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The Residency Training Experience in Podiatric Medicine and Surgery

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ABSTRACT

The podiatric medicine and surgery residency is currently characterized by 3 years of comprehensive training. Contemporary issues have recently influenced the direction of training in the profession of podiatric medicine. Formal investigation into the residency training experience has, nonetheless, been limited. The purpose of the present study was to conduct a learning needs assessment of podiatric residency training. An electronic survey was developed, with comparable versions for program directors and residents. The specific topics investigated included the use of minimum activity volume numbers, learning resources, duty hours, strengths and weaknesses of residents, motivation of hosting student externship positions, noncognitive residency traits, meetings between residents and directors, resident satisfaction, and director satisfaction. A total of 197 program directors nationwide were sent the survey electronically, and 109 (53%) responded. Of 230 residents receiving the survey, 159 (78%) responded. Several statistically significant differences, and notable similarities, were observed between the 2 groups encompassing many aspects of the survey. A majority opinion, among both directors and residents, was found that the use of procedural assessment tools might improve resident evaluation. The responding directors and residents agreed that the following 3 topics were weaknesses in podiatric training: practice management, biomechanics, and performing podiatric research. Direct feedback immediately after surgery was the most valuable learning resource reported by the residents. The results of our study reflect the current status of the podiatric medicine and surgery residency and could facilitate improvement in the residency training experience.

The residency in podiatric medicine and surgery has undergone constant transformation. Although 1-year rotating residencies were formerly common, residency training in the profession of podiatric medicine is now characterized by a standard 3 years of comprehensive training.

The Council on Podiatric Medical Education (CPME) is designated by the American Podiatric Medical Association (APMA) as the accrediting agency in the profession of podiatric medicine (1). CPME document 320 delineates the standards and requirements for approval of podiatric medical and surgical residencies (PMSRs). Compliance with these standards, which are separated into institutional standards and program standards, is necessary for both initial and continuing approval. Program standard 6.0 states broadly: "The podiatric medicine and surgery residency is a resource-based, competency-driven, assessment-validated program that consists of three years of postgraduate training in inpatient and outpatient medical and surgical management. The sponsoring institution provides training resources that facilitate the resident's sequential and progressive achievement of specific competencies." CPME document 320 standards also involve learning activities; for example, "Didactic activities that complement and supplement the curriculum shall be available at least weekly" (program standard 6.7), and, "A journal review session, consisting of faculty and residents, shall be scheduled at least monthly to facilitate reading, analyzing, and presenting medical and scientific literature" (program standard 6.8).

Currently, the CPME requires that graduating residents complete a minimum number of case activities and procedure activities, defined together as patient care activity requirements. The required numbers for each of these activities is referred to as the minimum activity volume (MAV). The CPME 320 document defines MAVs as "patient care activity requirements that [en]sure that the resident has been exposed to adequate diversity and volume of patient care" (1).

One contemporary issue in podiatric medicine is the residency training shortage. According to the American Association of Colleges of Podiatric Medicine, residency programs were short 86 positions for the classes of 2012 and 2013 (2). Strategies to correct the residency training shortage have been discussed in various podiatric statements

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Table 1
Value of learning resources, sorted by resident and director scores

Variable	Residents			Directors			*p* Value
	Mean Score	n	SD	Mean Score	n	SD	
Direct feedback immediately after surgery	4.62	143	0.54	4.67	103	0.58	.4880
Personal communication with residency faculty	4.55	145	0.62	4.64	102	0.50	.2258
Cadaver foot/ankle laboratory sessions	4.54	145	0.61	4.46	102	0.71	.3441
Personal communication with other residents	4.49	144	0.72	4.73	102	0.60	.0063*
Personal communication with residency director	4.44	145	0.77	4.72	103	0.55	.0018*
Podiatric surgical texts	4.37	145	0.76	4.39	103	0.66	.8296
Radiology conferences	4.33	80	0.69	4.00	75	0.82	.0073*
Orthopedic surgical texts	4.23	145	0.78	4.08	103	0.84	.1497
Podiatric journals	4.13	143	0.89	4.20	102	0.83	.5332
Surgical videos, free	4.03	145	1.00	3.56	103	0.97	.0003*
Morbidity and mortality conferences	4.02	89	0.89	3.62	78	0.90	.0045*
Orthopedic journals	3.99	145	0.98	4.00	103	0.86	.9337
Journal clubs	3.93	145	0.84	4.11	103	0.79	.0896
Surgical videos, paid	3.89	145	1.01	3.81	102	0.85	.5141
Anatomic textbooks	3.86	144	0.94	3.83	101	0.90	.8026
Grand rounds	3.83	144	1.01	4.04	103	0.88	.0907
International training opportunities	3.83	64	1.15	3.08	49	1.29	.0015*
Pathology conferences	3.66	50	1.21	3.33	52	0.90	.1203
Other online podiatry education websites	3.37	143	1.12	3.02	103	1.01	.0124*
PRESENT Podiatry (online)	3.35	142	1.21	3.08	103	1.27	.0926

Abbreviation: SD, standard deviation.
* Statistically significant.

and commentaries (3–5). A second contemporary issue in podiatric medicine is the APMA Board of Trustees Vision 2015. The goal of Vision 2015 is, "to ensure that podiatrists are universally accepted and recognized as physicians consistent with their education, training, and experience" (6). The training of residents in the profession of podiatric medicine, in this context, is a central and critical issue (7).

Formal investigation of podiatric training institutions has the potential to improve the educational experience for both program directors and residents. The purpose of the present study was to identify the learning needs of PMSR programs through the use of a national survey. The goal was to provide insight into the wide range of issues affecting the future of these programs.

Materials and Methods

An online survey was designed using Qualtrics, a Web-based survey tool (Qualtrics LLC, Provo, UT). We collectively developed a survey for residents and one for directors. The existing published data on resident training was reviewed before the construction of the 2 surveys. To improve content validity, feedback was then solicited from 5 experienced podiatric physicians with exposure to academic podiatry and podiatric residency training. This feedback was used to add questions, remove questions, and refine the language or phrasing of the existing questions. Notably, the decision to address the topic of MAVs was generated through this portion of the feedback process. As a method of trialing the survey, 5 geographically diverse residency directors were then sent the survey. Feedback from these responses was used to further refine the questions. The final version included questions covering the following topics: residents' learning resources, resident work hours, supplemental resident hours, strengths and weaknesses of residents, motivation of hosting student externship positions, noncognitive residency traits, meetings between residents and directors, MAVs, resident satisfaction, and director satisfaction. The survey distributed to the directors is presented in Supplemental Appendix SA.

Electronic mail (e-mail) addresses were available for 197 of the 208 residency directors through the Central Application Service for Podiatric Residencies/Centralized Residency Interview Program website (available at: http://casprcrip.org). An introductory e-mail was sent describing the purpose of the study and other relevant information. In the introductory e-mail, the directors were asked to forward the e-mail to each of their active residents. The e-mail included separate links for residents and directors. All the responses were anonymous. Three weekly reminder e-mails were sent. At 3 weeks after the last reminder e-mail was distributed, the online survey was closed.

Data analysis was performed using an independent unpaired *t* test for all continuous variables, with the exception of trends by resident year. Trends by resident year were evaluated using 1-way analysis of variance. A chi-square test was used for all categorical variables. Statistical significance was defined at the 5% ($p \leq .05$) level. Pearson correlation coefficients were calculated to determine the trends with regard to resident satisfaction, director satisfaction, residency year, and program size. The local institutional review board approved the present study. The survey began with a brief question obtaining informed consent.

Results

Of 197 program directors contacted, individual questions were answered by 98 (50.0%) to 103 (52.3%) program directors. This

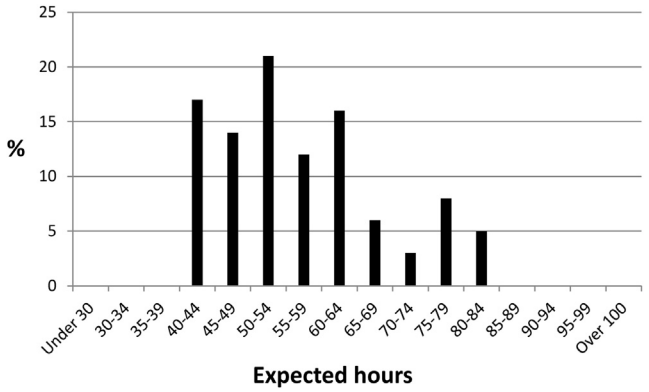

Fig. 1. Directors' expectation of resident work hours, against the percentage of directors (N = 103 directors).

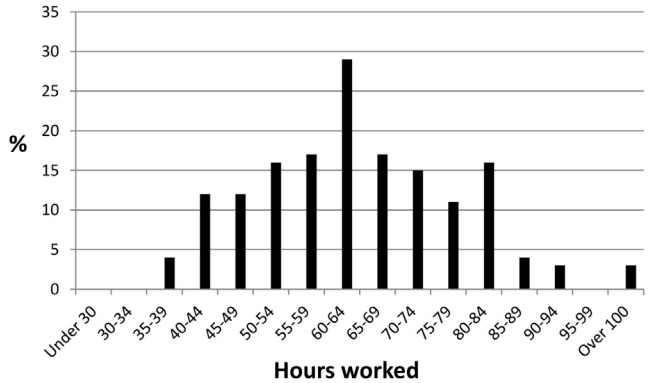

Fig. 2. Resident work hours self-reported by residents, against the percentage of residents (N = 159 residents).

Table 2
Purpose of hosting student externs

Reason	Mean Score		*p* Value
	Residents (n = 129)	Directors (n = 90)	
It allows you to evaluate students as potential residency applicants	4.73	4.79	.4395
It improves the teaching skills of the program's residents	4.29	4.15	.1663
It improves the management skills of the program's residents	4.08	4.06	.8526
It improves the academic knowledge of the program's residents	3.91	3.90	.9305
It improves the social skills of the program's residents	3.74	3.87	.3046

Responses ranged from 1 (strongly disagree) to 5 (strongly agree) (N = 219).

difference resulted from surveys that were started but not completed. The directors were asked how many of their residents received the survey. From these responses, a total of 231 residents received the survey. The number of responses from the residents to the individual questions ranged from 132 (57.1%) to 159 (68.8%). Survey reliability, determined by evaluating internal consistency, was good-to-excellent. Among the directors, Cronbach's α overall was 0.916 (95% confidence interval [CI] 0.842 to 0.966). Cronbach's α was 0.861 (95% CI 0.775 to 0.925) for the 20 items concerning learning resources and 0.956 (95% CI 0.942 to 0.968) for the 20 items concerning resident strengths and weaknesses. Among the residents, Cronbach's α overall was 0.929 (95% CI 0.871 to 0.969), 0.931 (95% CI 0.895 to 0.959) for learning resources, and 0.922 (95% CI 0.901 to 0.940) for strengths and weaknesses.

Of the 20 learning resources listed, the 3 items considered most valuable by the residents were as follows (Table 1):

1. Direct feedback immediately after surgery
2. Personal communication with residency faculty
3. Cadaver foot and ankle sessions

The following 5 items were considered more valuable by residents than directors, with statistical significance:

1. Free surgical videos
2. International training opportunities
3. Morbidity and mortality conferences
4. Radiology conferences
5. Online podiatry education websites other than PRESENT Podiatry (Present E-Learning Systems LLC, Boca Raton, FL)

The following 2 items were considered significantly more valuable by directors than by residents:

1. Personal communications with the residency director
2. Personal communications with other residents

Residents spent less time supplementing their education than directors had anticipated. More than two thirds (69.2%) of the residency directors believed that residents should be spending ≥6 hours each week supplementing their residency education; however, only 51.3% of residents identified spending at least that much time ($p = .0038$). Directors reported that they expected residents to work an average of 56.66 hours per week (Fig. 1). However, residents reported working an average of 63.67 hours each week (Fig. 2). This difference was statistically significant ($p < .0001$). Just more than one tenth (10.1%) of residents worked 80 to 84 hours a week, and 6.3% of residents worked ≥85 hours a week.

Of the responding directors, a considerable majority (86%) hosted podiatry externs at their residency program. The reasons for hosting student externs were similar between residents and directors (Table 2). Among both residents and directors, the strongest reason

Table 3
Resident strengths and weakness, stratified by residents' score

Variable	Residents			Directors			*p* Value
	Mean Score	n	SD	Mean Score	n	SD	
Nonsurgical							
Communicating with patients in podiatric clinic	6.58	137	0.63	6.13	100	0.93	.0001*
Communicating with attending physicians in podiatric clinic	6.42	135	0.67	6.22	100	0.93	.0565
Note writing in podiatric clinic	6.39	137	0.73	5.97	100	0.99	.0002*
Hands-on skills in podiatric clinic	6.33	136	0.72	6.06	100	0.98	.0154*
Overall knowledge in podiatric clinic	6.10	135	0.66	6.14	100	0.83	.6812
Radiology	5.54	136	0.97	5.77	100	0.97	.0732
Practicing evidence-based medicine	5.41	135	1.07	5.36	99	1.02	.7191
Performing podiatric research	4.51	136	1.49	4.36	99	1.47	.4443
Biomechanics	4.18	136	1.35	4.84	99	1.13	.0001*
Practice management	4.13	136	1.63	4.33	100	1.36	.3194
Surgical							
Communicating with primary surgeon	6.07	137	0.90	6.16	100	0.90	.4478
Surgical field exposure	5.86	137	1.11	6.12	99	0.85	.0520
Suturing ability	5.79	136	1.07	6.17	99	0.87	.0041*
Knowledge of surgical anatomy	5.78	137	0.90	6.02	98	0.93	.0480*
Preoperative workup	5.75	136	0.99	5.92	100	0.95	.1862
Postoperative care	5.71	136	0.97	6.01	99	0.91	.0171*
Appropriate procedure selection	5.65	136	0.97	5.84	100	0.92	.1300
Surgical dissection	5.44	136	1.13	6.03	100	0.86	.0001*
Performing osteotomies	5.30	136	1.27	6.04	100	0.86	.0001*
Fixation techniques	5.29	135	1.26	6.05	99	0.91	.0001*

Abbreviation: SD, standard deviation.
A high score represents a perceived strength; a low score, a perceived weakness (N ranging from 234 to 237).
* Statistically significant.

Table 4
Noncognitive residency traits

Variable	Residents			Directors			*p* Value
	Mean Score	n	SD	Mean Score	n	SD	
The residency program promotes strong ethical values	4.35	136	0.78	4.77	99	0.56	.0001*
My residency program encourages a culture of open dialogue between the residents and attending physicians	4.41	135	0.79	4.70	100	0.42	.0020*
There is an atmosphere of mutual trust and respect between the residents and attending physicians	4.29	137	0.88	4.53	100	0.61	.0198*

Abbreviation: SD, standard deviation.
Responses ranged from 1 (strongly disagree) to 5 (strongly agree). N = 235, 235, 237, respectively.
* Statistically significant.

for hosting externs was the following option: "It allows you to evaluate students as potential residency applicants."

Both residents and directors identified the following 3 areas as the greatest weaknesses: performing podiatric research, biomechanics, and practice management (Table 3). Compared with the residents' self-assessment, the directors thought residents were stronger in the following areas, with statistical significance: biomechanics, suturing ability, knowledge of surgical anatomy, postoperative care, surgical dissection, performing osteotomies, and fixation techniques. Again compared with the residents' self-assessment, the directors thought residents were weaker in the following areas, also with statistical significance: communicating with patients in the podiatric clinic, note writing in the podiatric clinic, and hands-on skills in the clinic.

Residents' responses agreed less with all 3 noncognitive statements presented (Table 4). Residents believed less strongly than did directors that, "The residency program promotes strong ethical values"; "My residency program encourages a culture of open dialogue between the residents and the attending physicians"; and, "There is an atmosphere of mutual trust and respect between the residents and the attending physicians." These differences were each statistically significant ($p = .0001$, $p = .0020$, and $p = .0198$, respectively).

Residents also reported that they were meeting with their directors significantly less frequently ($p < .0001$) than was reported by the directors (Table 5). Both residents and directors considered in-person meetings more valuable than e-mail correspondence. Still, the directors considered in-person meetings significantly more valuable than did the residents, and the residents considered e-mail correspondence significantly more valuable than did the directors (Table 6).

Both residents and directors collectively identified nearly all the existing MAV requirements as too low, including all procedure activity numbers (Table 7). The notable exception was biomechanical cases, which both residents and directors identified as too high. Also of note, the number for comprehensive history and physical examinations was inadvertently absent from the residents' survey.

Both residents and directors responded that procedural assessment tools would be more effective than MAVs. This preference was even stronger among the directors (Fig. 3), with statistical significance (chi-square test of distribution, $p < .0001$).

Directors were asked how satisfied they were with their current group of residents. The residents were asked, similarly, how satisfied they were with their program. Pearson correlations were calculated using both director and resident satisfaction. Director satisfaction correlated significantly positively with valuing the following resident learning resources: international training, radiology conferences, personal communication with the residency director, morbidity/mortality conferences, direct feedback immediately after surgery, grand rounds, and personal communication among residents (Table 8). A mild, but statistically, significant positive correlation was discovered between resident satisfaction and the identified value of the following resident learning resources: direct feedback immediately after surgery, personal communication with the residency director, and personal communication with residency faculty (Table 9). A mild, but statistically, significant positive correlation was also discovered between resident satisfaction and perceived strength in the following areas: practicing evidence-based medicine, biomechanics, appropriate procedure selection, and practice management (Table 9). A mild, but statistically significant, positive correlation was discovered between resident satisfaction and the number of hours residents spent supplementing their residency education (Pearson correlation, $r = 0.194$, $p = .026$). Regarding the noncognitive residency traits, a strong, significant, positive correlation was observed between resident satisfaction and agreement with each of the following: "the residency program promotes strong ethical values" ($r = 0.592$, $p < .001$), "my residency program encourages a culture of open dialogue between the residents and the attending physicians" ($r = 0.608$, $p < .001$), and "there is an atmosphere of mutual trust and respect between the residents and the attending physicians" ($r = 0.608$, $p < .001$).

Program size correlated with 3 learning resources and perceived strengths in 2 areas (Table 10). With statistical significance, increasing program size was mildly positively correlated with the value assigned to grand rounds, morbidity and mortality conferences, and radiology conferences and the perceived strength in performing podiatric research and overall knowledge in podiatric clinic.

The survey results were stratified by residency year. The perceived value of learning resources by residency year is presented in Table 11. Using 1-way analysis of variance, these values were evaluated for significant trends: the only statistically significant

Table 5
Frequency of advisory meetings from the perspective of residents and directors (N = 238)

Frequency	Residents (n = 137)	Directors (n = 101)
More than once a week	35 (26)	52 (51)
Weekly	55 (40)	36 (36)
Every other week	13 (9)	5 (5)
Monthly	34 (25)	8 (8)

Data presented as n (%).
Chi-square test of distribution: $p < .0001$.

Table 6
"How valuable do you find the following?"

Answer	Mean Score		*p* Value
	Residents (n = 131)	Directors (n = 98)	
In-person meetings with resident and director	4.21	4.54	.0041*
Electronic mail correspondence between resident and director	3.88	3.55	.0193*
Rotation evaluations of resident's performance	3.41	3.56	.3035

Responses ranged from 1 (strongly disagree) to 5 (strongly agree).
* Statistically significant difference (N = 229).

Table 7
Averaged responses, among residents and directors, to the query, "What do you think of the minimum activity volume (MAV) requirements for each of the following residency activities?"

Activity	Residents			Directors			*p* Value
	Mean Score	n	SD	Mean Score	n	SD	
Case							
1000 Podiatric clinic/office encounters	2.00	131	0.41	2.08	96	0.28	.1003
300 Podiatric surgical cases	1.57	131	0.50	1.63	93	0.69	.4512
50 Trauma cases	1.64	132	0.51	1.83	96	0.41	.0029*
25 Podopediatric cases	1.68	132	0.51	1.81	94	0.71	.1105
75 Biomechanical cases	2.30	131	0.55	2.32	96	0.51	.7805
Procedure							
400 First and second assistant procedures	1.65	131	0.54	1.66	94	0.69	.9031
80 Digital surgical procedures	1.83	132	0.47	1.90	97	0.49	.2752
60 First ray surgical procedures	1.69	131	0.48	1.72	97	0.38	.6115
45 Other soft tissue foot surgery	1.72	132	0.45	1.86	97	0.64	.0532
40 Other osseous foot surgery	1.67	132	0.49	1.76	97	0.58	.2054
50 Reconstructive rearfoot/ankle surgery	1.63	132	0.60	1.72	96	0.58	.2580

Abbreviation: SD, standard deviation.
Data <2.00 correspond to "too few"; >2.00 to "too many" (n ranging from 224 to 229).
* Statistically significant.

trend ($p = .031$) was a decrease in the "perceived value of personal communications with other residents" with increasing resident year. The perceived strengths and weakness of the residents by residency year are presented in Table 12. The perceived strength in every surgical topic—as well as "hands-on skills in the podiatric clinic," "overall knowledge in the podiatric clinic," and "communicating with attending physicians in the podiatric clinic"—increased with increasing resident year. First-year residents worked an average of 64.92 hours per week, second-year residents worked an average of 66.13 hours per week, and third-year residents worked an average of 60.00 hours per week.

The directors were asked the following voluntary, open-ended question: "At your program or on a national level, is there anything that you believe may improve the education or training of podiatric residents?" Residents were asked a similar question: "Is there anything that you feel may improve your overall experience as a resident of podiatric surgery?" A total of 38 directors and 12 residents responded to this prompt. The director and resident responses are presented in Supplemental Appendix SB.

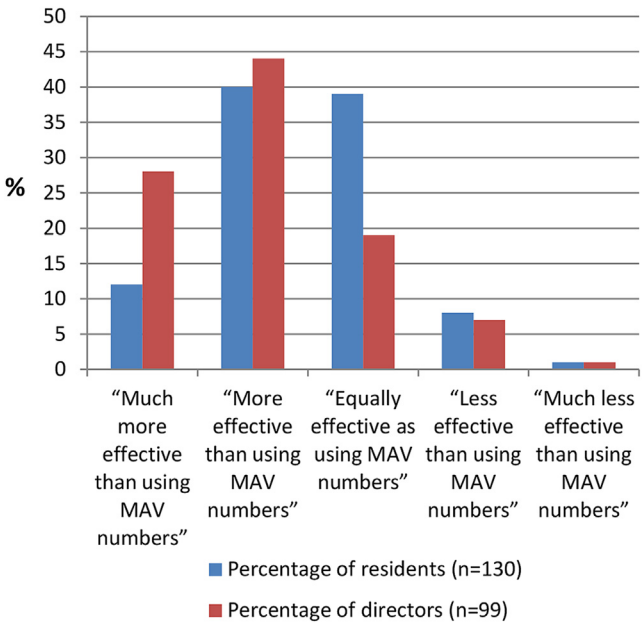

Fig. 3. "In your opinion, using procedural assessment tools to evaluate your performance in podiatric surgery would be…" (n = 229 residents and directors).

Discussion

The most striking findings concern the opinion of the MAV requirements. The consensus opinion of both program directors and residents was that procedural assessment tools would likely be more effective in evaluating resident performance. The sentiment was strongest among the program directors. Because of these responses, the development of a procedural assessment tool seems appropriate. Still, it is also important to ensure adequate procedural repetitions. As some comments from the directors' feedback reflect, sufficient

Table 8
Director satisfaction correlated significantly positively with valuing the following resident learning resources

Resident Learning Resource	n	Pearson Correlation	*p* Value
International training	49	0.393	.006*
Radiology conferences	75	0.370	.001*
Personal communications with residency director	103	0.305	.002*
Morbidity/mortality conferences	78	0.301	.008*
Direct feedback immediately after surgery	103	0.274	.006*
Grand rounds	103	0.268	.007*
Personal communication between residents	102	0.229	.024*

* Statistically significant.

Table 9
Resident satisfaction correlated positively with valuing the following resident learning resources and perceived strengths (n = 132)

Item	Pearson Correlation	*p* Value
Learning resource: personal communication with residency director	0.268	.002*
Learning resource: direct feedback immediately after surgery	0.208	.017*
Learning resource: personal communication with residency faculty	0.204	.019*
Perceived strength: practicing EBM	0.211	.015*
Perceived strength: biomechanics	0.208	.017*
Perceived strength: appropriate procedure selection	0.200	.022*
Perceived strength: practice management	0.190	.030*

* Statistically significant.

Table 10
Significant correlations of program size with learning resources and perceived strengths

Item	n	Pearson Correlation	*p* Value
Learning resource: radiology conferences	80	0.310	.006*
Learning resource: morbidity/mortality conference	89	0.223	.041*
Learning resource: grand rounds	144	0.178	.040*
Perceived strength: overall knowledge in podiatric clinic	135	0.221	.013*
Perceived strength: performing podiatric research	136	0.211	.017*

* Statistically significant.

procedural repetitions can provide exposure to rare complications, improve confidence, and improve operative mastery (8,9).

Residents worked significantly more hours than the directors had estimated. The guidelines articulated by the Accreditation Council for Graduate Medical Education state that a resident must not average >80 duty hours per 4-week period (10). A total of 6.3% of residents identified averaging >85 work hours per week. An additional 10% of residents identified working an average of 80 to 84 hours each week.

Residents spent less time supplementing their residency education than directors believed should be spent, with a statistically significant difference. A mild statistically significant correlation was discovered between the number of supplemental hours and resident satisfaction. Because correlation does not imply causation, it is unclear whether this relationship suggested that an increasing number of supplemental hours led to improved resident satisfaction or improved resident satisfaction led to increased supplemental hours. Alternatively, a nonsurveyed confounding variable might have been present, accounting for both improved resident satisfaction and increased supplemental hours. It is important that, generally, congruency exists between the residents' and directors' perceptions of appropriate work hours and supplemental hours.

Of all learning resources, direct feedback immediately after surgery was ranked highest by residents and third highest by directors (Table 1). Thus, it might be appropriate for residency programs to ensure that appropriate and adequate feedback is provided by the faculty. This could be accomplished using various methods, including workshops, assigned readings, and/or direct instruction. In other surgical fields, research studies have defined feedback as a strong motivational teaching technique and a precious opportunity for teaching in the operating room (11–13). Feedback has been shown to be most effective when specific examples of strengths and weaknesses are provided and has been shown to be enhanced with standardized documentation (14–16). It is also important that the resident is capable of receiving feedback well: residents should be able to accurately self-assess, should be reflective, and should not be sensitive to negative feedback (17).

Both residents and directors agreed that the 3 greatest resident weaknesses were performing podiatric research, biomechanics, and practice management. Both residents and directors ranked these 3 topics substantially lower than any other topic. With such a parallel finding, organizing a focused plan to address these weaknesses could be appropriate. Both the November 2012 issue of the *Journal of the American Podiatric Medical Association* and the January 2008 issue of *Clinics in Podiatric Medicine and Surgery* have effectively explored various aspects of residency training and podiatric education. It might be useful for residency faculty to revisit these podiatric resources in considering modes of improvement. Furthermore, a period of required research could be a consideration in structuring residency programs. This is common in, for example, general surgery and has been shown to be associated with academic productivity (18–20). It should also be noted that the practice of evidence-based medicine was identified as the fourth greatest weakness by both directors and residents, although this was ranked notably higher than the 3 lowest-ranked topics.

Directors generally believed that residents were stronger at surgical topics than the residents self-identified (Table 3). This might reflect an issue of resident confidence rather than an actual deficiency and might warrant additional study. Still, the 3 relative surgical weaknesses self-identified by residents—surgical dissection, performing osteotomies, and fixation techniques—might be areas on which directors and residency faculty should focus.

Regarding noncognitive residency traits, residents ranked all 3 items significantly lower than did the directors (Table 4). Intuitively, it is reasonable that residency directors would be partial in the view

Table 11
Learning resources and average value by residency year (responses not given if the resources were not applicable or not routinely held)

Variable	First Year			Second Year			Third Year			*p* Value
	Value	n	SD	Value	n	SD	Value	n	SD	
Personal communication with residency director	4.54	54	0.69	4.38	45	0.94	4.38	45	0.68	.488
Personal communication with residency faculty	4.59	54	0.63	4.56	45	0.66	4.51	45	0.59	.818
Personal communication with other residents	4.70	54	0.54	4.36	45	0.83	4.39	44	0.75	.031*
Anatomic textbooks	3.81	54	0.93	3.82	44	0.92	3.93	45	0.99	.794
Orthopedic surgical texts	4.30	54	0.66	4.22	45	0.85	4.16	45	0.85	.672
Podiatric surgical texts	4.44	54	0.66	4.38	45	0.81	4.27	45	0.84	.545
Podiatric journals	4.22	54	0.90	4.14	43	0.89	4.00	45	0.90	.476
Orthopedic journals	4.07	54	0.84	4.11	45	1.01	3.78	45	1.08	.211
Cadaveric foot/ankle laboratory sessions	4.56	54	0.60	4.44	45	0.69	4.62	45	0.53	.363
Surgical videos, free	4.04	54	1.08	3.93	45	0.99	4.11	45	0.93	.694
Surgical videos, paid	4.04	54	0.95	3.76	45	1.03	3.82	45	1.05	.342
PRESENT Podiatry (online)	3.66	53	1.09	3.20	44	1.09	3.18	44	1.37	.077
Other online podiatry education websites	3.60	53	1.13	3.13	45	1.01	3.39	44	1.15	.112
Journal clubs	4.04	54	0.82	3.87	45	0.76	3.87	45	0.94	.504
Grand rounds	3.98	54	0.91	3.71	45	1.12	3.76	45	1.03	.368
Direct feedback immediately after surgery	4.65	54	0.52	4.56	43	0.59	4.64	45	0.53	.690
International training opportunities	3.61	23	1.31	3.71	21	1.19	4.21	19	0.85	.215
Morbidity and mortality conferences	4.00	28	0.72	3.96	28	1.07	4.09	32	0.89	.849
Radiology conferences	4.19	27	0.68	4.44	25	0.58	4.33	27	0.78	.425
Pathology conferences	3.88	17	0.86	3.56	16	1.31	3.69	16	1.30	.733

Abbreviation: SD, standard deviation.
Data from the residents who provided their residency year (N = 159), with *p* values calculated using 1-way analysis of variance.
* Statistically significant.

Table 12
Strengths and weakness stratified by residency year

Variable	First Year			Second			Third			*p* Value
	Value	n	SD	Value	n	SD	Value	n	SD	
Nonsurgical										
Communicating with patients in podiatric clinic	4.26	51	0.77	4.00	42	0.52	4.27	44	0.45	.066
Communicating with attending physicians in podiatric clinic	5.32	50	0.74	5.64	41	0.67	5.70	44	0.54	.012*
Note writing in podiatric clinic	4.16	51	0.84	3.95	42	0.59	4.25	44	0.62	.131
Hands-on skills in podiatric clinic	5.10	50	0.80	5.36	42	0.70	5.80	44	0.59	.001*
Overall knowledge in podiatric clinic	4.28	50	0.73	4.50	41	0.61	4.77	44	0.52	.001*
Radiology	6.12	50	1.02	6.40	42	1.01	6.50	44	0.85	.143
Practicing evidence-based medicine	6.12	49	1.01	6.52	42	1.25	6.57	44	0.82	.074
Performing podiatric research	6.35	50	1.44	6.69	42	1.52	6.73	44	1.49	.392
Biomechanics	6.24	50	1.38	6.44	42	1.50	6.61	44	1.15	.410
Practice management	5.86	50	1.62	6.15	42	1.70	6.32	44	1.62	.391
Surgical										
Communicating with primary surgeon	5.29	51	1.04	5.95	42	0.77	6.09	44	0.59	.001*
Surgical field exposure	5.14	51	1.24	5.83	42	0.88	6.07	44	0.63	.001*
Suturing ability	5.57	50	1.02	5.69	42	0.98	6.11	44	0.66	.013*
Knowledge of surgical anatomy	5.65	51	0.98	6.12	42	0.84	6.52	44	0.75	.001*
Preoperative workup	5.18	51	0.99	6.05	41	0.84	6.48	44	0.96	.001*
Postoperative care	4.60	50	1.01	5.62	42	0.85	6.23	44	0.84	.001*
Appropriate procedure selection	4.38	51	1.06	5.48	42	0.79	6.18	43	0.74	.001*
Surgical dissection	4.46	50	1.01	5.34	42	0.94	6.18	44	0.71	.001*
Performing osteotomies	5.10	50	1.05	5.86	42	1.19	6.50	44	0.79	.001*
Fixation techniques	5.26	50	1.09	5.83	41	1.13	6.11	44	0.87	.001*

Abbreviation: SD, standard deviation.
Data from residents who provided their residency year (N = 159), with *p* values calculated using 1-way analysis of variance.
* Statistically significant.

that their program was ethical, open, and respectful. What was more meaningful was the strong, statistically significant, correlation between each of these 3 items and resident satisfaction. As before, correlation does not imply causation. Thus, it is unclear whether the residents were more satisfied because their programs were ethical, open, and respectful or whether residents considered their program more ethical, open, and respectful because they were, overall, more satisfied with their program. Alternatively, a nonsurveyed confounding variable might have been responsible for both satisfaction and a high ranking of noncognitive traits.

The directors were asked to distribute these surveys to their own residents, which might have limited the involvement of residents with poor resident–director relationships or poor obedience. This would represent a selection bias, because the results would thus not be representative of the opinions of all PMSR residents. A second limitation was the timing of the survey, which was delivered between July and September. Because this was the beginning of the residency year, the resident responses might not represent the opinions of the residents later in the residency year. A third limitation was that institutional information was not queried. Institutional qualities, including institution type and the presence of additional trainee programs, might affect resident satisfaction; however, this potential relationship was not captured.

Basement and ceiling effects were also considered as potential limitations. Ceiling effects were notable in 2 instances. With regard to resident work hours, the constructed scale did not carefully capture the extremely high responses of 3 resident respondents. These 3 respondents identified working >100 hours weekly, and their responses could not be narrowed to a 5-hour interval as was intended. Ceiling effects were also notable with regard to the noncognitive traits. Program directors, in large numbers, strongly agreed that their respective programs were ethical (77%), open (75%), and respectful (58%). If a more extreme response option were available, the directors' opinions on this topic might have been better represented. Also, an unforeseen limitation was found that potentially affected the criterion validity with the learning resource items "personal communications with residency faculty," and "personal communications between residents." It was unintentionally unclear whether this question referred to all residents and residency faculty or whether the question referred only to residents of podiatric medicine and surgery and residency faculty in the profession of podiatric medicine, as was intended.

The survey content was limited to the podiatric portion of residency training. The residency experience in podiatric medicine and surgery, however, includes an array of required and elective nonpodiatric rotations. These rotations are especially important in the context of the APMA Board of Trustees Vision 2015. Also, the nonpodiatric rotations could have an effect on resident satisfaction, which was not captured. Nonpodiatric rotations were not evaluated in our survey owing to concerns regarding the extended length and time it would have required and the potential impact on the response rate.

Faculty should be aware of their residents' learning needs, set against the backdrop of their own perceptions. The perceived needs of residents should be evaluated when considering residency training objectives and standards. It is critical that residents maintain a high-quality learning experience from their surgical cases, especially in the current medicolegal climate. Numerous validated objective assessment tools exist for resident evaluation after surgery in other surgical specialties. A follow-up study focusing on how objective assessment tools can be incorporated into PMSRs might be appropriate, considering the opinions of MAVs portrayed in our study. Other issues that could be explored further include rotations outside of podiatric medicine and surgery, the operative confidence of graduating residents, and a more in-depth evaluation of duty hours.

Supplementary Material

Supplementary material associated with this article can be found in the online version at www.jfas.org (http://dx.doi.org/10.1053/j.jfas.2015.03.008).

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