Academic Longevity and Attrition of Full-Time Orthopaedic Faculty Members

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Orthopaedic faculty members catalyze the renewal of the specialty. They may provide the strongest role model for a medical student's or resident's career[2,8]. Undoubtedly, all residents weigh the relative merits of accepting that role model for themselves, and some do become faculty members, at least for a portion of their careers. Many of the pros and cons of such a career choice differ by institution. The decision points are also subjective and intangible, and they vary over time. No objective data exist, either for those considering such a choice or for program directors offering such a position, regarding the anticipated longevity of an academic position. What is the likelihood of a faculty member spending an entire career at one institution as opposed to moving to another academic position or to private practice? Has the longevity changed over time? Does it differ by subspecialty? Are there gender differences?

Such questions have national implications. Certainly, the opportunity, appeal, and pressures of serving as an orthopaedic teacher have changed over the approximately 100 years that orthopaedics has existed as a discipline and over the sixty-five years that it has existed as a board-certified specialty[2-5,7,12]. In the first half of the twentieth century, orthopaedic faculty members were predominantly volunteers who had private practices and contributed time at teaching hospitals[18]. There were seventy-seven medical schools in the United States from 1933 to 1948. By 1963, the addition of ten schools and the expansion of class size at the existing schools accounted for a 31 percent increase in the annual number of graduates compared with the number in 1948[8]. An additional increase of 75 percent occurred between 1963 and 1975, following two federal government reports, in 1958 and 1959, that asserted the United States was facing a serious shortage of doctors[8,15,17]. The size and number of orthopaedic residency programs and the size of full-time orthopaedic faculties expanded concurrently. A 1974 study predicted the alleviation of any orthopaedic surgeon shortage by 1980 and the possibility of a slight oversupply by 1985[11]. A 1980 federal report predicted a 35 percent surplus of orthopaedists by 1990[16]. By 1993, an oversupply of all specialists was widely perceived, and financial changes were instituted to increase residency training opportunities in primary care and to adjust Medicare fee schedules upward for general physicians and downward for specialists[10]. A 1998 study predicted a 24 percent surplus of orthopaedic surgeons by 2010[9]. Changes such as these will undoubtedly have an effect on the size of orthopaedic residency programs and on that of full-time orthopaedic faculties.

Our purpose was to document academic longevity and attrition of full-time orthopaedic faculty members over the forty-year period from 1959 to 1998. The data serve as a baseline against which to compare faculty staffing as changes in the financing of both health care and resident education continue. The data also allow comparison of academic longevity in orthopaedics with that in other specialties.

Inclusion and Exclusion Criteria

We chose to study orthopaedic surgeons holding full-time academic positions at any time between 1959 and 1998 inclusively. A full-time academic position

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meant that the surgeon's income was under some sort of institutional control, such as straight salary, salary with incentive, dean's tax, or income-limitation plan. Faculty based at outlying hospitals, commonly Veterans Administration and children's hospitals, were included as long as they fell under an institutional financial constraint. This definition of full-time excludes teachers commonly described as volunteer faculty, clinical faculty, or geographic full-time faculty. The distinction is not intended to denigrate the contributions of less-than-full-time academic orthopaedists to the mission of residency training programs; however, the level of contribution by such individuals is difficult to standardize and quantify. Furthermore, the academic, administrative, and financial pressures to leave a faculty position are different for these individuals than for those with full-time academic appointments. For programs that did not exist in 1959 and those that did not have full-time faculties in that year, we tracked the full-time faculty's academic longevity and attrition from the time of inception of the faculty compensation plan. We excluded programs that closed before 1996 and those with plans that started later than 1989. We also excluded programs based at military institutions, such as the Walter Reed Army Medical Program; those based at community hospitals, such as Orlando Regional Health Care; and those based at health-science universities and freestanding medical colleges, such as Oregon Health Sciences University and the Medical College of Georgia. These inclusion and exclusion criteria were chosen so that we could evaluate academic longevity and attrition at currently existing programs that have had faculty compensation plans for at least ten years and that were sponsored by institutions with at least somewhat similar administrative, budgetary, and tenure considerations.

We collected data from all eighty-two American universities that had orthopaedic surgery residency programs and that met the above criteria. (The institutions that were studied are listed in the Appendix.) These institutions constituted 52 percent of the 157 orthopaedic residency programs in the United States and accounted for approximately 61 percent (approximately 344) of the approximately 560 orthopaedic surgery residency positions in 1998[6]. (These numbers are approximate because of ongoing mergers and the resizing of several programs represented in the numerator or the denominator.)

Data Collection

We devised a questionnaire and faxed it to all members of the Academic Orthopaedic Society and to members of the American Academy of Orthopaedic Surgeons who had mailing addresses at university medical centers. The questionnaire requested information on the following: name, birth year, verification of full-time status, institution(s) where the surgeon was (or had been) employed, subspecialty (if any), year that the surgeon joined the faculty, year that the surgeon left the faculty (if applicable), next activity (if applicable), and names of orthopaedic faculty members at the medical school and residency program attended. Next activity referred to death; retirement; private practice; and taking another academic position, regardless of whether the subsequent position was at an institution included in our study.

Additional names were gleaned from orthopaedic departments that listed faculty members on departmental letterhead or on their departmental Web site. Our preliminary working list was then discussed either face-to-face or by telephone with at least two senior orthopaedists familiar with each institution, who supplied names that otherwise would have been overlooked. When possible, we faxed questionnaires to these additional identified individuals. When a fax number was not available, we attempted to contact the individual by mail, e-mail, telephone, or direct contact at a meeting. When an individual could not be contacted or did not respond, we requested the desired information from departmental and institutional records. Obituaries published in *The Journal of Bone and Joint Surgery* provided additional information on surgeons who had died prior to data collection. The data were compiled with use of Microsoft Access (Microsoft, Redmond, Washington).

When our database was as complete as possible, we again showed the spreadsheet for each institution to past and present department chairpersons and other senior faculty members to verify the accuracy of our information. At the time of the analysis, our data were more than 99 percent complete for the following categories: birth year, year that the surgeon joined the faculty, year that the surgeon left the position (if applicable), subspecialty (if applicable), and next activity (if applicable). These data were analyzed with use of Microsoft Access, and the survivorship data were analyzed with use of Stata (Stata, College Station, Texas). For the purpose of the survivorship analysis, we defined failure as departure from a full-time faculty position.

Data Analysis

Our study group consisted of 1777 orthopaedic surgeons who at some point between 1959 and 1998

TABLE I
WOMEN STARTING CAREERS IN ACADEMIC ORTHOPAEDICS

Time-Period	No. of Women/ Total No. of Orthopaedists
All	77/1777* (4%)
Before 1959	0/87 (0%)
1959-1968	1/109 (<1%)
1969-1978	1/344 (<1%)
1979-1988	23/524 (4%)
1989-1998	52/700 (7%)

*Precise data on starting year were unavailable for thirteen men.

had held a full-time faculty position at one or more of eighty-two universities in the United States. Two hundred and nine of these surgeons had been on the faculties of at least two institutions, thirty-two had served on at least three faculties, and four had served on four faculties. Thus, a total of 2022 positions were studied.

The age at which the surgeon started his or her first faculty position averaged thirty-two to thirty-four years during the period of the study, with no decade-by-decade differences. Women constituted 4 percent of the entire study group, with greater numbers and percentages of women accepting faculty positions in more recent decades (Table I).

A breakdown of the 1777 orthopaedists by subspecialty is given in Table II. Foot and ankle surgery and orthopaedic oncology were the two smallest subspecialties represented. There was a significant relationship between gender and subspecialty ($p < 0.001$, chi-square test). Women were two to three times more likely than men to subspecialize in pediatric or foot and ankle surgery, and they were three to four times less likely than men to subspecialize in spine, trauma, or adult reconstructive surgery. When the data were broken down according to the decade that the surgeon had begun to practice, there were noteworthy differences among the subspecialties ($p < 0.001$, chi-square test) (Table II). General orthopaedics saw a precipitous decline, from 40 percent in the early portion of the study to only 7 percent in the most recent decade. Hand surgery saw a 2.5 percent increase over two decades and then declined. Adult reconstructive surgery saw an increase in the second decade of the study and then declined. Spine surgery and trauma surgery each saw a twofold increase over the entire study period, and sports medicine had more than a threefold increase.

The attrition of academic orthopaedic surgeons is enumerated in Table III. Nearly one-half (835) of the 1777 surgeons were still at their first academic position, slightly more than one-fourth had moved to private practice, and almost one-fifth had moved to another academic position. Of the 320 who had taken a second academic job, more than one-half were still there, 15 percent had left for private practice, and nearly one-fourth had taken a third academic position. Of the seventy-four surgeons who had taken a third position, more than one-half had remained in that position and one-fifth had moved to a fourth position. Small percentages of surgeons had left their first, second, or third academic position because of death or retirement. One percent had left for private practice and later had returned to a full-time university position, often at the same institution.

Survivorship analysis showed that 53 percent of the 1777 faculty members remained at their first job for at least ten years, 35 percent remained for at least twenty years, and 25 percent remained for at least thirty years (Table IV). With regard to the total time spent in these 2022 academic positions, 70 percent of the 1777 faculty members stayed for at least ten years, 53 percent stayed for at least twenty years, and

TABLE II
SUBSPECIALISTS STARTING ACADEMIC CAREERS, ACCORDING TO GENDER AND DECADE*

	All Time-Periods (N = 1777)		1959-1968 (N = 109)	1969-1978 (N = 344)	1979-1988 (N = 524)	1989-1998 (N = 700)
	Men	Women				
Foot and ankle surgery	3	13	2	2	2	6
General orthopaedics	14	8	40	16	8	7
Hand surgery	14	16	7	15	18	12
Adult reconstructive surgery	13	3	16	18	13	10
Children's orthopaedics	16	40	14	21	19	15
Spine surgery	13	4	8	11	12	16
Sports medicine	12	10	5	8	13	17
Trauma surgery	9	3	5	6	11	10
Orthopaedic oncology	5	4	4	4	4	6

*All values are given as percents.

TABLE III
ATTRITION FROM FULL-TIME FACULTY POSITIONS*

	1st Full-Time Position (N = 1777)	2nd Full-Time Position (N = 320)	3rd Full-Time Position (N = 74)
Still present	47	53	57
Left for private practice	27	15	3
Left for another academic position	18	23	20
Retired	7	7	16
Died	1	2	3

*All values are given as percents.

39 percent stayed for at least thirty years. No differences were noted when academic longevity was analyzed with regard to gender, although the small number of women in our study precludes precise statistical analysis.

Overall, approximately one-half, one-third, and one-fourth of the faculty members remained at their first academic position for at least ten, twenty, and thirty years, respectively. Longevity varied significantly according to subspecialty. Hand surgeons ($p < 0.005$), spine surgeons ($p < 0.011$) and general orthopaedic surgeons ($p < 0.072$) remained in academic positions for shorter periods than did surgeons in the other subspecialty groups (Table IV).

There were also decade-by-decade differences in longevity. The greatest longevity was noted in the first decade that was studied (1959 to 1968) (Fig. 1). A downward trend was noted for the second decade (1969 to 1978), and an additional decrease was observed for the third decade (1979 to 1988) ($p < 0.005$, log-rank test). The academic longevity for the most recent decade (1989 to 1998) increased compared with that for the previous time-period and was similar to that seen in the first two decades of the study.

The growth of full-time orthopaedic academic faculties over the period of this study is reflected in Table V. There was a rapid and steady increase in the number of surgeons starting an academic career during the first thirty-five years of the study, whereas the number accepting academic posts dropped in the most recent five-year period. The number of surgeons leaving academic positions increased steadily over the duration of the study. For the first twenty-five years, at least 2.3 surgeons started a faculty position for every one who departed. In the most recent five-year period, only 1.3 surgeons started for every one who left.

Some programs showed more apparent turnover in faculty than others. However, after taking into account program size, growth, and length of time that each program had existed, we were unable to clearly identify programs for which academic longevity was greater or smaller than the averages presented above.

Implications of Our Findings

Our primary purpose was to collect and present the data. Although our findings are open to various interpretations, they may serve as a framework for the study of academic demographics in other specialties and for comparison with future data for orthopaedic surgery. Several generalizations may be drawn from our findings.

First, despite a growing number of women in academic orthopaedics, this group remains predominantly male. The percentage of female medical school graduates was less than 6 percent in 1960, 8 percent in 1970, 23 percent in 1980, and nearly 41 percent in

TABLE IV
LONGEVITY IN ACADEMIC ORTHOPAEDICS*

	≥10 Yrs.	≥20 Yrs.	≥30 Yrs.
All orthopaedists			
First position	53 ± 1.3	35 ± 1.5	25 ± 1.8
All positions	70 ± 1.2	53 ± 1.6	39 ± 2.2
By subspecialty			
Foot and ankle surgery	77 ± 6.4	61 ± 11.6	46 ± 14.9
General orthopaedics	65 ± 3.2	44 ± 3.7	30 ± 3.8
Hand surgery	55 ± 3.5	42 ± 4.2	24 ± 7.4
Adult reconstructive surgery	73 ± 3.1	56 ± 4.3	42 ± 5.8
Children's orthopaedics	78 ± 2.6	58 ± 4.0	45 ± 6.6
Spine surgery	62 ± 3.3	49 ± 4.2	40 ± 7.6
Sports medicine	65 ± 4.6	48 ± 6.4	44 ± 7.1
Trauma surgery	73 ± 4.2	46 ± 8.8	DNS
Orthopaedic oncology	79 ± 5.4	65 ± 7.7	DNS

*All values are given as percents and are based on a total of 1777 orthopaedists. The values are expressed as the average and the standard error. The 95 percent confidence intervals are derived by adding and subtracting 1.96 times the standard error to the estimated survival percentage. DNS = data not sufficient.

TABLE V
RATES OF GROWTH AND ATTRITION OF FACULTY, ACCORDING TO FIVE-YEAR INTERVALS

Interval	No. of Orthopaedists Starting an Academic Position	No. of Orthopaedists Departing an Academic Position	Ratio of Those Starting to Those Departing
1959-1963	41	18	2.3
1964-1968	68	29	2.3
1969-1973	149	52	2.9
1974-1978	195	83	2.3
1979-1983	245	104	2.4
1984-1988	279	152	1.8
1989-1993	372	220	1.7
1994-1998	327	251	1.3

1996[1,8]. In contrast, women accounted for 1 percent of orthopaedic residents in 1977 and for 7 percent in l996[1]. Our study shows that women also accounted for approximately 1 percent of full-time orthopaedic faculty members in the late 1970s and for 7 percent in the 1990s (Table I). Female academic orthopaedists are more likely to specialize in foot and ankle surgery and in children's orthopaedics, while trauma surgery, spine surgery, and adult reconstructive surgery remain overwhelmingly male-dominated. Academic longevity was not found to be gender-related.

Second, subspecialization has swept though orthopaedics in the last thirty years[13]. There was a great burst of interest in adult reconstructive surgery following the release of methylmethacrylate for use in total joint replacement almost thirty years ago, and that subspecialty showed corresponding growth in the 1970s, with a subsequent decrease that perhaps was related to restricted Medicare reimbursement. The rise in hand surgery may likewise be attributed to the technological advances brought about by microsurgery and limb replantation in the 1970s. Sports medicine and spine surgery have shown dramatic and more recent growth. Whether these changes are related to economics, population demographics, advances in surgical techniques and instrumentation, or other factors is speculative.

Third, we found that hand, spine, and general orthopaedic surgeons remained on full-time orthopaedic faculties for significantly shorter periods of time than average. For hand and spine surgeons, this finding may reflect the nature of these subspecialties and how dependent or independent they are on tertiary medical centers for interdisciplinary care, expensive and sophisticated technology, and ease of access to appropriate operating-room facilities. The attrition of general orthopaedic surgeons from academic positions probably parallels the rapid growth in the subspecialization of orthopaedic surgery over the timespan of this study.

Fourth, the fact that 47 percent of the orthopaedists who took a full-time faculty position during the forty-year period of this study were still at their first position at the time of this writing speaks to the rapid growth of the specialty and the relative attractiveness

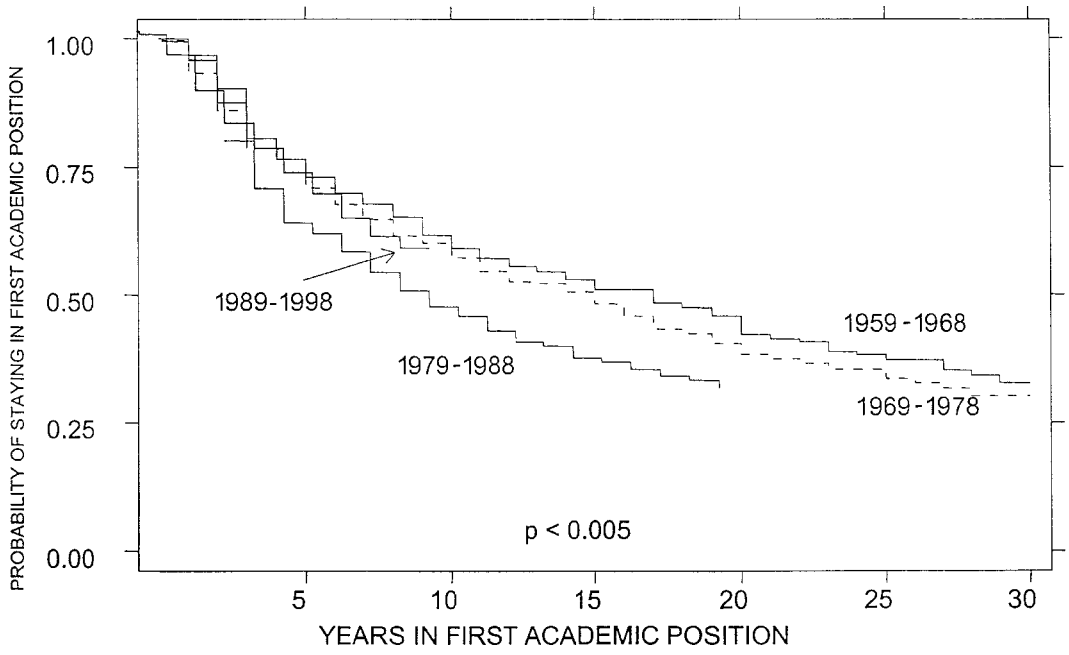

FIG. 1
Kaplan-Meier survivorship-analysis curves showing decade-by-decade differences in academic longevity.

of such positions. The attrition to private practice among orthopaedists in their second and third academic positions diminished progressively. Once an orthopaedist left academia for private practice, however, there was only a 1 percent chance of return. The decade-by-decade differences in longevity are noteworthy and may imply variation in the relative attractiveness of an academic position compared with that of private practice over time. We did not explore the reasons that full-time faculty members left for private practice, although commonly discussed reasons were related to such factors as autonomy, compensation, and leadership. The relative importance of such factors is currently being explored in a follow-up study of orthopaedists who recently left an academic position for private practice.

From the data presented in Table V, it is apparent that the rapid growth in orthopaedic faculty positions has leveled and the number of orthopaedic surgeons starting full-time academic careers is reaching an equilibrium. The effects that health-care-financing reform and other pressures will have on academic orthopaedics are unknown. Some residency programs are voluntarily downsizing in response to the perceived abundance of specialists, and a corresponding downsizing of full-time faculty may ensue. As government support for teaching hospitals diminishes[14], there may be more pressure for full-time faculty to increase clinical productivity, probably at the expense of research and teaching, thereby making academic positions less attractive. On the other hand, decreases in third-party reimbursement rates for orthopaedists in private practice may reduce differences in compensation between academic positions and private practice, thus enhancing the attractiveness of an academic career. For these reasons, it may be useful to reevaluate these data in the future.

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Appendix

The Eighty-two Institutions That Were Included in the Study, According to Geographic Location

Alabama: University of Alabama, University of South Alabama

Arizona: University of Arizona

Arkansas: University of Arkansas

California: Stanford University, University of California at Davis, University of California at Irvine, University of California at Los Angeles, University of California at San Diego, University of Southern California

Colorado: University of Colorado

Connecticut: University of Connecticut, Yale-New Haven Hospital

Florida: University of Florida, University of Florida at Jacksonville, University of Miami

Georgia: Emory University

Hawaii: University of Hawaii

Illinois: Loyola University, Northwestern University, Southern Illinois University, University of Chicago, University of Illinois at Chicago

Indiana: Indiana University

Iowa: University of Iowa

Kansas: University of Kansas

Kentucky: University of Kentucky, University of Louisville

Louisiana: Tulane University, Louisiana State University

Maryland: Johns Hopkins University, University of Maryland

Massachusetts: Tufts University, University of Massachusetts

Michigan: Michigan State University, University of Michigan, Wayne State University

Minnesota: University of Minnesota

Mississippi: University of Mississippi

Missouri: University of Missouri, University of Missouri at Kansas City, Washington University, St. Louis University

Nebraska: University of Nebraska/Creighton University

New Hampshire: Dartmouth-Hitchcock Medical Center

New Mexico: University of New Mexico

New York: Albert Einstein College of Medicine at Yeshiva University, Columbia University, State University of New York at Brooklyn, State University of New York at Buffalo, State University of New York at Stony Brook, State University of New York at Syracuse, University of Rochester

North Carolina: Duke University, University of North Carolina, Wake Forest University

Ohio: Case Western Reserve University, Ohio State University, Wright State University, University of Cincinnati

Oklahoma: University of Oklahoma

Pennsylvania: Pennsylvania State University, Temple University, University of Pennsylvania, University of Pittsburgh

Rhode Island: Brown University

South Carolina: University of South Carolina

Tennessee: Vanderbilt University

Texas: Texas Tech University, University of Texas at Houston, University of Texas at San Antonio, University of Texas Southwestern

Utah: University of Utah

Vermont: University of Vermont

Virginia: Medical College of Virginia/Virginia Commonwealth University, University of Virginia

Washington: University of Washington

Washington, D.C.: George Washington University, Georgetown University, Howard University

West Virginia: West Virginia University

Wisconsin: University of Wisconsin

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