Late		
	n	%	*n*	%	*n*	%	P^b	*n*	%	*n*	%	*n*	%	*n*	%	P^b (MH)
Overall	159	61	28	11	73	28		43	17	79	30	110	42	28	11	
Career stage							ns (MH)									
Late	18	11	1	4	9	12										
Senior	73	46	13	46	24	33										
Mid	46	29	5	18	28	38										
Early	22	14	9	32	12	16										*
Practice setting							**									
Private practice	66	42	14	50	37	51		14	33	38	48	54	49	11	39	
HMO (staff model)	12	8	1	4	5	7		7	16	5	6	5	5	1	4	
Corporate	35	22	9	32	23	32	*	11	26	18	23	33	30	5	18	ns
Government	15	9	1	4	5	7		8	19	7	9	3	3	3	11	
Consulting company	11	7	–	0	2	3		–	0	4	5	8	7	1	4	
University/academia	20	13	2	7	1	1		3	7	7	9	6	5	7	25	
Other	–	0	1	4	–	0		–	0	–	0	1	1	–	0	
Practice group							***									*
Injury care	83	52	24	86	62	85	**	34	79	52	66	69	63	14	50	
Clinical specialist	19	12	3	11	5	7		5	12	9	11	10	9	3	11	ns
Manage/population	57	36	1	4	6	8		4	9	18	23	31	28	11	39	

ns = $P > 0.05$; *: $0.01 < P < 0.05$; **: $P < 0.01$.
[a]Practice groups, career stages, and other definitions are described in detail in an earlier publication.
[b]P value was calculated from either chi-square or Mantel-Haenszel test appropriately applied to that variable.
HMO, health maintenance organization; MH, Mantel-Haenszel.

TABLE 2. Average Percentage of Times in Which an Activity Characteristic Was Present

	Board Certification, %				Career Stage, %				
n	Yes 159	Eligible 28	No 73	P^a	Early 43	Mid 79	Senior 110	Late 28	P^a
Payment source									
Workers' compensation	27	39	41	***	45	30	31	27	**
Employer/company	30	28	25	*	25	29	29	29	*
Primary beneficiary									
Injured/ill patient	40	58	53	***	57	42	43	44	**
Employer/company	21	13	13	***	13	21	18	19	*
Healthy worker	11	12	15	*	13	13	12	7	*
Society	2	1	0	***	2	2	2	1	*
Workplace environment	4	3	2	***	3	2	3	4	*
Activity focus									
Patient	56	76	73	***	77	60	60	61	***
Industry	14	7	5	***	7	11	11	11	*
Public health	5	1	2	***	2	4	4	2	*
Health condition									
Musculoskeletal (not spine)	19	28	25	***	30	19	21	19	***
Spine	11	11	12	*	11	11	11	13	*
Acute injury	4	9	7	***	8	5	5	4	*
Toxicology	6	1	1	***	3	3	4	5	*
Where									
Occupational clinic	38	56	50	**	61	47	37	30	***
Other skills									
Diagnosis	25	41	38	***	35	28	29	32	*
Legal	22	21	16	**	16	21	21	23	*
Treatment	13	26	21	***	21	16	16	17	*
Hazard	14	12	8	**	12	11	11	19	**
Communication skills									
Pt: Diagnose/treat	28	43	38	***	42	32	29	28	**
Pt: Prevention	18	31	22	***	26	20	20	17	*
Pt: Work restriction	11	27	22	***	25	15	14	13	*
Meeting (small)	7	4	4	***	5	7	5	6	*
Meeting (large)	7	4	3	**	4	6	6	8	*

ns = $P > 0.05$; *: $0.01 < P < 0.05$; **: $P < 0.01$.
[a] P values were calculated from Kruskal-Wallis test. Pt, patient.

(19% vs 12%, $P = 0.006$; 22% vs 16%, $P = 0.016$; 14% vs 8%, $P = 0.035$ respectively). They were also significantly more likely to spend time in both large- and small-group meetings.

The impact of board certification was also evaluated by estimating the proportion of physicians who carried out an activity at least once during the reported times. These results are shown in Table 3. In comparison with noncertified physicians, the proportion of board-certified physicians conducting an activity was considerably higher for toxicology; 41% of certified physicians had at least one toxicology-related activity versus only 14% of the noncertified physicians ($P < 0.0001$). Similarly, board-certified physicians were much more likely to have reported an activity for the benefit of a group of workers ($P = 0.033$), the workplace environment ($P = 0.0079$), or society in general ($P = 0.0017$). They were also more likely to have at least one activity period focused on public health (40% vs 19%, $P < 0.0007$) or for the benefit of industry (72% vs 48%, $P < 0.0005$). Conversely, the certified physicians were less likely to have communicated with patients about diagnosis and treatment (80% vs 92%, $P = 0.0289$) or about work restriction (50% vs 68%, $P = 0.0053$).

Conversely, many factors were similar for the board-certified and noncertified physicians. Activities that were very common among noncertified physicians were also generally incorporated in the work of the certified physicians. The board-certified physicians were less likely to have treated injured/ill patients ($P = 0.04$), but such care was common for both groups (90% vs 97%). Musculoskeletal conditions were commonly handled at least once for both, although less so for the certified physicians (92% vs 83%, $P = 0.02$). Workers' compensation payment was also quite relevant to both. Additional commonalities may be seen in Tables 2 and 3.

Career Stage

There were differences according to career stage. Table 2 also shows average percentage of time spent in each activity. Early-career physicians spent significantly more time (57% of times sampled) caring for ill/injured patients than those in the mid-, senior-, and late-career stages (42% to 44%, $P = 0.021$). They also spent more time in activities paid by workers' compensation ($P = 0.0276$) and in occupational health clinics ($P = 0.0021$). The early-career physicians spent considerably more time with musculoskeletal problems than

TABLE 3. Percentage of Subjects Who Reported an Activity Characteristic at Least Once

	Board Certification, %				Career Stage, %				
	Yes	Eligible	No		Early	Mid	Senior	Late	
n	159	28	73	P^a	43	79	110	28	P^a
Payment source									
Workers' compensation	74	82	88	*	86	75	80	75	*
Employer/company	88	82	90	*	77	95	88	86	*
Primary beneficiary									
Injured/ill patient	90	100	97	**	100	91	93	89	*
Employer/company	85	79	79	*	77	90	80	82	*
Society	23	7	5	***	12	18	15	25	*
Worker group	42	21	29	**	26	38	39	36	*
Workplace environment	42	36	21	***	44	25	38	36	*
Activity focus									
Patient	96	100	99	*	100	96	96	96	*
Industry	72	50	48	***	58	62	67	57	*
Public health	40	14	19	***	26	32	35	29	*
Health condition									
Musculoskeletal (not spine)	83	100	92	**	100	85	85	82	**
Spine	61	71	70	*	65	68	65	54	*
Acute injury	37	64	52	***	60	44	36	50	*
Toxicology	41	14	14	***	35	20	35	36	*
Where									
Occupational clinic	66	79	75	*	88	75	61	64	***
Other skills									
Diagnosis	84	96	89	*	88	86	86	86	*
Legal	88	93	71	***	72	89	85	86	*
Treatment	67	89	84	***	88	67	73	75	*
Hazard	65	79	48	***	67	53	61	82	*
Communication skills									
Pt: Diagnose/treat	80	93	92	**	91	84	85	79	*
Pt: Prevention	72	89	82	*	79	82	75	68	*
Pt: Work restriction	50	75	68	***	63	61	56	50	*
Meeting (small)	60	36	38	***	47	56	51	50	*
Meeting (large)	54	50	37	*	40	51	52	46	*

ns = $P > 0.05$; *: $0.01 < P < 0.05$; **: $P < 0.01$.
[a] P values were calculated from either chi-squared or Mantel-Haenszel test appropriately applied to that variable.

did the others ($P = 0.0045$). There was a not statistically significant trend for increasing time for toxicologic problems with advancing career stage perhaps because of the small overall time spent on these problems.

The pattern was different when assessed by "ever" metric (ie, whether the physician did an activity at least once in the 25 times sampled; Table 3). Differences were less prominent than when considering the distribution of time. Although they spent less time in many activities, most of the more-senior physicians also had patient activity and received some payment from workers' compensation sources. Although there were statistically significant differences for the proportion of physicians who ever dealt with musculoskeletal problems ($P = 0.0373$), 82% did so even in the least frequent group. The late-career physicians had more legal involvement than the others. Thirty-two percent reported meeting with a lawyer (vs 10% to 12% in the other groups), and 25% wrote legal communications (in comparison with 5% to 12% for the others). Several activities that accounted for a low proportion of time in the early-career physicians were conducted at least once. For example, toxicology accounted for only 3% of the time of early-career physicians, but 35% did so at least once.

Practice Diversity

Diversity of practices was assessed by examining the data for all variables. Sixty-one of the 72 subitems were "ever" done by at least 25% of certified physicians, but 51 subitems were done by at least 25% of noncertified physicians. Figure 1 shows the number of subitems in each of the major domains for which at least 25% of the physicians in each group did the activity at least once; for 8 of the 9 domains, the number of such subitems was greater for certified than for the noncertified physicians. (The number of subitems differed among domains.)

Table 4 summarizes the analyses on the basis of the number of activity items performed by each study participant, using the metric described in the Methods section. The analyses show that certification status has a highly significant impact on the diversity of practice. This was not due to confounding by career stage, because this impact persisted when adjusted for career stage. The analyses of

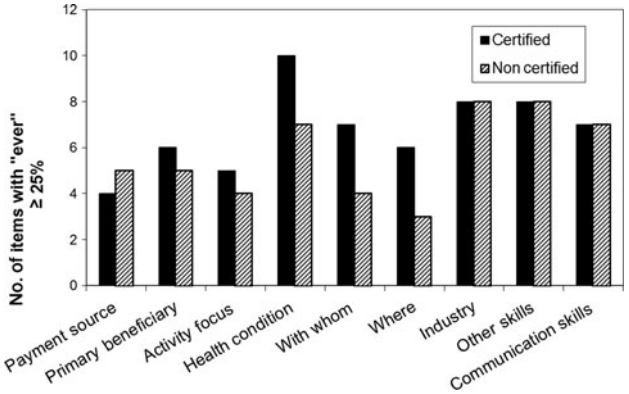

FIGURE 1. Diversity of practice. The figure compares certified (solid bars) and noncertified (striped bars) physicians. Each of the nine major practice domains (eg, payment source) included a series of subitems. The bars represent the number of subitems for which at least 25% of the physicians in each group did the activity at least once among the 25 logs reported. The number of subitems differed among the domains (see Table 3).

variance showed significant effects of certification status for every variable, except types of patient care, while career stage status effect was also statistically significant for several of the variables. The diversity summary scores, shown graphically in Fig. 2, also show that certified physicians had higher diversity scores, and career stage also had a significant effect. None of the analyses of variance including any interaction term between certification status and career stage had a statistically significant interaction term.

DISCUSSION

In the United States, board certification generally requires successful completion of a 3-year postgraduate residency training program, obtaining a masters of public health degree, and passing an examination.[8–10] Board certification in the United States is roughly equivalent to specialist-level certification in the United Kingdom.[11] Nevertheless, unlike other medical specialties, a relatively small proportion of physicians practicing in the area are actually board certified.[3] The OMP study data provide insight into the effect of board certification and career stage on practice characteristics. The study obtained information from two sources, questionnaires and practice activity logs, providing approximately 25 snapshots of activities for each participating physician. The diversity of the sample facilitates assessment of factors affecting practice activities.

Understanding the effect of formal training and board certification should help guide postgraduate medical education programs in the specialty. Furthermore, these data can provide insight to individual physicians and policy leaders about the value of committing time and resources for several years of formal training before entering practice in the field. Information about career stage may help assure that educational programs train for a full career, not simply the "first job."

This study showed that there were both differences and commonalities among board-certified and non–board-eligible physicians. Several broad patterns are identified, which are as follows:

1. Several specialized activities such as those related to toxicology and public health were considerably more frequent among the board-certified physicians. In general, these differences are best demonstrated for activities/skills that are relatively infrequently used (eg, <10% times or <20% ever doing it) than for the activities/skills that are overall more frequent.
2. Many activities and skills are held in common, suggesting that the cadre of occupational physicians does not consist of two distinct groups. This finding is consistent with our earlier analysis of the baseline questionnaire data, which supported the hypothesis that there were three categories of practices, but that there was a significant amount in common.[5]
3. The practice activity and skill distinctions between board-certified and non–board-certified eligible physicians were generally more evident when considering the percentage of time spent with the activity than for the metric of whether they did it at least once in the sample of 25 coded times. The certified physicians, therefore, seem to have more-diverse activities rather than different activities (ie in comparison to the noncertified, the certified physicians use a broader skill set rather than a different skill set).

These results imply that formal training and board certification allow the physician to conduct a more-diverse practice rather than preparing the physician for a fundamentally different type of practice. Board-certified physicians were involved in many more types of activities than the noncertified practitioners. In addition, the board-certified physicians were more likely to conduct activities having impact on populations rather than single patients.

The results of this study, which are based on actual activities, complement several surveys about occupational physicians' opinions about the value of several competencies. A large US survey showed that board-certified physicians tended to place greater value on data analysis, management, surveillance, and scientific principles,[3] and another demonstrated that formal residency training led to ascribing greater value to areas such as toxicology and epidemiology.[7]

The study included only physicians whose practices were focused on occupational health. Even the noncertified physicians in this study had many years of experience, which may partially compensate for the absence of formal residency training. It is likely that there are greater differences between full-time OM practitioners and those for whom occupational medical conditions constitute only a limited component of practice. For example, many dermatologists, pulmonologists, and family physicians see relatively few occupationally related patients.[12,13] Thus, this report's demonstrated differences between certified and noncertified physicians may underestimate the actual impact of training/certification. Furthermore, the study may underestimate the benefit of residency training, because some of the noncertified physicians probably had formal residency in OM, although they did not sit for the board examination. (Only 75% of recent graduates in another study were actually board certified.)[6]

Focusing practice in OM, regardless of certification status, may confer significant benefits. An analysis based on 5000 physicians participating in the US National Ambulatory Care Survey showed that occupational physicians were three times more likely than primary care physicians to address workplace issues when caring for work-related injuries.[14]

Career stage also had effects, although not as great as training. Areas of particular emphasis differed in the early career stage. Physicians who were early in their OM career tended to focus more on clinical activities than their more-senior colleagues and have considerably greater focus on musculoskeletal problems than their seniors.

Effects of both certification status and career stage were identified. Because these factors were not randomly distributed (ie, among earlier stage physicians, certification was less common), we assessed whether the observed effects of certification were due to confounding by career stage. Table 4 and Fig. 2 indicate that the observed effect of certification status is not due to confounding by career stage. Indeed, the impact of certification was more generally consistent and larger than the effect of career stage per se.

Recognizing that activities will vary over the professional career, educational programs should prepare trainees for lifelong

TABLE 4. Practice Diversity by Certification Status and Career Stage[a]

Career Stage	Certified, Mean (SD)	Noncertified, Mean (SD)	ANOVA	Significance	
Primary beneficiary					
Early	4.44 (1.48)	3.96 (2.10)	Cert	<0.0001	**
Mid	4.91 (2.03)	4.35 (1.37)	Career stage	0.32	NS
Senior	5.04 (1.67)	4.03 (1.48)			
Late	5.00 (1.87)	3.65 (1.83)			
Communication					
Early	5.53 (1.42)	4.92 (2.28)	Cert	0.01	**
Mid	5.60 (2.00)	5.27 (1.82)	Career stage	0.40	NS
Senior	5.67 (1.88)	4.90 (1.47)			
Late	5.20 (2.36)	4.36 (2.47)			
Health care system					
Early	1.74 (0.76)	1.48 (0.78)	Cert	0.00	**
Mid	2.11 (0.79)	1.85 (0.98)	Career stage	0.05	NS
Senior	1.97 (0.83)	1.58 (0.75)			
Late	2.05 (0.83)	1.50 (0.66)			
Industry					
Early	5.70 (2.69)	7.04 (2.59)	Cert	0.00	**
Mid	5.71 (2.93)	7.48 (2.11)	Career stage	0.31	NS
Senior	6.07 (2.82)	6.38 (2.63)			
Late	5.10 (2.52)	5.93 (3.08)			
Management					
Early	2.66 (1.53)	2.20 (1.26)	Cert	0.00	**
Mid	3.37 (1.55)	2.72 (1.66)	Career stage	0.02	*
Senior	3.36 (1.43)	2.68 (1.60)			
Late	3.05 (1.47)	2.22 (1.63)			
Industry					
Early	1.96 (0.83)	1.56 (0.77)	Cert	<0.0001	**
Mid	2.10 (1.01)	1.74 (0.83)	Career stage	0.42	NS
Senior	2.20 (0.95)	1.65 (0.95)			
Late	2.20 (1.37)	1.79 (0.98)			
Practice management					
Early	1.44 (0.51)	1.44 (0.51)	Cert	0.00	**
Mid	1.70 (0.47)	1.48 (0.51)	Career stage	0.03	*
Senior	1.72 (0.46)	1.58 (0.51)			
Late	1.60 (0.51)	1.36 (0.50)			
Patient care					
Early	3.87 (1.18)	3.36 (1.26)	Cert	0.12	NS
Mid	3.50 (1.40)	3.56 (0.93)	Career stage	0.45	NS
Senior	3.77 (1.45)	3.38 (1.11)			
Late	3.30 (1.50)	3.15 (1.57)			
Public health					
Early	1.40 (0.95)	1.24 (0.44)	Cert	<0.0001	**
Mid	1.70 (0.96)	1.22 (0.48)	Career stage	0.50	NS
Senior	1.65 (0.94)	1.25 (0.59)			
Late	1.60 (0.89)	1.15 (0.54)			
Summary score					
Early	133.01	134.29	Cert	<0.0001	**
Mid	354.28	222.81	Career stage	0.02	*
Senior	507.84	224.24			
Late	123.24	71.47			

ns = $P > 0.05$; *: $0.01 < P < 0.05$; **: $P < 0.01$.
[a]Analyses repeated with interaction term included showed no significant interaction terms.
ANOVA, analysis of variance.

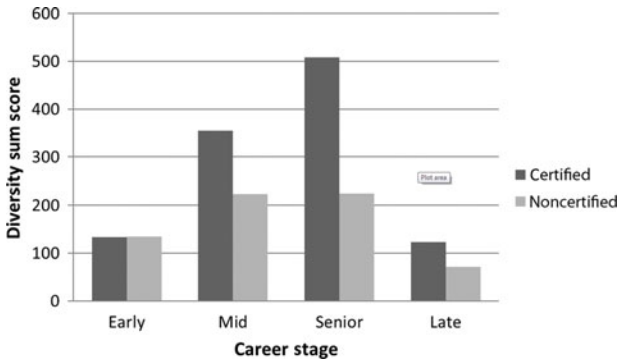

FIGURE 2. Diversity summary score by career stage and certification status. The figure shows the diversity summary scores as defined in Table 4, which also shows standard deviations for each group.

practice and not solely focus on skills for activities during the first job. Skills in areas such as toxicology, while relatively infrequently used in early career stage, will be important later in their careers. In a related study, we observed that career transitions are frequent.[15]

LIMITATIONS

The OMP study was cross-sectional in nature. Therefore, the study cannot directly determine whether the differences according to career stage represent natural professional progression or represent a cohort effect (ie, whether the field has fundamentally changed). Although participants came from multiple areas in the United States and recruitment methods were used, it is possible that participants may not be completely representative of all physicians providing occupational medical services. For example, the proportion of physicians who were board certified in this study is greater than that in the major US professional organization.[3] In addition, board certification status was based on self-report and not independently verified.

Board certification status is a composite characteristic. Board certification depends on successfully passing a 1-day written test, formal educational coursework, and experiential learning. The data do not permit identifying the specific components that are responsible for the demonstrated effect of certification. Indeed, the nature of these three components has varied over time and continues to evolve. During some years, certification required completing a masters of public health degree, whereas in the past and most recently, completion of specified coursework without a degree would qualify an individual for taking the board examination. Similarly, during the "middle years," experiential learning in a formal OM residency was required; in the earlier years and more recently, the "alternative pathway" criteria permit experiential learning outside a formally approved residency program.

IMPLICATIONS

The study supports the value of formal training and board certification. Adequate education allows physicians to have a broader range of activities. This finding makes it unlikely that residency training fails to prepare physicians for the "real world" of frontline practice. Rather, the data suggest that the formal training allows physicians to more effectively integrate public health and frontline clinical activities. Education must prepare physicians for their full career, which may change over time.

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