The Geographic and Temporal Patterns of Residency-Trained Family Physicians: University of Washington Family Practice Residency Network

Peter A. West, MD, MPH, Thomas E. Norris, MD, Edmond J. Gore, PhD, Laura-Mae Baldwin, MD, MPH, and L. Gary Hart, PhD

Background: **There is a clear national mandate to increase the proportion of generalist physicians within the medical community and to increase their numbers within rural and underserved urban locations. Little is known, however, about the geographic and temporal career patterns of family physicians or about how these patterns differ by sex and graduation cohort.**

Methods: **Using information from a follow-up survey of the University of Washington Family Practice Residency Network, we analyzed the characteristics of 358 graduate physicians and their 493 practices, including data on geographic practice locations.**

Results: **Two thirds of graduates began their practices in urban locations, and one third initially settled in rural communities. Female graduates were much less likely than their male peers to choose rural practice locations. Few physicians left practices after they had practiced in them for 5 or 6 years. The majority of graduates were still in the practice where they started as long as 18 years earlier.**

Conclusions: **The most important career decision made by the graduate of a family medicine residency involves practice location. Because women are less likely to practice in rural areas, the increasing proportion of women graduating from family practice residencies might presage shortages of rural physicians in the future. (J Am Board Fam Pract 1996;9:100-8.)**

The University of Washington Department of Family Medicine has coordinated the development of one of the largest networks of affiliated family medicine residencies in the nation. In 1995 the Family Practice Residency Network consists of 13 affiliated training programs located throughout the northwestern United States. Beginning in 1972, the network had four member residencies: University Hospital, Group Health Cooperative of Puget Sound, and Doctor's Hospital (now Swedish Medical Center), all in Seattle, and the Residency Program of Family Medicine in Spokane, Wash. The network had grown to 11 affiliates in two states (with additional programs under development) when the survey reported here was administered in 1991. While each residency develops its own objectives, at least three programs give special emphasis to preparing physicians for rural careers, and one focuses on training for care of the urban underserved. The network residencies coordinate their activities and develop mutual goals.

Recruiting and Retaining Family Physicians in Areas of Need

The supply of family physicians to areas of need is dependent on both the successful recruitment of well-trained physicians and on their retention in service to the designated area. Although we are aware of some of the factors on which physicians base their decisions to locate at a specific site,[1-6] much less is known about the retention decisions of family physicians in either rural or urban locations.[4,7-10] Additional information about practice decisions would be useful to several groups: communities interested in recruiting physicians, med-

Submitted, revised, 5 December 1995.

From the Department of Family Medicine, University of Washington, Seattle. Address reprint requests to Peter West, MD, MPH, Department of Family Medicine, University of Washington, Box 354715, Seattle, WA 98195-4715.

This research was supported through the WAMI Rural Health Research Center, which is funded by the Health Resources and Services Administration's Office of Rural Health Policy, and the University of Washington Family Medicine Residency Network.

ical educators who are training family practice physicians, and family physicians who are considering where to practice. With this in mind, we addressed the following questions:

1. What are the common geographic and temporal career paths of family physicians?
2. To what extent are sex and year of residency graduation associated with the choice of either rural or urban practice and with the duration of each practice in a given setting?
3. What part does a physician's prior practice experience, sex, and year of graduation play in predicting the location and duration of subsequent practices?

Methods

To explore the questions noted above, we used information from the recent (1991) triennial University of Washington Family Practice Residency Network Graduate Follow-up Survey. The survey questionnaire asked graduates to list the location and the beginning and ending dates of each of their practices since graduation. The goal of the survey was to describe the content of current practices of graduates and to contrast the practices of rural and urban graduates.[11]

Physician Selection Criteria

From 1973 to 1990, 749 physicians successfully completed their residencies in one of the 11 network residency programs. Of these graduates 128 were graduates of military programs, and a single civilian graduate subsequently chose a military career. These military physicians were excluded from this analysis because their practice choices following training were strongly influenced by their military obligations. The remaining 620 civilian physicians were mailed a survey questionnaire; 23 questionnaires were undeliverable after three mailings during an 8-month period, leaving 597 graduates who were contacted. Of these, 503 responded with usable information, resulting in a response rate of 84.3 percent (Table 1).

For the purpose of the physician-level analysis, several additional selection criteria were applied. First, if practice history (ie, practice location or duration) was incomplete, respondents were excluded from the analyses (6 respondents). Second, respondents who had left the practice of family medicine for another type of practice (eg, emergency medicine) were excluded (43 respondents). Third, the 91 respondents who were less than 4 years beyond graduation at the time of the survey were excluded. This criterion enabled us to examine 4-year retention rates for all study physicians. Fourth, physicians practicing outside the United States were excluded because we were unable to classify accurately their foreign rural-urban status (5 respondents). Thus, this study is based on analyses of information on the remaining 358 responding physicians.

Table 1. Physician and Practice Selection.

Study Selection Criteria	Physicians	Practices
Civilian physicians completing family practice residency 1973 to 1990	620	
Undeliverable questionnaires	23	
Total civilian physicians surveyed	597	
Nonrespondents	94	
Civilian respondents (84.3%)	503	
Respondents with missing or invalid practice history	6	
Respondents practicing in non-family practice specialty	43	
Respondents with fewer than 4 years postgraduation	91	
Respondents retained for practice evaluation	363	
Practices of physicians		601
Practices observed for less than 4 years		93
Foreign or missing practice locations	5	15
Physician respondents included in study	358	
Practices included in study		493

Practice Selection and Modeling

Because analyses included practice-specific information, further selection rules were applied to practices. A practice was excluded from the analyses if its end date had not occurred at the time of the survey and its duration was less than 4 years (ie, any practice that started less than 4 years before the survey). As a result, we excluded 93 practices because of this criterion, and 15 additional foreign practices were excluded. Consequently, this study involves the 493 individual practices of the 358 study physicians.

The practice histories reported by our graduates ranged from a single location practice for the physician's entire career to complex patterns with overlapping, encompassing, and concurrent practices. We converted the reported practice histories into simplified models to facilitate a simpler

analysis. Practice locations were reported by city or town (ie, intracity changes in practice location were disregarded). Two graduates reported concurrent practices in the same town, which we summarized as a single practice location, with the practice duration equal to the range of the combined practices. Sequential (or consecutive) practices occurring within the same city or town were considered as only one practice location.

We also chose to model practices as being nonoverlapping. While most practice patterns were sequential, some graduates reported two practices that were active concurrently. These practices fell into two groups: overlapping (one practice extending either before or after the other existed) and encompassing (one practice existing both before and after the other existed). Some practices (1.3 percent) overlapped by 1 year or more, but were concurrent only at the beginning or ending of the other practice. Each practice in such an overlapping pair contributes uniquely to the physician's practice history by being the only practice location for some period, and so both are included in the sequence of practices. Twenty-one encompassed practices (4.3 percent) were concurrent with and embedded within other longer practices for their entire duration. The encompassing practice was retained as the primary practice at the time, while the embedded practice was excluded as an extension or satellite to the primary practice. These situations and other reporting anomalies were adjusted so that the practices were modeled as truly consecutive.

Description of Practice Histories

Unlike survival methods do,[12] we did not attempt to predict the retention behavior of censored cases (ie, those more recent graduates who had not been observed as long as graduates from previous eras). Instead we analyzed and presented the information in terms of the actual observed retention. For example, the 10-year retention rate for physician practices was computed by dividing the number of practices that lasted 10 or more years by the total number of practices that could have lasted 10 or more years (ie, all practices that were initiated 10 or more years before the survey). This direct approach was chosen because of its simplicity, ease of interpretation, appropriateness with these highly censored data, and capability of providing the necessary information for this study. Retention, when computed in this way, could be readily compared across characteristics of graduates and practice duration patterns.

To describe the physicians' practice histories in a meaningful fashion, we analyzed both practice location and practice duration at selected graduation anniversaries (4, 8, and 12 years). Because more graduates had achieved their 4th graduation anniversary than their 12th, it was necessary to control for possible changes in practice location and duration patterns with time. We therefore stratified graduates into three cohort groups (recent: 4 to 7 years from graduation; middle: 8 to 11 years; and early seniors: 12 or more years) and compared our results across these three cohort groups.

Outcome Measures

We define "career trajectory" as the total observed career behavior of each respondent. The outcome measures of interest in this study of career trajectories are the geographic practice location patterns of physicians (ie, a physician's sequence of rural and urban practice sites), practice duration, physician's number of different practice locations, length of time between graduation and first practice and between practices, and practice retention rate. Urban communities are defined as those located within a metropolitan area as defined by the Office of Management and Budget.[13] All other communities are defined as rural.

Independent Measures

The physician and practice analyses consisted of examining differences in the outcome measures by responding graduate sex and graduation cohort. Limited information about the physicians or their practices across time were available from the survey responses because they were strongly oriented toward describing only what the graduates were doing at the time of the survey. In addition, the practice analyses used information on the location and duration of first practices to analyze subsequent practices.

Analyses

Relations among categorical variables (sex, graduation cohort, and practice location) were evaluated for statistical significance through the use of the standard chi-square statistic. Analysis of

Table 2. Characteristics of Physician Respondents and Practices.

Characteristics	Number	Percent
Physician characteristics		
Physicians	358	100.0
Practice status		
Currently in practice	350	97.8
No longer in practice	8	2.2
Sex		
Female	86	24.0
Male	272	76.0
Career cohort		
4-7 years (recent)	112	31.3
8-11 years (middle)	123	34.4
12 or more years (older)	123	34.4
Practice location pattern		
Rural only (1 or more)	80	22.3
Urban only (1 or more)	203	56.8
Mixed rural and urban	75	20.9
Number of practices		
1 practice	210	58.7
2 practices	88	24.6
3 practices	42	11.7
4 or more practices	18	5.0
Practice characteristics		
Practices	493	100.0
Practices by physician sex		
Female	122	24.7
Male	371	75.3
Practices by career cohort		
4-7 years (recent)	130	26.4
8-11 years (middle)	170	34.5
12 or more years (older)	193	39.1
Practice location		
Rural	160	32.5
Urban	333	67.5
Practice number		
1st practice	352	71.4
2nd practice	100	20.3
3rd practice	28	5.7
4th practice	13	2.6

variance (ANOVA) was used to test the significance of the single and interactive effects of the independent variables on practice location and retention. A minimum significance level of 0.05 was used to determine statistical significance in these tests.

Results

Description of Respondents and Respondent Practices

Table 2 describes the characteristics of the 358 respondent physicians and their 493 practices included in this study. The majority of physicians (58.7 percent) have been located in only one practice town since they finished their residency. Of those physicians who changed practice locations, very few (16.7 percent) changed practice location more than once. More than one half (56.8 percent) of all physicians had practiced in urban locations only, and more than two thirds (67.5 percent) of all practice locations were urban. The number of physicians was evenly distributed across cohort groups. Few graduates were no longer practicing medicine (2.2 percent). There were far more male than female graduates (76.0 percent versus 24.0 percent).

Career Practice Location Patterns

One third (33.8 percent) of the initial practices of graduate physicians were in rural locations, and 64.5 percent were in urban locations (1.7 percent had foreign or missing initial locations). We assessed the geographic pattern of practice locations (rural and urban) at the respondent's 4th and 12th career anniversaries. Figure 1 displays a summary of these findings. Although many permutations are possible, several simple patterns accounted for most of the geographic patterns of the physicians. At the 4th career anniversary, the single most common pattern was one single urban practice location (48.8 percent) and the next most frequent was one rural practice (22.6 percent). In fact, 86.2 percent of all careers involved one or more practices exclusively in either rural (26.5 percent) or urban (59.7 percent) locations. In addition, 6.1 percent moved from rural to urban locations, whereas 3.6 percent moved from urban to rural locations. An additional 3.9 percent had more complex patterns, such as a period of time in a foreign practice.

Practice patterns were very stable both during the course of physician careers and across graduation eras. As seen in Figure 1, the proportion of careers spent exclusively in either urban or rural locations did not change meaningfully from the 4th to the 12th career anniversary.

Very few of the respondents switched between rural and urban environments after the first 4 years of a career (ie, rural to urban or urban to rural). Physicians switching from rural to urban environments, however, accounted for a significantly larger percentage of those who switched than did those moving in the reverse direction (19.3 percent with initial rural practices switched to urban, whereas 5.7 percent switched in the opposite direction by the 4th-year anniversary). The

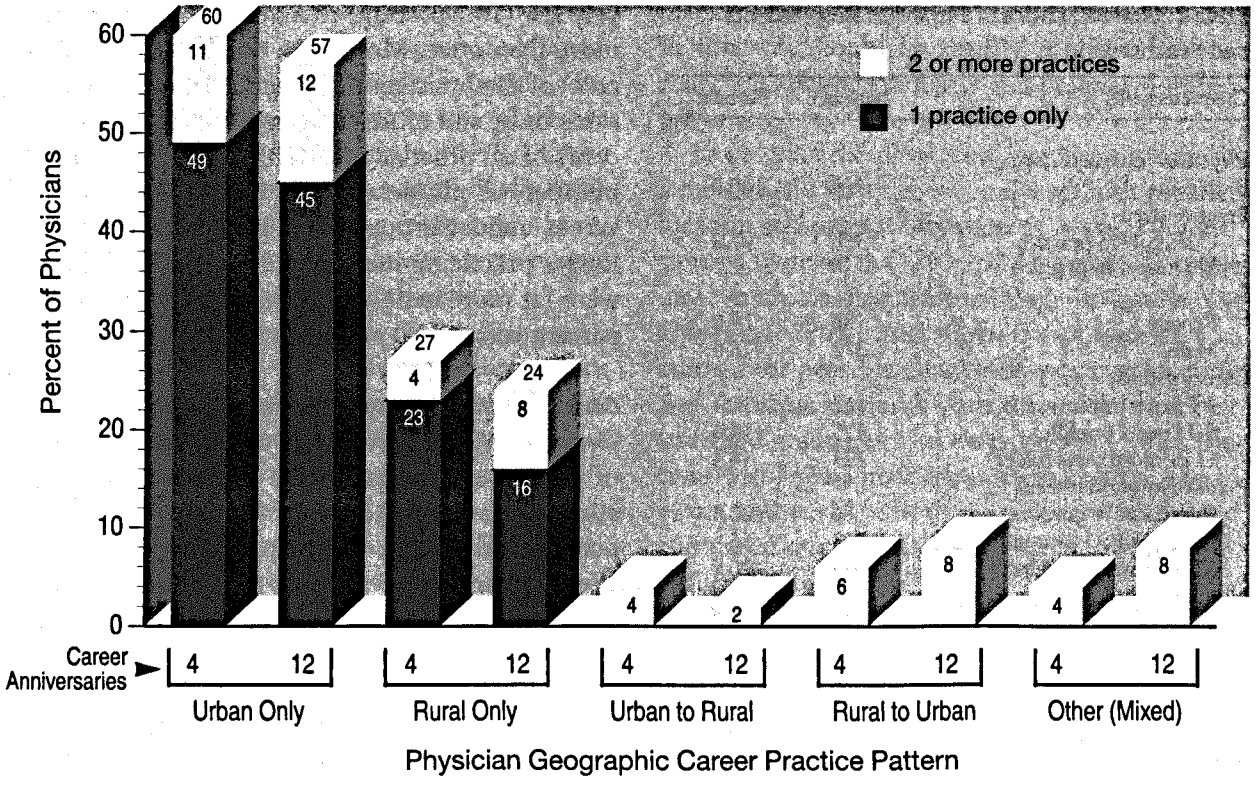

Figure 1. Physician location patterns: physicians at 4th- and 12th-year career anniversaries. The numbers of physicians for each vertical bar from left to right are: 213, 70, 96, 30, 13, 3, 22, 10, 14, and 10.

actual number of physicians switching in the two directions was not very large (22 from rural to urban and 13 from urban to rural).

Association of Sex and Cohort on Location Pattern

At the 4-year graduation anniversary date, we analyzed all respondents by sex and graduation cohort. Female graduates were significantly less likely to choose a rural first practice location than their male counterparts ($P = 0.006$). Female graduates had their initial practice locations in rural communities 20.9 percent of the time, while their male counterparts located in rural areas 37.9 percent of the time. This pattern remained consistent across the graduation cohorts.

While women might be less likely to choose rural locations initially, they are no more likely than men to switch environments by the 4th career anniversary. Of those initially in rural practice, 27.4 percent of women and 18.4 percent of men switched to urban locations, whereas 6.0 percent of women and 5.5 percent of men initially in urban locations switched to rural locations. Neither of these differences was statistically significant.

Overall Practice Retention

If graduates were available from much earlier eras, we could plot an exact retention curve for one set of respondents after all had permanently left practice. Because family practice is such a young discipline, the information on practice retention for residency-trained family physicians is necessarily incomplete. In our sample of physicians, for example, we have not yet observed that point where retirement, death, and disability have reduced the retention rate to near zero in even our earliest graduation cohort.

Figure 2 displays observed practice retention percentages during the 18-year span of practice covered by the responding residency graduates. The figure demonstrates that if a physician stays in practice for approximately 6 years, she or he is likely to remain in that practice until the 18th practice anniversary. Of the 403 practices observed for at least 6 years, 36.5 percent had closed by that anniversary. Of the 144 practices observed for at least 12 years (another 6 years), only 4.9 percent closed after the sixth and before the 12th practice anniversary. It is important to note that all practices located in the United States, not just

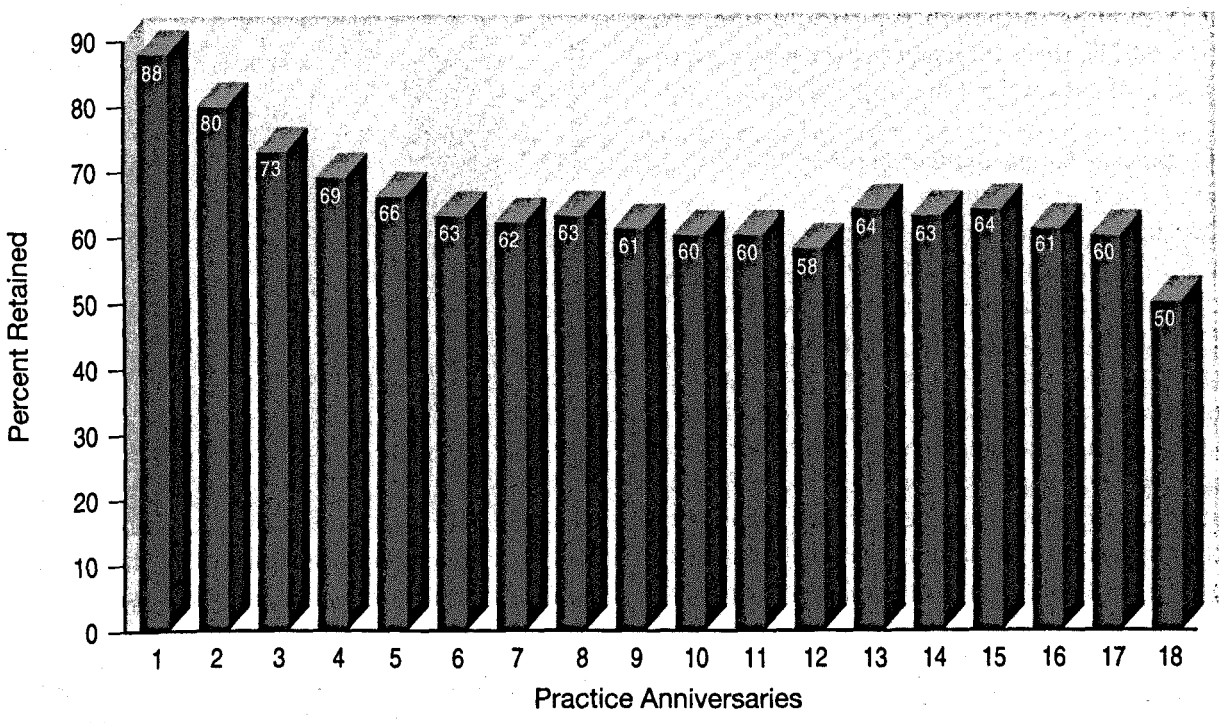

Figure 2. Observed practice retention: all practices. Observed practice retention is based on a declining number of practices over time. The denominators for the retention percentages from left to right are: 493, 493, 493, 493, 442, 403, 355, 315, 274, 224, 184, 144, 107, 70, 47, 31, 15, and 4.

initial practices, are included in this analysis. In our sample second practice duration was not significantly shorter than the first when examined at the 4th, 8th, and 12th practice duration anniversaries ($P = 0.47$, $P = 0.60$, $P = 0.57$).

We analyzed practice retention during the first 4 years since residency. The 1-, 2-, and 3-year retention rates for these 493, 4-year practices were 88.4 percent, 80.1 percent, and 73.0 percent, respectively. We were concerned that our findings from the minimum 4-year cohort practice groups might not be generalizable to the practices of more recent graduates with shorter careers and practices. Thus, we examined the retention rates for those physicians who were excluded from this study because they were recent graduates (ie, graduated less than 4 years before the survey). Retention rates in these practices observed for only 1, 2, and 3 years were respectively 83.8 percent (n = 167), 76.3 percent (n = 114), and 70.0 percent (n = 60). Because the retention percentages of the short observation practices did not significantly differ from those of the 4-year or more practices ($P = 0.16$, $P = 0.44$, $P = 0.73$), we conclude that very recent graduates are likely to behave similarly to those who preceded them.

Relation of Initial Practice Location and Retention to Physician Sex and Graduation Cohort

Sex and Graduation Cohort

Sex and year of graduation were strongly associated ($P = 0.011$). In the cohort that graduated 12 or more years before the survey, only 15.4 percent of the respondents were female. In the next cohort graduating between 8 and 11 years before the survey, 26.8 percent were female. Finally, in the recent cohort graduating between 4 and 7 years before the survey, 31.6 percent were female. Because of this relation, and others to be noted later, it is necessary to consider the interactive associations of both sex and cohort on the other variables.

Interval from Graduation to First Practice

The time interval from residency graduation to the start of the first practice was sex-linked in all of our cohorts, averaging 5.7 months for female and 1.9 months for male physicians ($P < 0.001$). We further explored whether the interval between the first practice and a subsequent practice varied by sex. The average interpractice gap for male physicians was 0.21 months during the first 4 years, whereas female physicians averaged

0.55 months. Although statistically significant ($P = 0.021$), these interpractice gaps amount to a matter of days and are not important.

Association of Sex and Graduation Cohort with Initial Practice Retention

For initial career urban practices, we found a significant association between sex and graduation cohort and retention at 4 years (ANOVA $P = 0.005$) (Figure 3). The retention pattern associated with physician sex reversed with time. The most recently graduated women who chose an initial urban practice location were more likely than their male peers to be in that same location at 4 years ($P = 0.091$). When looking at the retention experience of the most recently graduated group (those observed for 4 to 7 years), the retention in the urban setting after 4 years of practice was 85 percent for female graduates and only 66 percent for male graduates (overall 78 percent). By contrast, women from the cohort who completed training more than 12 years before the survey had a 50 percent retention rate at the 4-year practice anniversary, whereas their male contemporaries experienced a 84 percent retention rate by comparison ($P = 0.003$).

Because of the small number of women in rural practice, we could examine only the effect of graduation cohort (but not sex) on initial career rural practice retention at the 4th-year anniversary. There was a significant decline in rural initial practice retention from the middle to the most recent graduation cohort ($P = 0.015$). In the rural middle cohort (8 to 11 years), retention at 4 years was 78 percent; whereas for the rural recent cohort (4 to 7 years), the retention was 51 percent. Thus, a lower percentage of recent graduates of both sex stay in their initial rural practice until their 4-year graduation anniversary than was previously the case.

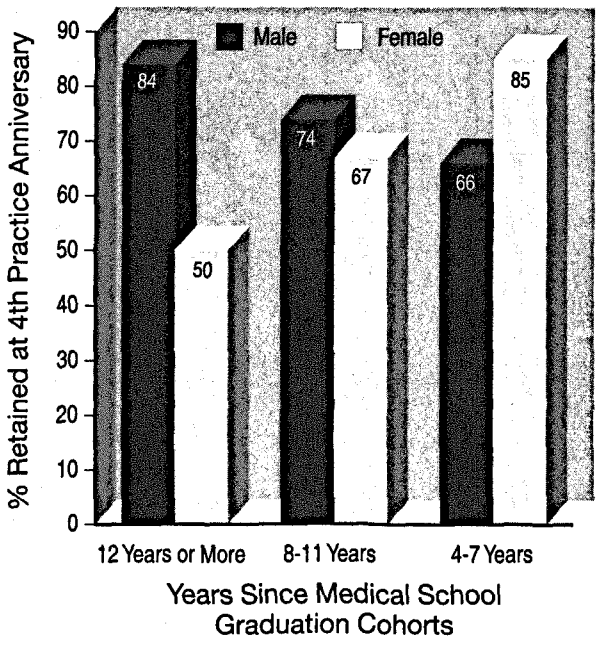

Figure 3. Retention by sex and years since graduation: urban first practices. The denominators for the retention percentages from left to right are: 63, 16, 57, 25, 26, and 44.

Discussion

This study has several limitations that should be recognized. Our information on location of the practices is limited to movement to different towns or cities. Because of data limitations, we could not track movement from practice to practice within towns or cities. The number of female graduates in the earlier cohorts and the number of female graduates choosing rural practices were quite small and limited some sex-specific analyses. In addition, the reasons for geographic relocation were not available in the data source, and we clearly lack information on many of the factors relevant to the processes being described. Nevertheless, the findings are unique and could direct others to the analysis of larger and more complete data sets to study career trajectories.

Because of the quantity and complexity of the information that has been presented, it is useful to categorize and summarize the results before discussing them. Briefly, we have studied 358 family practice residency graduates who have been involved in 493 practices for a period of 4 to 18 years.

We found that two thirds of the first practice locations were urban and one third were rural. More than 70 percent of the graduates were still in their first practice site at the time of their 4th-year practice anniversary. Relatively few providers switched from one type of location to another (rural and urban). Among those who did relocate, more family physicians moved from a rural site to an urban site than the reverse, though the difference in the number of relocators was small.

Once providers were in practice at a location for approximately 6 years, they were very unlikely to change their geographic practice locations.

Thus, physicians were most likely to relocate during the first 6 years of a practice.

As has been reported elsewhere, there has been a steady and significant increase in the proportion of the graduating family physicians who were female,[14] which proved true for our respondents as well. Female graduates tended to take a few months longer after graduation before entering practice than did their male colleagues. Female graduates were much less likely than their male contemporaries to choose rural practice locations. Once having selected a rural location, however, women were no more likely than men to relocate to an urban environment. Recently graduated women who chose urban practice locations were more likely than their male peers to have remained at that same urban practice location at the 4th practice anniversary. Of note, we found that the initial rural location retention rate decreased substantially for the most recent cohort for both men and women when compared with earlier cohorts of graduates.

The most notable finding of this study was the remarkable stability of the first practice location established by family practice residency graduates. From these data it appears that almost two thirds of family physicians will stay in their first practice location until retirement. At least for the University of Washington Family Practice Residency Network, the classic pattern of a physician selecting a community in which to practice, entering practice there shortly after training, and staying until retirement still endures.

Based on the information presented here, it appears that most of those choosing rural practice, in all of our cohorts, are men.[15] This fact should be of great concern to a nation that has been fighting a long battle to overcome a shortage of rural generalist physicians. Because women currently make up one half of the entering class of medical students at the University of Washington and tend to choose family medicine and other generalist residencies, means must be found to make rural practice more desirable and acceptable to women. Future studies should critically describe those mutable factors that will increase the percentage of female generalist physicians who locate and remain in rural practice locations. These factors might range from changes in premedical school recruitment, medical school admission policies, medical school and residency training methods and locations, and rural practice environments.

The results of this study clearly indicate that long durations of practice at the initial geographic practice site represent the most commonly seen pattern, and that most who choose either a rural or urban practice as their initial location will continue at that site until retirement. If a second practice location is chosen, the retention in that practice varies little from retention rates seen in initial practices. Because the length of observation was limited to 18 years or less, however, we can only by conjecture predict behavior in late career stages. For recent graduates, retention in the first practice is higher in urban than in rural locations, and women have higher retention in urban locations than do men.

Our analyses also have a bearing on the recruitment of family physicians. Most obviously recent graduates are the most available for recruitment, whereas physicians in a practice more than 6 years appear to be unlikely to change geographic practice location. Additionally, female graduates delay initiation of their first practices, which suggests that recruitment activities later in their training might be more fruitful. Furthermore, the choice of a rural location in a previous practice substantially increases the likelihood of choosing a rural location in a subsequent practice. Finally, those who have located earlier practices in urban areas are unlikely to move to rural practices.

Judy Gilmore provided information about the network, and John Geyman, MD, assisted in designing the survey.

1. Crandall LA, Dwyer JW, Duncan RP. Recruitment and retention of rural physicians: issues from the 1990s. J Rural Health 1990;6(1):19-38.
2. Langwell KM, Drabek J, Nelson SL, Lenk E. Effects of community characteristics on young physicians' decisions regarding rural practice. Public Health Rep 1987;102:317-28.
3. Magnus JH, Tollan A. Rural doctor recruitment: does medical education in rural districts recruit doctors to rural areas? Med Educ 1993;27:250-3.
4. Pathman DE, Konrad TR, Ricketts TC 3rd. Medical education and the retention of rural physicians. Health Serv Res 1994;29:39-58.
5. Riley K, Myers W, Schneeweiss R. Recruiting physicians to rural practices—suggestions for success. West J Med 1991;155:500-4.
6. Rosenthal TC, Rosenthal GL, Lucas CA. Factors in

the physician practice location puzzle: a survey of New York State residency-trained family physicians. J Am Board Fam Pract 1992;5:265-73.

7. Willke RJ. Practice mobility among young physicians. Med Care 1991;29:977-88.
8. Pathman DE, Konrad TR, Ricketts TC 3rd. The comparative retention of National Health Service Corps and other rural physicians. Results of a 9-year follow-up study. JAMA 1992;268:1552-8.
9. Pathman DE, Konrad TR, Agnew CR. Studying the retention of rural physicians. J Rural Health 1994; 10:183-92.
10 Pathman DE, Konrad TR, Ricketts TC 3rd. The National Health Service Corps experience for rural physicians in the late 1980s. JAMA 1994;272:1341-8.
11. Baldwin LM, Hart LG, West PA, Norris TE, Gore E, Schneeweiss R. Two decades of experience in the University of Washington Family Medicine Residency Network: practice differences between graduates in rural and urban locations. J Rural Health 1995; 11(1): 60-72.
12. Matthews DE, Farewell VT. Using and understanding medical statistics. New York: Karger, 1985.
13. Butler MA. Rural-urban continuum codes for metro and nonmetro counties. Washington, DC: US Department of Agriculture, Economic Research Service, Agriculture and Rural Economy Division, 1990. Staff report no. AGES 9028.
14. Bickel JW, Quinnie R. Women in medicine: statistics. Washington, DC: Association of American Medical Colleges, 1992.
15. Rosenblatt RA, Whitcomb ME, Cullen TJ, Lishner DM, Hart LG. Which medical schools produce rural physicians? JAMA 1992;268:1559-65.