

A Model for Faculty Mentoring in Academic Radiology¹

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Rationale and Objectives. The purpose of this report is to describe the development and implementation of a faculty mentoring program in radiology designed to promote the career development of junior faculty and enhance communication in the department.

Materials and Methods. The mentoring program was implemented in five stages: organizational readiness, participant recruitment, mentor matching and orientation, implementation, and evaluation. Evaluations were based on Likert scale ratings and qualitative feedback. A retrospective analysis was also conducted of the annual performance reviews of junior faculty in the areas of research, teaching, patient care, and overall performance.

Results. An average of 83% (19 of 23) of the junior faculty participated in the pilot phase of the mentoring program. During five rounds of testing, the median rating (1 indicates not important; 10, extremely important) from responding junior faculty was 10 for overall value of individual mentoring meetings; the median rating for the mentors responding was 8.75. Research and academic development were identified as the areas of greatest importance to the faculty. Research and patient care were most improved as assessed by faculty peers during performance reviews. The schedule of semiannual formal mentoring meetings was reported to be optimal.

Conclusion. The program was implemented to the satisfaction of junior faculty and mentors, and longitudinal performance suggests positive effects. Issues to be contended with include confidentiality and the time needed for mentoring beyond already saturated schedules. Overall, the authors propose that mentoring programs can be an asset to academic radiology departments and a key factor in maintaining their vitality.

Key Words. Mentoring, mentors, faculty development, academic radiology.

In Greek mythology, a boy named Telemachus was the first to be mentored when his father Odysseus set off to war and left him in the trusted care of Mentor for his development and education; Athena, the goddess of wisdom, sometimes appeared disguised as Mentor to attend to the boy, as well (1). Set in the context of academic medicine, mentoring has occurred throughout the ages as one generation of faculty has imparted knowledge and wisdom to the next. Traditionally, chronological age has determined the role of the indi-

vidual as a mentor or the person being mentored. In today's environment, however, the mentoring relationship is also built on experience (2), as the rapidly evolving technological and digital age and equally rapidly changing health care systems mandate the need for reciprocity in information sharing between newly trained individuals with state-of-the-art skills and their elders.

The literature provides ample reports and models of mentoring in medicine and allied health-related fields but none previously, to our knowledge, in radiology. Nevertheless, many of the principles described elsewhere in the literature are largely applicable to radiology. For example, Bland et al (3) described three areas of professional academic skills in which, in their view, all faculty new to academic medicine need to be educated: (a) adopting academic values, (b) managing an academic career, and

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(c) establishing and maintaining a productive network of colleagues. Consistent with the evolving academic skills of those being mentored, mentors in medicine must bring to the relationship (a) a personal element that encourages confidence and creativity in the mentored person, (b) a functional element that deals with pragmatic aspects of professional activity, and (c) a developmental element that focuses on interpersonal skills and networking (4). These overlapping themes are clearly relevant in the context of any mentoring relationship in which the goal is to cultivate the successful careers of individuals and future leaders of academic medical subspecialties (5).

Clearly two of the most important elements of any mentoring partnership are the acceptance of the need to mentor and to be mentored and the willingness to teach and to learn. When successful, mentoring has yielded important benefits to those mentored. For example, a report by the American College of Physicians showed that in academic institutions, junior faculty with identified mentors tend to publish more papers, have better career opportunities, and feel more confident about their capabilities, and are more satisfied professionally (6). In a study of more than 1,800 junior faculty members in the United States, Palepu et al (7) learned that individuals with mentors had higher institutional support for teaching, administration, and research than individuals who lacked mentors. While the two groups in this study did not differ in terms of the numbers of publications, individuals with mentors were more likely to have been awarded research grants and had greater overall career satisfaction.

The radiology mentoring program we describe here was implemented originally in 1995 and was designed to take into consideration the complex matrix of issues facing all faculty in today's academic environment. It was specifically responsive to the need (a) to better promote successful career development of the junior faculty as measured by metrics such as publications, grant funding, and professional advancement and (b) to enhance the overall openness and clarity of communication in the department. The rationale for developing the program was rooted in the fundamental need for more formal partnership among junior faculty, senior faculty, and other department professionals and staff and to enhance the sense of community and opportunity for success for all department members. For example, although various forms of written documentation about the responsibilities associated with faculty appointments and requirements for advancement in the medical school have been generally available to all faculty, this material is generic by necessity. Lacking, for

example, were department-specific details about the type of publications and journals desirable for advancement and merit-versus-time pressures associated with administrative and committee duties. To attain specific guidance related to career advancement in the Department of Radiology within the School of Medicine, junior faculty relied on discussions sought formally with the department chairman, section chiefs, and colleagues and, equally important, on advice garnered from informal and impromptu meetings. However, these types of communication were suboptimal from the point of view of rigor, efficiency, and quality and consistency of information flow, with the burden of discovery on the junior faculty.

Coexistent with the emerging need for formal mentoring was the establishment of an infrastructure in the department dedicated to research development. This effort was designed to assist all faculty in developing a trajectory for extramural funding (8) and benchmarks for success, and provided substantial mentoring in this area. Nevertheless, as funding is only one dimension of activity for faculty in the department, the need for a comprehensive approach to faculty development was clearly mandated. To this end, our program was designed to operate in real time for the presumed benefit of all faculty in the department and, therefore, was never set up as an experiment. This article is a report of our activity in that context.

MATERIALS AND METHODS

A five-stage system (9) was used as a model to launch the mentoring program. The stages can be characterized as follows: (a) organizational readiness and assessment of needs, (b) participant recruitment, (c) mentor matching and orientation, (d) implementation (all described in this section), and (e) evaluation (described in "Results" section).

Organizational Readiness

A series of open-forum discussions dedicated to the development of a mentoring program were held among faculty and senior department managers. The two major goals of promoting the successful career development of the junior faculty in the department and improving communication and openness among faculty and staff were identified through these sessions.

Participant Recruitment

Mentoring committee.—The senior department manager responsible for strategic research development and two faculty mentors volunteered to serve on the mentoring

committee. The committee had responsibility for (a) overall program oversight, evaluation, and assurance of effectiveness; (b) analysis and interpretation of the data received from the semiannual mentoring meetings; (c) participation in and facilitation of annual faculty retreats; and (d) hosting of seminars.

A short publication detailing the mentoring program was written by the committee chair and distributed to all faculty. It included (a) a description of the history, goals, and structure of the radiology mentoring program, (b) a brief description of the School of Medicine mentoring program², (c) the university *Appointment and Promotions* publication, (d) a list of prospective mentors and their areas of expertise and interest, and (e) "Mentor Selection" and "Program Evaluation" forms. This publication is updated annually.

The committee also distributed selective mentoring-related publications to faculty, such as McHugh's *A "Letter of Experience" about Faculty Promotion in Medical Schools* (10), the National Academy Press publication, *Adviser, Teacher, Role Model, Friend* (11), and Gray's *Mentoring the Young Clinician-Scientist* (12). Committee members met formally approximately twice per year, coincident with acquiring the data from the semiannual mentoring meetings, and on an as-needed basis.

Mentors.—All faculty at or above the rank of associate professor were invited to serve as mentors. Roundtable discussions with all interested faculty about the responsibilities of mentors and individual meetings between many prospective mentors and members of the program committee culminated in the following definition of mentor responsibilities: to assist and advise junior faculty in (a) setting clinical, research, and teaching goals, (b) setting a timeline for accomplishments, (c) meeting the requirements for advancement and promotion, (d) other areas of mutual interest and importance.

The department chairman and the associate chairman of clinical affairs were ineligible to serve as mentors to avoid any potential conflict of interest in the promotion process. Faculty emeriti opted not to participate in the program.

Mentored junior faculty.—The program was designed so that all assistant professors would be entitled and expected to have a mentor. Untenured associate professors in the tenure line were considered for mentoring on a case-by-case

basis. Participation in the pilot phase was strongly encouraged but not mandatory.

Mentor Matching and Orientation

Each junior faculty member selected a mentor at the time the program was established; subsequently, and continuing to date, junior faculty acquire a mentor on joining the department. Junior faculty were encouraged to select a mentor on the basis of a match with clinical, research, and administrative interests and expertise. Most commonly, a mentor was selected from within the junior faculty member's section, but in some instances mentors were chosen from outside the section. The mentoring partnership was approved by the prospective mentor, and shifting of mentors has been permissible at any time, with the agreement of the new mentor.

Implementation

Formal mentoring meetings.—Formal mentoring meetings were set to occur approximately every 6 months. All faculty were reminded electronically by the committee chair to schedule their meetings and were given a 6–8-week window in which to have their meetings and provide feedback to the committee.

Evaluation.—Evaluation of the mentoring program was based on junior faculty and mentor ratings of the overall satisfaction with their semiannual meetings ($n = 5$) and of the relative importance of five major professional areas—academic progress, research, clinical, teaching, and administration—in the discussion. Ratings were made on the basis of a simple Likert scale with a rating of 1 indicating not important to 10 indicating extremely important. Areas not discussed were given a score of zero. While comments were always encouraged, this objective method allowed us to identify and track the value of the meetings, the level of agreement between mentoring partners, and the areas of major concern to the junior faculty without encroaching on the confidentiality of the meetings. The data were also analyzed for the cohort of women and ethnic faculty in the department.

A retrospective analysis was also conducted of the annual performance reviews of junior faculty in the areas of research, teaching, patient care, and overall performance to provide independent measures of career progress. For annual performance reviews, six faculty constituting a chair-appointed ad hoc review committee scored each area of responsibility (scale: 1 indicates low; 5, high). Service on the committee rotates annually. Final scores represent the averaged score per measure across reviewers. Herein we report the results of difference scores for

²This program, developed coincidentally and concurrently with the radiology program, is broadly dedicated to enhancing communication among junior and senior faculty across School of Medicine departments. It provides opportunities for cross-department mentoring and hosts regular seminars on topics related to professional development.

Table 1
Participation of Junior Faculty in Mentoring Program and Junior Faculty and Mentor Completion of Evaluation Forms

Participation or Form Completion	Evaluation Round				
	1	2	3	4	5
Junior faculty participating in pilot mentoring program	19 (83)	22 (85)	18 (78)	21 (88)	19 (83)
Junior faculty completing meeting evaluation forms	17 (89)	18 (82)	13 (72)	10 (48)	11 (58)
Mentors completing meeting evaluation forms	13 (68)	21 (95)	12 (66)	13 (62)	13 (68)

Note.—Numbers in parentheses are percentages.

Table 2
Median Ratings by Junior Faculty and Mentors of Overall Value of Mentoring Meetings

Rating Group	Evaluation Round				
	1	2	3	4	5
Junior faculty	10 (<i>n</i> = 17)	8 (<i>n</i> = 18)	10 (<i>n</i> = 13)	10 (<i>n</i> = 10)	10 (<i>n</i> = 11)
Mentors	8.5 (<i>n</i> = 13)	8 (<i>n</i> = 21)	8.75 (<i>n</i> = 12)	8.5 (<i>n</i> = 13)	9 (<i>n</i> = 13)
Women junior faculty*	9.5 (<i>n</i> = 6, 86%)	8 (<i>n</i> = 7, 100%)	9.25 (<i>n</i> = 4, 80%)	9 (<i>n</i> = 3, 50%)	10 (<i>n</i> = 4, 50%)

Note.—In rating scale, 1 indicates not important; and 10, extremely important.

*Percentage indicates faculty response.

mentored junior faculty between the 1st and 2nd year of joining the faculty (therefore encompassing at least one mentoring meeting) and the results of difference scores for these measures between the 1st year of joining the department and either the year that a junior faculty person was promoted or to the present.

Finally, we evaluated and summarized subjectively the programmatic activity emerging from the initiative.

RESULTS

Program Acceptance and Participation

Participation and response rate.—Table 1 shows the percentage of junior faculty participating in the program (ie, selecting a mentor) over the initial five rounds of evaluation (1995 through mid-1998), and the percentage of responses received per round from both junior faculty and mentors. The participation rate fluctuated due to new faculty hires, departures, and promotions; variability in response rate is attributable to the voluntary nature of the pilot phase of the program.

All junior faculty women (varied from 7 to 9 during the course of the pilot phase) participated in the program except one, who was among the small group of radiologists with a temporary appointment in the department. One hundred percent of the minority faculty (*n* = 4–5 during the course of the pilot phase and included some women) participated in the program. Furthermore, all radiology faculty selected mentors from

the departmental mentoring program in preference to mentors to the alternative interdepartmental mentoring program contemporaneously sponsored by the School of Medicine.

Pattern of mentor selection.—All junior clinical faculty (those with MD degrees and clinical responsibilities) selected mentors from among the group of clinical mentors; two of the six junior faculty (33%) in the basic sciences section selected mentors within that section, and one selected a mentor from among the clinical faculty. There were three junior faculty who occupied positions as section chiefs, and all selected other section chiefs as their mentors. Two shifts in mentors during the pilot phase were due to mentor departure or retirement. In one of these cases, the junior clinical faculty person selected a new mentor from the basic sciences section.

Evaluation of mentoring meetings.—Mentored junior faculty and mentor ratings of overall satisfaction with the mentoring meetings for the five evaluated periods are shown in Table 2. Ratings for overall value were very high from both groups, with a tendency for higher ratings by the junior faculty. Respecting the unequal *n*'s and the skew of the data toward the high values, we report median rating scores for qualitative review without further statistical analysis. Table 2 also shows the overall ratings given by the junior faculty women.

Ratings of meetings value for minority faculty are available for only the first and second rounds of evaluation, for which median ratings were 10 and 8, respectively (*n* = 5 in both rounds).

Table 3
Median Junior Faculty Ratings of Importance of Five Major Areas in Mentoring Meetings

Evaluation Round	Major Areas				
	Academic Progress	Research	Clinical	Teaching	Administrative
1 (n = 17)	10	9	5	7	5
2 (n = 18)	8.5	8	5	6	4
3 (n = 13)	10	10	5	5	2
4 (n = 10)	10	9.5	6	7	3.5
5 (n = 11)	10	9	3	5	1.5

Note.—In rating scale, 1 indicates not important; and 10, extremely important.

Table 4
Median Mentor Ratings of Importance of Five Major Areas in Mentoring Meetings

Evaluation Round	Major Areas				
	Academic Progress	Research	Clinical	Teaching	Administrative
1 (n = 13)	9	9	8.5	8.5	1
2 (n = 21)	8	8.5	5	5	0
3 (n = 12)	8.75	8	4	8	0
4 (n = 13)	10	8	6	8	1
5 (n = 13)	9	9	0	0	0

Note.—In rating scale, 1 indicates not important; and 10, extremely important.

Table 5
Assessment of the Frequency of Semiannual Mentoring Meetings

Rating Group	Evaluation Round 4			Evaluation Round 5		
	Not Frequent Enough	Just Right	Too Frequent	Not Frequent Enough	Just Right	Too Frequent
Junior faculty	1 (10)	9 (90)	0 (0)	1 (9)	10 (91)	0 (0)
Mentors	4 (31)	9 (69)	0 (0)	2 (13)	13 (87)	0 (0)

Note.—Numbers in parentheses are percentages.

Importance of major professional areas in mentoring meeting discussions.—Median ratings of the importance of major areas of professional responsibility in the five rounds of meetings are shown in Table 3 for junior faculty and in Table 4 for mentors. Junior faculty and mentors consistently rated academic progress and research as the most important areas. We also note that for the first and second rounds of mentoring meetings, the three junior faculty with section chief responsibilities also gave the discussion of administrative duties high outlying scores of 7–10. Data for the further rounds are sporadic and insufficient to report reliably. Issues reported in an open “other” category were (a) time management, (b) prioritization of responsibilities,

(c) interpersonal skills, (d) issues for women faculty, and (e) balancing personal and professional goals.

Assessment of appropriateness of meeting frequency.—All participating faculty were surveyed to assess the appropriateness of meeting frequency in the 4th and 5th evaluation rounds. The results, reproducibly suggesting that semiannual meetings are generally acceptable, are shown in Table 5. We also note, however, the trend for mentors to indicate a need for greater meeting frequency than the junior faculty (31% of mentors reporting that meetings are not frequent enough vs 10% of the junior faculty in evaluation round 4; 13% vs 9% in evaluation round 5).

Table 6
Proportion of Junior Faculty with Changes in Performance for Research, Teaching, and Patient Care and for Overall Performance

Category	First Monitoring Meeting to 1st Year Evaluation	First Monitoring Meeting to Promotion or Present
Research		
Increase \geq 0.5 point	35 (8/23)	52 (12/23)
Decrease	9 (2/23)	17 (4/23)
Teaching		
Increase \geq 0.5 point	17 (4/23)	26 (6/23)
Decrease	9 (2/23)	13 (3/23)
Patient care		
Increase \geq 0.5 point	12 (2/17)	6 (1/17)
Decrease	0	0
Overall performance		
Increase \geq 0.5 point	22 (4/23)	30 (7/23)
Decrease	0	4 (1/23)

Note.—Ratings are based on peer review. Data are computed as a composite of all participating junior faculty from 1995 to the present, giving an overall $n = 23$ for research, teaching, and overall performance and $n = 17$ for patient care (clinical faculty only). Total number of mentoring meetings and number of faculty varied per faculty and per year.

Independent Performance Measures

Table 6 shows changes in junior faculty performance for research, teaching, patient care, and overall performance (which includes a measure of administrative performance) as assessed by means of the annual review process (1995–1999) of the department. The data were analyzed for all junior faculty participating in the mentoring program. For each measure, changes of an arbitrary 0.5 point are shown for two time periods: the change between the 1st and 2nd year review and the change between the 1st year review to last review prior to the time of promotion or to the present.

Using these metrics but without the benefit of a control group or historical data, we note that the number of faculty who met or exceeded the 0.5 criterion surpassed several-fold the number who declined by that same benchmark. The data are consistent with junior faculty success with National Institutes of Health (NIH) basic research (R series) grants, for example, for which 43% (10 of 23) of the junior faculty are currently principal investigators on at least one grant, and 29% (seven of 24) were awarded on first-time submission. NIH reports an average first-time award rate (fiscal year 1997–1999) in the R series over all faculty levels of 18% (first-time award rates for assistant professors only are not available).

Additional Activities Supported by the Departmental Mentoring Program: Retreats, Seminars, and Meetings

Since the establishment of the mentoring program, four

faculty retreats have been held on a roughly annual basis. These day-long retreats allowed us to articulate and review the department's vision and mission, set short-term and long-term goals, and address department-wide issues. The program also implemented bimonthly, open-forum meetings led by faculty and senior managers in the department and has hosted mentoring-related seminars. Topics addressed at these seminars, led either by radiology faculty or by others with appropriate expertise from within the medical center, have included (a) promotion at the various professoriate levels and within the two appointment lines (tenured and medical center line), (b) teaching skills, (c) strategies for allocating research time, (d) effective use of the Internet, in particular for conducting searches for extramural research funding, and (e) sex and cultural differences in communication.

Radiology mentors and mentoring committee members also actively participate as lecturers and facilitators of events hosted by the school's interdepartmental mentoring program.

DISCUSSION

The data we present herein provide evidence of the desirability and acceptance of a mentoring program in the academic radiology setting. Most important, both junior faculty and mentors considered the program to be extremely important. We attribute performance improvements both to

- Formal mentoring in the academic radiology setting can be instrumental in promoting the careers of individual faculty members and in maintaining the health and evolution of the department overall.
- A mentoring program must be customized to meet the specific needs of the faculty and requires multiple phases of development that span conceptualization, testing, and evaluation before refinement and final implementation.
- Programs must be established cooperatively and efficiently so that participation is a mutually rewarding opportunity for both mentors and junior faculty, rather than an obligation.
- The mentoring relationship must take into consideration the whole person and every aspect of the career being mentored.
- Mentors need to be prepared with information on promotions and terms for career advancement.
- The mentoring relationship should not preclude junior faculty access to all faculty.
- The mentor–junior faculty relationship is multidimensional involving research, clinical, and teaching components. With the increasing pressures imposed by the rapidly changing health care system, the academic “triple threat” requirement facing radiology faculty today becomes ever more difficult to achieve and evolves as an essential and dominant focus of the mentoring process.

Observations and recommendations for mentoring in academic radiology.

the experience that is gained naturally over time combined with the formal mentoring that the program provided. Given the consistency of the ratings during the five test periods and the feedback from the faculty, we have streamlined the reporting load associated with the program, and only the rating of meeting satisfaction is reported at this time. These ratings pertain only to the semiannual meetings prescribed by the program, with the recognition that meetings between mentors and junior faculty members now occur frequently without program oversight. We consider this to be a positive evolution in the mentoring process and one of the most successful aspects of the program.

Our mentoring program has become one of the pillars of our rapidly evolving Department of Radiology (13). With an average of three new faculty hires each year over 10

years since 1989, the program has been instrumental in providing clarity and definition of career pathways in academic radiology for the new faculty, enhancing overall communication and information flow among all faculty and staff within the department, and supporting the research and extramural funding success of all faculty. In the past 2 years alone (1998 and 1999), 11 assistant professors have been promoted, including three women, two of whom are also members of an ethnic minority group, and another two minority faculty. Women now represent 11% of the faculty and, together with other women faculty who are still at the junior level, already lead major departmental programs in thoracic imaging, breast imaging, musculoskeletal imaging, interventional magnetic resonance, and outcomes analysis. These women will now serve as professional advisors and advocates for more junior faculty women and as role models for the development of their professional identity (see also <http://www.aaup.org/aafctsh.htm>).

Our radiology mentoring program was established with the consensus and cooperation of the program planners, the chairman, and the junior and senior faculty, and has passed the tests of usefulness and endurance over time. We note that the major issues to be contended with in developing the program related to confidentiality and the additional time needed for the mentoring process beyond already heavily saturated schedules; we attribute the decline over time in completion of meeting evaluation forms (despite high values reported for the meetings) to the latter factor. In addition to the need to be continuously cognizant of these issues, further growth of our program will include opportunities for improved mentoring of radiology staff physicians whose appointments are short-term and whose career issues—focused either on academia or on private practice—often have different elements than those of the long-term academic faculty. The overall summary of our experience and recommendations are presented in the Figure.

The expectations of the radiology profession for success in a faculty role in radiology are high, as are the expectations of the academic radiologist for a supportive and challenging environment. Our model for faculty mentoring has played an important role in ensuring that these mutual expectations are met in our department. We believe that a mentoring program can be an asset to all academic radiology departments and a key factor in maintaining their vitality.

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