ORIGINAL ARTICLES

Confidence of Academic General Internists and Family Physicians to Teach Ambulatory Procedures

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OBJECTIVE: **To evaluate and compare the readiness of academic general internal medicine physicians and academic family medicine physicians to perform and teach 13 common ambulatory procedures.**

DESIGN: **Mailed survey.**

SETTING: **Internal medicine and family medicine residency training programs associated with 35 medical schools in 9 eastern states.**

PARTICIPANTS: **Convenience sample of full-time teaching faculty.**

MEASUREMENTS AND MAIN RESULTS: **A total of 331 general internists and 271 family physicians returned completed questionnaires, with response rates of 57% and 65%, respectively. Academic generalists ranked most of the ambulatory procedures as important for primary care physicians to perform; however, they infrequently performed or taught many of the procedures. Overall, compared with family physicians, general internists performed and taught fewer procedures, received less training, and were less confident in their ability to teach these procedures. Physicians' confidence to teach a procedure was strongly associated with training to perform the procedure and performing or precepting a procedure at least 10 times per year.**

CONCLUSIONS: **Many academic general internists do not perform or precept common adult ambulatory procedures. To ensure that residents have the opportunity to learn routine ambulatory procedures, training programs may need to recruit qualified faculty, train current faculty, or arrange for academic specialists or community physicians to teach these skills.**

KEY WORDS: **academic generalists; ambulatory procedures; residency training; confidence teaching.**
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The shift in health care delivery toward the ambulatory setting has increased the need for broadly trained primary care physicians who can provide comprehensive care.[1-3] However, surveys of practicing general internists indicate deficiencies in their training for a variety of common ambulatory procedures,[4-9] raising the question whether general internists can provide common components of ambulatory care without referral. In response to this perceived need to improve ambulatory training, the Internal Medicine Residency Review Committee (RRC) guidelines,[10] effective July 1998, increased residents' training time in the ambulatory setting, and the American Board of Internal Medicine and others have published recommendations for residency training in ambulatory skills.[10-18] Nonetheless, a consensus regarding specific requirements for training in ambulatory procedures has not emerged, and it is not clear who should teach these procedures.

Though academic general internists supervise the majority of resident ambulatory training, they may not be prepared to teach common ambulatory procedures.[19,20] This may be due to inadequate training and experience with these procedures, limited time spent in the ambulatory setting, or the common practice in academic settings of referring patients to readily available specialists. With this in mind, we conducted this study to assess the confidence of academic general internal medicine and aca-

demic family medicine physicians to teach 13 common ambulatory procedures. Family medicine's long-standing focus on ambulatory training and practice provided the rationale for including family physicians in this survey.

METHODS

Study Participants

Full-time faculty from the divisions of general medicine and the departments of family medicine at all 37 medical schools in the 9 states represented by the investigators (Florida, Georgia, Kentucky, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia) were invited to participate in this survey. Faculty were identified by requesting a roster of all full-time generalist faculty from each school. Two medical schools declined to participate. In September 1995, a questionnaire was mailed to physicians at the 35 remaining schools. Nonrespondents received a reminder postcard at 2 weeks after the initial mailing and a second letter and questionnaire 6 weeks after the initial mailing. Data collection remained open until May 1996.

Questionnaire Design

The investigators selected the procedures on the basis of a literature review[3,6,8,9,21-24] and recommendations for residency training from the Internal Medicine RRC.[25] For each procedure, respondents estimated the total number they performed and precepted each year, their confidence in precepting the procedure, and the importance for a primary care physician to perform the procedure (see Table 2 for a list of procedures in the questionnaire). We selected confidence to teach as a proxy self-assessment of one's ability to perform and precept procedures. Confidence and importance were measured using Likert scales with 1 = not confident or important and 6 = very confident or important. Respondents indicated their predominant mode of training for each procedure from the choices of no training, medical school, residency, fellowship, continuing medical education, peer-trained after residency, self-taught after residency, or other. Also, respondents estimated the percentage of practice time in the inpatient and outpatient settings as well as the percentage of practice time with and without residents.

Analysis of Survey Results

The Wilcoxon-Mann-Whitney rank sum test for continuous data and Fisher's exact test for categorical data were used to compare demographic variables between the general internist and family physician groups. The Wilcoxon-Mann-Whitney rank sum test was used to compare the numbers of procedures performed and precepted between the general internist and family physician groups. The Pearson χ^2 test was used to compare general internists and family physicians for importance of performing and confidence to teach these procedures.

Ordinal logistic regression with a proportional odds model was used to model the probability of having a high level of confidence to precept each of the 13 procedures. This model assumes proportional odds; i.e., the odds ratio for a given predictor variable is the same for all cutpoints of high and low confidence along the 6-point Likert scale. The proportional odds ratio provides a stable estimate over all cutpoints. The assumption of homogeneity of odds ratios across cut points was verified using a score test and other graphical techniques.[26] The goodness-of-fit tests were performed, and the results supported the adequacy of the final models.[27] The main independent variables were number of procedures performed and taught, training received versus no training, self-reported importance of performing the procedure, which was classified as a high level of importance (Likert score 5 or 6) versus a low level of importance (Likert score of 1–4), physician type (general internist vs family physician), and gender. A forward selection procedure was used with a P value $\leq .05$ as the criterion for entry into the model. All analyses were performed using Epi-Info (Centers for Disease Control and Prevention, Atlanta, Ga) and SAS software systems (SAS Institute, Cary, NC). Two-sided P values and 95% confidence intervals are reported.

RESULTS

Surveys were mailed to 571 general internists and 434 family physicians. The final overall response rate was 57% for general internists (range by state, 31%–84%) and 65% for family physicians (range by state, 48%–79%). As shown in Table 1, physicians from the two groups were similar in age and completed residency training at about the same time. Gender distribution differed, with general internists having a greater percentage of female physicians than family physicians. Although the great majority of general internists trained in university programs, almost half of family physicians trained in community programs. Most physicians from both groups practiced in a university-based setting; however, there was a greater tendency for general internists to practice in metropolitan areas and a greater tendency for family physicians to practice in small towns and rural areas. Surveyed physicians spent approximately half of their time in the ambulatory setting and about half of that time with residents. General internists saw a greater percentage of Medicare and indigent patients, about the same percentage of Medicaid patients, and a smaller percentage of privately insured or HMO patients compared with family physicians. Although some comparisons of demographic variables between general internists and family physicians were sta-

Table 1. Characteristics of Physician Respondents by Specialty

Characteristic	Internal Medicine (*N* = 331)	Family Medicine (*N* = 271)
Mean age, y (SD)	41 (8)*	44 (9)
Mean of year completed residency (SD)	1985 (8)*	1983 (9)
Male, %	60†	70
Medical school located in U.S., %	93	94
Post-graduate training program, %		
University	87*	54
Community	13*	45
Current practice type,‡ %		
University based	77	76
Private practice/HMO	15	21
VA	15*	0
Community health center	3	7
Public clinic	6†	2
Residency training program	2§	9
Practice location (population), %		
Rural/small town (<50,000)	10§	21
Large town/small city (50,000–200,000)	27	33
Large city/metropolitan area (>200,000)	63*	46
Time spent practicing, %		
Ambulatory		
With residents	23‖	27
Without residents	26†	29
Inpatient		
With residents	14*	9
Without residents	4	3
Payer mix, %		
Indigent	19§	10
Medicare	33*	24
Medicaid	17†	19
Private insurance	32*	47

*$P < .0001$; *P values were calculated by the Wilcoxon-Mann-Whitney rank sum test for continuous data and Fisher's exact test for categorical data comparing the two groups of respondents.*
†$P < .05$.
‡*Total > 100 % as respondents were allowed to indicate > 1 practice type.*
§$P < .001$.
‖$P < .01$.

tistically significant, it is likely that the comparison was not practically significant as the difference in percentages between the two groups was very small.

The median number of procedures performed and precepted per year and the percentages of physicians performing and precepting any procedure and 10 or more procedures per year are presented in Table 2. All medians are 10 or fewer, except for cryotherapy of skin lesions performed by family physicians. General internists consistently performed fewer procedures than their family medicine counterparts. Although the majority of general internists performed only 4 of the 13 procedures, the majority of family medicine physicians performed all procedures except electrocardiographic (ECG) treadmill stress testing. Internists also precepted fewer procedures than family physicians.

As depicted in Table 3, family physicians generally rated the procedures as highly important for primary care physicians to perform and family physicians' self-reported confidence scores paralleled their high importance scores for most of the procedures. Overall, general internists attributed less importance to 9 of the procedures and were less confident in their ability to precept 10 of them compared with family physicians. In addition, among general internists, there was a disparity between self-reported confidence and importance scores, with importance consistently rated higher than confidence.

Most of the training to perform these procedures occurred during residency for both groups of physicians (data not shown). However, the majority of academic general internists reported no training during residency for flexible sigmoidoscopy, ECG treadmill stress testing, fluorescein eye examination, endometrial biopsy, abscess incision and drainage, cryotherapy of skin lesions, suturing, skin punch biopsy, splinting a sprained ankle, and ingrown toenail removal. The majority of academic family physicians reported no training during residency for flexible sigmoidoscopy and ECG treadmill stress testing. More than 20% of academic family physicians were self-taught or peer-taught for flexible sigmoidoscopy, interpretation of simple spirometry, endometrial biopsy, and cryotherapy of skin lesions. The only procedure for which more than 20% of academic general internists were self-taught or peer-taught was flexible sigmoidoscopy.

A high level of importance attributed to a procedure, the number of procedures performed and precepted per year, and training to perform the procedure were consistently significant predictors of being highly confident to teach these procedures, as presented in Table 4. The odds ratios were highest for performing 10 or more procedures per year and for training, emphasizing the contribution of these characteristics to a high level of confidence to teach the procedures. Family physicians were more likely to be highly confident than general internists in performing all dermatological procedures surveyed as well as fluorescein eye examination, ankle splinting, and ingrown toenail removal. Male physicians were more likely to be highly confident than female physicians in performing flexible sigmoidoscopy, interpretation of simple spirometry, ECG treadmill stress testing, minor wound suturing, as well as aspiration and therapeutic injection of the knee joint. There were no procedures for which female physicians were significantly more likely to be highly confident than male physicians. Physicians completing residency training before 1981, when compared with those finishing residency after 1992, were more likely to be highly confident in performing flexible sigmoidoscopy, fluorescein eye examination, abscess incision and drainage, and therapeutic knee joint injection. There were no procedures for

Table 2. Procedures Performed per Year: Median Number and Percentages of Physicians Performing and Precepting Any Procedure and 10 or More Procedures

Procedure	Physician Group*	Performed			Precepted		
		Median	Any	≥10	Median	Any	≥10
General procedures							
Flexible sigmoidoscopy	GIM	0†	18	17	0†	14	8
	FP	2	52	35	2	47	21
Spirometry interpretation	GIM	5	61	44	0	50	30
	FP	9	71	50	2	60	33
ECG treadmill stress test	GIM	0	7	5	0	7	5
	FP	0	10	8	0	8	6
Fluorescein eye examination	GIM	0†	45	15	0	29	9
	FP	10	97	61	5	82	36
Endometrial biopsy	GIM	0†	3	1	0	1	0
	FP	5	70	25	2	66	21
Dermatologic procedures							
Abscess incision & drainage	GIM	2†	69	15	1†	55	9
	FP	10	98	55	5	91	39
Cryotherapy of skin lesions	GIM	0†	30	19	0†	23	11
	FP	20	89	76	10	88	54
Minor wound suturing	GIM	0†	38	8	0†	24	5
	FP	10	93	56	5	86	40
Skin punch biopsy	GIM	0†	20	3	0†	16	2
	FP	6	88	41	4	78	27
Orthopedic procedures							
Knee joint aspiration	GIM	2	74	19	2	69	13
	FP	3	86	22	2	75	17
Knee joint injection	GIM	1†	55	15	1†	51	10
	FP	3.5	76	29	2	68	19
Splinting a sprained ankle	GIM	0†	31	9	0†	22	7
	FP	10	91	51	5	78	34
Ingrown toenail removal	GIM	0†	17	3	0†	11	1
	FP	5	87	29	3	81	20

**GIM indicates general internists; FP, family physicians.*

†P < .001; P value comparisons are shown for medians only. P values were calculated by the Wilcoxon-Mann-Whitney rank sum test comparing the two groups of respondents.

which recent graduates were more highly confident than those graduating before 1981.

DISCUSSION

Although there is no consensus regarding the ambulatory procedures that generalists should perform, we selected a set of 13 routine ambulatory procedures that we believe reasonably represent current practice expectations for generalists. Recently, 5 of these procedures (flexible sigmoidoscopy, spirometry, ECG treadmill stress testing, endometrial biopsy, and skin punch biopsy) were added to the Internal Medicine RRC list of skills that should be taught to residents.[13] Our findings are remarkable for how infrequently academic general internists performed these procedures and their general lack of confidence to teach them. Realizing that confidence does not necessarily define one's competence, we feel that self-belief in one's ability to teach is a reasonable starting point to evaluate a physician's competency. Formal training, performing procedures frequently, and attributing high importance to these procedures were the strongest predictors of being highly confident to teach them, underscoring the need to perform the procedures and to perform them often.

Compared with family physicians, general internists received less training in these procedures, performed fewer, considered them less important, and reported less confidence to teach them. Time spent in ambulatory practice with and without residents was similar for academic general internists and family physicians and would not account for the observed differences in performing and teaching these procedures. It is plausible that general internists' academic practice setting with readily available subspecialists decreases the number of procedures they perform. Fewer

Table 3. Percentages of Physicians Ranking Highest Scores (5 or 6) for Importance of Performing and Confidence in Precepting Procedures

Procedure	Physician Group*	Importance of Performing	Confidence in Precepting
General procedures			
Flexible sigmoidoscopy	GIM	51†	18‡
	FP	63	41
Spirometry interpretation	GIM	70	62
	FP	69	58
ECG treadmill stress test	GIM	30‡	16
	FP	18	12
Fluorescein eye examination	GIM	51‡	45‡
	FP	93	91
Endometrial biopsy	GIM	13‡	2‡
	FP	69	64
Dermatologic procedures			
Abscess incision & drainage	GIM	64‡	56‡
	FP	96	93
Cryotherapy of skin lesions	GIM	41‡	25‡
	FP	87	90
Minor wound suturing	GIM	53‡	44‡
	FP	93	89
Skin punch biopsy	GIM	42‡	23‡
	FP	86	88
Orthopedic procedures			
Knee joint aspiration	GIM	79	67
	FP	71	70
Knee joint injection	GIM	65	52†
	FP	66	64
Splinting a sprained ankle	GIM	51‡	33‡
	FP	87	84
Ingrown toenail removal	GIM	27‡	14‡
	FP	78	84

**GIM indicates general internists; FP, family physicians.*

†P < .01; P values were calculated by the Pearson χ^2 test comparing the two groups of respondents.

‡P < .001.

perceived economic incentives may also have contributed to the difference in procedure rates, as general internists reported a larger percentage of patients with Medicare and Medicaid and a smaller percentage of patients with private insurance than did their family physician counterparts.

Our findings raise two important questions. Should all residents be trained to perform a full array of ambulatory procedures? And, who should teach these procedures? Because the majority of general internists will practice in urban areas and increasingly in large group practices,[28] physicians with the expertise to perform these procedures usually will be readily available. In this type of practice environment, as evidenced by the general internists surveyed in this study, there may not be a need for all general internists to perform these procedures, especially the more complex ones (ECG stress testing and flexible sigmoidoscopy), for which better trained and more experienced colleagues are readily available. However, as the penetration of managed care increases, market demands may increase for primary care physicians who are trained to deliver comprehensive routine ambulatory care, even in areas where specialists are readily available. It also may be more desirable from patients' perspective for the primary care physician to perform routine procedures rather than a physician unknown to them.[20]

Given limited resources for residency training and recognizing that many internal medicine trainees will not practice primary care medicine, it may not be possible or even desirable to train all residents to perform the full array of ambulatory procedures. However, it is important that all internal medicine residents, and especially those who plan to enter primary care, have opportunities to learn these skills. Our data suggest that the majority of general internists are not prepared to teach these procedures. However, several potential resources for teachers exist. Further training of academic general internists should be considered, as this would fulfill a perceived need in training programs for academic generalist role

Table 4. Predictors of Confidence in Teaching Ambulatory Procedures

Procedure score test of homogeneity (*P*†)	Adjusted Proportional Odds Ratios (95% Confidence Intervals) from Proportional Odds Regression Models*								
	Importance Likert Score 5–6	Family Physician	Performed 1–9/y	Performed ≥ 10/y	Precepted 1–9/y	Precepted ≥ 10/y	Training in Procedure	Completed Residency Before 1981	Male Gender
General procedures									
Flexible sigmoidoscopy (< .001)	1.9 (1.2 to 2.9)‡		4.3 (1.7 to 10.5)‡	10.3 (4.4 to 24.3)	4.5 (1.8 to 11.2)	10.2 (4.2 to 24.9)	12.3 (5.8 to 26.1)	2.7 (1.3 to 5.5)	2.0 (1.2 to 3.1)‡
Spirometry interpretation (< .107)	3.6 (2.4 to 5.5)		2.7 (1.5 to 4.9)	4.5 (2.5 to 8.0)	2.0 (1.2 to 3.5)‡	3.9 (2.2 to 6.6)	8.0 (3.6 to 17.5)		1.8 (1.3 to 2.6)
EKG treadmill stress test (< .001)	2.8 (1.7 to 4.4)		4.7 (1.3 to 16.6)§	31.7 (12.2 to 82.2)			14.2 (8.8 to 23.0)		2.0 (1.3 to 3.2)‡
Fluorescein eye examination (< .001)	8.2 (4.9 to 13.7)	2.2 (1.4 to 3.7)	5.5 (2.9 to 10.2)	4.1 (2.0 to 8.3)	1.8 (1.0 to 3.2)§	3.2 (1.6 to 6.3)	18.2 (7.8 to 42.4)	3.2 (1.7 to 6.1)	
Endometrial biopsy (.017)	2.8 (1.6 to 5.0)		13.3 (5.0 to 35.4)	47.5 (13.8 to 163.8)	9.1 (3.7 to 22.2)	16.6 (5.2 to 53.1)	15.2 (7.5 to 30.6)		
Dermatologic procedures									
Abcess incision & drainage (< .001)	3.6 (2.3 to 5.8)	2.8 (1.8 to 4.4)	6.2 (3.4 to 11.5)	9.1 (4.3 to 19.3)	2.2 (1.3 to 3.6)‡	3.9 (1.9 to 7.9)	6.6 (2.4 to 17.9)	2.3 (1.3 to 4.3)	
Cryotherapy of skin lesion (.425)	3.3 (2.0 to 5.4)	2.9 (1.7 to 5.0)	6.2 (2.6 to 14.8)	19.9 (8.5 to 50.0)	1.2 (0.5 to 2.6)§	4.5 (1.9 to 10.7)	20.7 (10.7 to 40.1)		
Minor wound suturing (.365)	2.7 (1.8 to 4.1)	2.2‡ (1.3 to 3.5)	3.3 (1.9 to 5.5)	4.1 (2.1 to 7.9)	2.9 (1.7 to 4.9)	4.5 (2.2 to 9.0)			1.6 (1.1 to 2.3)‡
Skin punch biopsy (< .001)	2.8 (1.8 to 4.5)	1.8 (1.1 to 3.1)§	5.0 (2.4 to 10.2)	8.5 (3.3 to 21.5)	3.1 (1.6 to 5.9)	5.1 (1.9 to 13.6)	18.5 (9.8 to 34.9)		
Orthopedic procedures									
Knee joint aspiration (.069)	4.5 (2.9 to 6.8)		5.2 (3.1 to 8.7)	11.4 (5.5 to 23.6)	3.0 (1.8 to 4.7)	4.7 (2.2 to 10.0)	23.7 (7.5 to 74.2)		1.8 (1.3 to 2.6)
Knee joint injection (.444)	3.8 (2.5 to 5.8)		10.0 (5.6 to 17.7)	31.2 (14.2 to 68.2)	2.4 (1.5 to 4.1)	4.0 (1.8 to 8.9)	8.8 (4.5 to 17.0)	2.5 (1.3 to 4.6)	1.9 (1.3 to 2.7)
Splinting a sprained ankle (< .001)	4.3 (2.8 to 6.6)	2.3 (1.5 to 3.5)	3.2 (1.8 to 5.7)	4.4 (2.3 to 8.5)	1.2 (0.7 to 2.1)§	2.2 (1.1 to 4.2)§	14.8 (7.8 to 27.9)	14.8 (7.8 to 27.9)	
Ingrown toenail removal (.042)	3.1 (2.0 to 4.9)	2.1 (1.2 to 3.6)‡	7.3 (3.7 to 14.4)	15.1 (6.1 to 37.2)	3.0 (1.6 to 5.9)	5.0 (1.8 to 13.8)	10.5 (6.0 to 18.5)		

**Adjusted for the other variables in the final model; only primary independent variables are listed here. Blanks imply nonsignificant predictiors that were not in the final model. The reference group characteristics were as follows: Likert score 1–4 for importance of procedure, general internist, performed 0 procedures per year, precepted 0 procedures per year, no training in the procedure, completed residency after 1992, and female gender.*

†*Owing to several limitations of the score test, we further examined the assumption of homogeneity of the odds ratio across cutpoints by estimating the binary logistic odds ratio for each cutpoint and then plotting these cutpoint-specific odds ratios with their confidence limits against cutpoints of the outcome (confidence). The assumption of imposing one common odds ratio across all cutpoints seems valid for all procedures.* P *values for odds ratios are <.001 except where otherwise noted.*

‡P *< .01.*

§P *> .01.*

models who perform a full array of ambulatory procedures.[1,20,29,30] Other possibilities include having specialists teach these procedures, enlisting community clinicians who commonly perform ambulatory procedures as preceptors for residents through community-based teaching programs,[1,19,31] and recruiting preceptors from HMOs that expect primary care physicians to perform these procedures routinely.[32,33] Our results indicate that the majority of academic family physicians do perform and teach most of these procedures and may be available in some settings to teach these skills to internal medicine residents through interdisciplinary collaboration.[30,34]

There are several limitations to our study. The response rate of 60% was typical of mailed surveys. No data were available on nonrespondents whose practices regarding ambulatory procedures may differ from those of respondents. No attempt was made to corroborate the self-reported frequencies of performing procedures with data from the medical record. In this regard, we believe physicians who perform procedures infrequently are able to give reasonable estimates of the total number they perform. The survey sample was limited to full-time generalists practicing at academic centers in 9 eastern states. Practice patterns may differ by region in the United States. Academic internists who teach in training programs with dedicated primary care tracks may teach these skills more frequently than their counterparts in categorical programs, but we did not identify such clinicians in our survey.

The need for internists to perform ambulatory procedures will vary across practice settings; however, it is important that residents have the opportunity to learn procedures they are likely to perform in their chosen practices as generalists or subspecialists. Internal medicine training programs may need to recruit qualified faculty or train current generalist faculty to teach these skills or develop systematic programs to ensure that academic specialists or qualified community physicians teach these skills.

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