

<<st2>>ORIGINAL ARTICLE

<<rrh>>Rheumatology Mentoring Barriers and Facilitators

<<lrh>>Ogdie et al

<<title>>Barriers and Facilitators of Mentoring for Trainees and Early Career

Investigators in Rheumatology Research: Current State, Identification of Needs, and Road Map to an Inter-Institutional Adult Rheumatology Mentoring Program

<<aut>>ALEXIS OGDIE,¹ JEFFREY A. SPARKS,² SHEILA T. ANGELES-HAN,³ KATHLEEN BUSH,¹ FLAVIA V. CASTELINO,⁴ AMIT GOLDING,⁵ YIHUI JIANG,¹ J. MICHELLE KAHLENBERG,⁶ ALFRED H. J. KIM,⁷ YVONNE C. LEE,² KIRTHI MACHIREDDY,¹ MICHAEL J. OMBRELLO,⁸ AMI A. SHAH,⁹ ZACHARY S. WALLACE,⁴ PETER A. NIGROVIC,¹⁰ AND UNA E. MAKRIS,¹¹ FOR THE AMERICAN COLLEGE OF RHEUMATOLOGY EARLY CAREER INVESTIGATOR SUBCOMMITTEE OF THE COMMITTEE ON RESEARCH

<<ftnts>>Dr. Ogdie's work was supported by the NIH (K23-AR-063764) and the Rheumatology Research Foundation. Dr. Sparks's work was supported by the NIH (K23-AR-069688, L30-AR-066953, and P30-AR-070253) and the Rheumatology Research Foundation. Dr. Angeles-Han's work was supported by the National Eye Institute (K23-EY-021760) and the Rheumatology Research Foundation. Dr. Castelino's work was supported by the NIH (K08-AR-062592 and K08-AR-062592). Dr. Kahlenberg's work was supported by the NIH (K08-AR-063668). Dr. Golding was supported by a Career Development Award (IK2-CX-000649) from the US Department of Veterans Affairs Clinical Sciences Research and Development Program. Dr. Kim's work was supported by the NIH (R21-AR-069833), the Department of Defense Discovery Award, the Washington University in St. Louis Institute of Clinical and Translational Sciences (supported in part by UL1-TR-000448), and the Rheumatology Research Foundation. Dr. Lee's work was supported by the NIH (R01-AR-064850). Dr. Ombrello is supported by the Intramural Research Program of the National Institute of Arthritis and Musculoskeletal and Skin Diseases (AR-041198). Dr. Shah's work was supported by the NIH (K23-AR-061439). Dr. Wallace's work was supported by the Rheumatology

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1002/acr.23286](https://doi.org/10.1002/acr.23286)

This article is protected by copyright. All rights reserved

Research Foundation. Dr. Nigrovic's work was supported by the NIH (R01-AR-065538, R01-AR-069569, P30-AR-070253, and P30-AR-070549), the Rheumatology Research Foundation, and the Fundación Bechara. Dr. Makris is supported by a VA Health Services Research & Development Career Development Award at the Dallas VA (HX-001916) and by the Patient-Centered Outcomes Research Institute.

¹Alexis Ogdie, MD, MSCE, Kathleen Bush, BS, Yihui Jiang, BS, Kirthi Machireddy, MD: Perelman School of Medicine, University of Pennsylvania, Philadelphia; ²Jeffrey A. Sparks, MD, MMSc, Yvonne C. Lee, MD, MMSc: Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts; ³Sheila T. Angeles-Han, MD, MSc: Cincinnati Children's Hospital Medical Center, University of Cincinnati, Cincinnati, Ohio; ⁴Flavia V. Castelino, MD, Zachary S. Wallace, MD: Massachusetts General Hospital, Boston; ⁵Amit Golding, MD, PhD: VA Maryland Health Care System, Baltimore; ⁶J. Michelle Kahlenberg, MD, PhD: University of Michigan, Ann Arbor; ⁷Alfred H. J. Kim, MD, PhD: Washington University School of Medicine, St. Louis, Missouri; ⁸Michael J. Ombrello, MD: National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health, Bethesda, Maryland; ⁹Ami A. Shah, MD, MHS: Johns Hopkins University School of Medicine, Baltimore, Maryland; ¹⁰Peter A. Nigrovic, MD: Boston Children's Hospital, Boston, Massachusetts; ¹¹Una E. Makris, MD: VA North Texas Health System and University of Texas Southwestern Medical School, Dallas.

Drs. Ogdie and Sparks contributed equally to this work.

Address correspondence to Alexis Ogdie, MD, MSCE, Division of Rheumatology, Center for Clinical Epidemiology and Biostatistics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania. E-mail: alexis.ogdie@uphs.upenn.edu.

Submitted for publication February 28, 2017; accepted in revised form May 16, 2017.

<</ftnts>>

<<abs>>

Objective. To determine perceived barriers and facilitators to effective mentoring for early career rheumatology investigators and to develop a framework for an inter-institutional mentoring program.

Methods. Focus groups or interviews with rheumatology fellows, junior faculty, and mentors were conducted, audiorecorded, and transcribed. Content analysis was performed using NVivo software. Themes were grouped into categories (e.g., mentor-mentee relationship, barriers and facilitators of a productive relationship). Rheumatology fellows and early career investigators were also surveyed nationwide to identify specific needs to be addressed through an inter-institutional mentoring program.

Results. Twenty-five individuals participated in focus groups or interviews. Attributes of the ideal mentee-mentor relationship included communication, accessibility, regular meetings, shared interests, aligned goals, and mutual respect. The mentee should be proactive, efficient, engaged, committed, focused, accountable, and respectful of the mentor's time. The mentor should support/promote the mentee, shape the mentee's goals and career plan, address day-to-day questions, provide critical feedback, be available, and have team leadership skills. Barriers included difficulty with career path navigation, gaining independence, internal competition, authorship, time demands, funding, and work-life balance. Facilitators of a successful relationship included having a diverse network of mentors filling different roles, mentor-mentee relationship management, and confidence. Among 187 survey respondents, the primary uses of an inter-institutional mentoring program were career development planning and oversight, goal-setting, and networking.

Conclusions. In this mixed-methods study, tangible factors for optimizing the mentor-mentee relationship were identified and will inform the development of an adult rheumatology inter-institutional mentoring program.

<</abs>>

<<h1>>INTRODUCTION

As the population ages, the demand for rheumatologists in the US is increasing, and the gap between the number of rheumatologists in training and the number needed continues

to widen (1). Simultaneously, rheumatologists struggle to maintain an academic research career (similar to physician–scientists in other specialties in the US) due to time demands, insufficient funding, clinical workload, and a relative lack of mentorship (2,3). Sustaining a research workforce pipeline is essential to advancing our understanding of the pathophysiology, prevention, and treatment of rheumatic diseases. The American College of Rheumatology (ACR) is committed to expanding support and resources for early career investigators. A recent survey study conducted by the ACR Early Career Investigator Subcommittee of the Committee on Research identified several major reasons for why early career investigators (ECIs) leave academia. Lack of mentorship was among the most commonly reported barriers to a career in research and was cited by most rheumatologists who had left a research career (2).

<<significance&innovations>>

Significance & Innovations

- This is the first qualitative study to examine attributes that make an ideal mentee–mentor relationship in mentees and mentors performing rheumatology research.
- Participants identified attributes of the mentor, the mentee, and the relationship. Successful relationships require both the mentee and mentor to be active participants.
- Success strategies for being a good mentee included being proactive, efficient, engaged and committed, focused, accountable, and respectful of mentors' time.
- These results provide the framework for a national inter-institutional mentoring program in adult rheumatology.

Enhancing effective mentorship for ECIs may be achieved through a broad-based intervention. For example, the ACR/Childhood Arthritis and Rheumatology Research Alliance (CARRA) Mentoring Interest Group (AMIGO) program, a national inter-institutional mentoring program for pediatric rheumatologists that was established in 2010, has demonstrated concrete benefits of such an intervention in rheumatology mentorship (4,5). While other opportunities to optimize mentoring and career development exist for rheumatology trainees (Table 1), an inter-institutional mentoring program similar to AMIGO has not been developed for adult rheumatology trainees in

the US.<<T1>> The ACR Early Career Investigator Subcommittee aimed to develop an inter-institutional platform to support mentorship of adult rheumatologists pursuing a career in research. We have previously published on numerous challenges that young investigators face in academia (e.g., funding, protected time, and institutional support). Because improving mentorship may be immediately actionable, we chose to focus on mentorship as a first step toward addressing the pipeline of rheumatology investigators. To this end, a qualitative study was conducted to address 3 objectives: determine the perceived barriers and facilitators to effective mentoring for early career rheumatology investigators; examine ways in which the ACR can enhance mentorship during the early career stages; and develop a framework for an effective adult rheumatology mentoring program.

<<hd1>>MATERIALS AND METHODS

<<hd3>>**Study design and setting.** This qualitative study included focus groups among ECIs (defined as fellows-in-training, instructors, and assistant professors) and in-depth semi-structured face-to-face interviews with mid-career and senior investigators in rheumatology. Subsequently, a nationwide survey was administered to understand how to best develop an inter-institutional adult rheumatology mentoring program. Focus groups and interviews were conducted at the ACR Rheumatology Research Workshop (RRW) in San Diego, California, in June 2015. The purpose of the annual RRW meeting is to provide ECI with scientific and career development lectures/workshops and a venue for facilitated interaction between ECI and established investigators to foster research collaboration and career mentoring.

<<hd3>>**Focus groups.** ECIs who attended the RRW were invited to participate in 1 of 2 focus groups. One focus group consisted of fellows-in-training and the other included only junior faculty. Each group was composed of 7–10 participants and lasted approximately 75 minutes. The purpose of the study and focus groups were introduced via e-mail 2–3 weeks in advance of the meeting. A semistructured discussion guide was used to prompt participants to share their experiences. None of the ECI committee

members (the authors) were participants in the focus groups (or interviews) given their role in designing this study.

<<hd3>>**Focus group facilitators.** The focus groups and interviews were led by an early career investigator subcommittee member with experience in qualitative methods (AO, JAS, and STA-H). The 3 facilitators underwent training by the University of Pennsylvania Mixed Methods Lab prior to conducting the study.

■ <<hd3>>**Interviews.** Individual interviews were completed with established rheumatology investigators (associate professors or full professors) who conduct research and mentor early career investigators. These rheumatologists were faculty speakers at the RRW or attending the parallel Disease Targeted Research Investigators (DTRI) meeting through the Rheumatology Research Foundation. An e-mail introduced the study 2–3 weeks in advance of the meeting. Interviews were facilitated with a semistructured discussion guide.

<<hd3>>**Analysis of focus group and interview transcripts.** All focus groups and interviews were audio-recorded and professionally transcribed verbatim with anonymized titles to identify speakers. The transcripts were then analyzed in NVivo 10.0 (QSR International). An inductive, text-driven approach was used to identify important themes. Three coders (AO, YJ, and UEM) developed a coding scheme in which meaningful statements were identified from transcripts and assigned codes to themes that emerged. Codes were reevaluated and revised in an iterative process. Discrepancies in coding were resolved through discussion.

<<hd3>>**Survey.** Following the focus groups, we developed a survey to address interest in participating in an inter-institutional mentoring program. The survey included questions on the career path and research interests of potential enrollees, methods of matching with mentors, desired frequency of contact with mentors, types of materials needed to support the program, and any additional suggestions. The survey was e-mailed in August 2016 to first-, second-, and third-year adult rheumatology fellows and attendees of the previous 2 RRW meetings. The web-based survey remained open for 4 weeks and included 1 reminder e-mail at 3 weeks.

This study was approved by the University of Pennsylvania Institutional Review Board (IRB) and was deemed exempt by the Partners HealthCare IRB. All participants

provided written informed consent prior to beginning the interview or focus group. All data were de-identified prior to analysis.

<<hd1>>RESULTS

Two focus groups and 10 interviews were conducted among a total of 25 participants. All ECI participants in the focus groups were actively engaged in research and identified a research supervisor as their mentor. Themes were divided into the following broad categories: 1) the mentee-mentor relationship, 2) the mentee role, 3) the mentor role, 4) barriers and challenges, 5) the role of a mentoring network, and 6) themes relevant for the development of an inter-institutional mentoring program (see Figure 1 and additional representative quotes in Supplementary Table 1, available on the *Arthritis Care & Research* web site at <http://onlinelibrary.wiley.com/doi/10.1002/acr.23286/abstract>).<<F1>>

<<hd3>>**Mentee-mentor relationship.** Mentees and mentors discussed the characteristics of a successful mentee-mentor relationship. Communication, accessibility, regular meetings, shared interests, and aligned goals were identified as critical elements of a successful relationship and were felt to be overriding principles. Among these, communication was most important, specifically having difficult conversations when needed, and discussing agreed upon expectations, such as expected outcomes of the relationship. Regular meetings facilitated better communication and also kept both parties on track toward reaching the desired goals.

<<hd3>>**Mentee role: mentees as their own facilitators.** Qualities of successful mentees were being proactive, efficient, engaged, committed, focused, and accountable, and having respect for the mentor's time. Being proactive included letting the mentor know when the mentee did not have the knowledge to move forward. Mentors, in particular, felt that mentees who were engaged and committed were more likely to be successful and easier to work with.

“I think specifically for a mentee, your role is to be really enthusiastic and passionate about your work, to be able to convey that and then also to look at yourself with a critical eye and take constructive criticism in a positive

manner and to continually try and improve yourself based on that feedback that you get. (Mentor)”

Accountability was described as “do what you say you will do,” and was a common theme from both mentors and mentees. Part of accountability was described as keeping timelines and managing time appropriately. Without accountability, mentors had little desire to mentor. Respect for the mentor’s time was described as giving adequate time for review of manuscripts or grants and providing advance notice of not being able to attend meetings.

Both mentees and mentors commented on the importance of “knowing how to be a good mentee” and that few receive instructions, either formal or informal, about this topic. For example, the mentee needs to manage the relationship. Coming prepared to meetings and having an agenda before meetings and an action plan after meetings is important. Mentees expressed a desire for additional training on how to be a good mentee.

“I think it might be easier to target what would be a good mentee versus what would be a good mentor, because you can shape how good your mentoring experience is ... if the mentee can control kind of the tempo and timbre of the conversation. (Mentor)”

Mentor role. Mentees and mentors described many important aspects of the mentor role. Key roles of mentors are to promote, encourage, and support the mentee and to address the day-to-day research questions. Mentors ideally help to shape the research goals and guide the mentee’s career trajectory, although mentees without definitive career paths were felt to be challenging to mentors (mentees likewise noted that defining a career path is a particularly difficult task). Shaping the long-term path was felt to be a key mentor role. Influencing the career trajectory is realized by helping the mentee organize and prioritize research plans; at other times, the mentor may help to steer the mentee in the right direction if they veer off track. The mentor should promote the mentee by identifying career and research opportunities, networking, and mediating difficult situations. Sometimes support is also financial (such as salary support) and infrastructural (such as study staff, statistical/programming support, and laboratory supplies).

“A good mentor also helps ... define certain milestones I have to be achieving and at what point. (Mentee)”

“Good mentors also often are good about introducing you to a broader community of people who may share your interests and who, in one way or another, you might be able to collaborate with—just supporting your personal career

- development. (Mentee)”

Attributes of successful mentors include availability and/or accessibility.

Mentoring is a substantial time commitment, and mentors need to be cognizant of what they can take on. Likewise, mentees need to be efficient and respectful of mentors’ time. Mentors must be the team leaders; many suggested more training for mentors on team management and leadership.

“One of the components to me that’s actually even more important ... is the team management aspect. If this were any other field besides medicine, the people that are in leadership positions would have had training on how to lead a team. And I think that a lot of people that are well-known mentors in my division who are excellent researchers could benefit from even just a little bit more structure in learning how to manage people. (Mentee)”

Additionally, honest bidirectional feedback was important to achieving quality mentoring.

“Eventually you get to a point where it’s not so easy always to solicit that sort of honest feedback on a personal basis. You may get it from a grant review or you may get it from ... a trusted colleague ... But it’s not always the easiest to find once you get out of that mentor to mentee stage. So I think it’s really critical to embrace that at that point. (Mentor)”

Some participants noted that mentors may at times be in conflict with their other roles (e.g., a division chief may want a person to succeed academically but also need them to see more patients), and in conflict with their own career interests. Mentors are faced with many time pressures, including maintaining their own research portfolio. This conflict should be considered by both the mentor and mentee; having multiple mentors is a strength in this regard.

“The primary mentor ... has to focus on her own career. She’s in her own pinch and doesn’t have the time to spare to be a productive mentor herself. (Mentee)”

We also asked mentors to reflect on why they mentor. Mentors listed mutual academic benefit, giving back to the scientific community through the development of ECIs, supporting the development of future colleagues, and personal satisfaction: watching people grow is rewarding. However, mentors did note the relative lack of tangible rewards for mentoring and teaching.

“Well, I obviously enjoy the successes. I see that when they get the paper accepted for the first time or a poster or a podium presentation, when they get excited about the research. (Mentor)”

“One of the things that is probably the greatest barrier is the fact that there is no reward for teaching and mentoring. (Mentor)”

Barriers and facilitators of successful mentoring relationships.

Participants discussed challenges and opportunities in cultivating the ideal mentor-mentee relationship. Time pressures were a commonly cited challenge for both parties. Mentees often felt pulled in various directions between clinical work and other fellowship and/or early career faculty requirements.

Several of the challenges identified were focused on peer-to-peer or mentor-mentee competition or misaligned goals. Competition among peers (e.g., for resources, time, and authorship), between the mentor and mentee, and within the scientific environment in general, was discussed. Authorship, in particular, was a commonly cited challenge. Mentees often felt vulnerable in authorship discussions, and both parties mentioned the need to seek clarity on authorship early. Several mentees described the challenges in differentiating from their mentors and gaining independence. Conflicts arose over data ownership, what the mentee could take forward as his/her own, and the mentee having sufficient expertise to bring to the table as an independent investigator (particularly when in the same circle as the mentor). Among the most challenging times for mentees was after fellowship during job searches; this process was difficult to navigate since local mentors often have a conflict of interest. Mentors and mentees

advocated for transparency and open discussions about how the mentee is to gain independence.

Many participants listed having agreed-upon expectations as a key to a successful relationship. Gaining confidence in one's own abilities was felt to be a facilitator for success.

- “Sometimes the mentor is a genius; he's a machine and he accomplished things in the blink of an eye. And having for me that expectation for myself, it was a bad thing. So, I started to realize over time that.... You're probably not going to be your mentor. You're going to be you. But what you're gonna be is fantastic. The world doesn't need another investigator like this one. They need one like you. (Mentee)”

Additionally, several women mentioned pregnancy during the ECI period as a challenge. One woman mentioned that a mentor decided not to work with her when it was discovered that she was pregnant. A second woman mentioned her appreciation for support from a mentor who specifically helped her to plan for the time during and after pregnancy. Returning to work after having a baby was also a particularly difficult time for women.

Having multiple mentors beyond the primary research supervisor and a professional network (within and outside of the institution) was described as an important facilitator for a successful career. Mentors and mentees noted that a single mentor cannot fulfill all of the mentoring roles. Mentees indicated that finding new mentors was a challenge, particularly outside of their institution and even within institutions where the rheumatology divisions are small.

Mentoring network. While most focus group participants reported having one or two local mentors, participants perceived building a network as important for success. A network includes internal and external mentors, career sponsors, peer mentors, and collaborators. The mentorship component includes a variety of different people, each mentoring the mentee on different aspects of his/her career. Ideally, an individual's network should include mentors from different institutions, different career stages, and/or different disciplines. Remote and interdisciplinary mentors can eventually become collaborators. However, cultivating these relationships can be challenging.

Sharing a research project and getting feedback on ongoing studies or grant aims were suggested as ideal facilitators for growing these relationships (6). Peer mentoring was also noted to be an essential component of the network; peers provide unique and pragmatic perspectives. The RRW and ACR Annual Meeting were mentioned as ideal networking opportunities for early career rheumatologists.

- “So particularly if you’re doing interdisciplinary work, it’s just crucial to be able to have that network of experts, because you can’t do it all yourself. (Mentor)”

“I think that it's really important to ... have these networks, and they don't necessarily have to be as structured as a proper physician-scientist program. ... what’s really helpful ... are the people in your year, because you’re ... struggling to figure things out together. But the mentorship, I think, really comes more from the people one year or two years ahead of you. (Mentee)”

Uses and mechanics of an adult rheumatology mentoring program: insights from early career rheumatologists. One of the objectives of this qualitative study was to identify how we can best facilitate improved mentoring for early career rheumatologists. For this reason, we followed up on the theme of mentoring network development with a survey to adult rheumatology fellows and participants in the RRW conference. Among 689 first-, second-, and third-year US rheumatology fellows and prior RRW participants, 187 (27%) answered the web-based survey (Table 2 and Figure 2). Of these, 23% of respondents were interested in a career in research, 63% in a clinical pathway (e.g., clinical educator, academic clinician, or private practice), and 14% were unsure of their career path. Most respondents were interested in mentorship outside of their institution to gain insight into career paths (all respondents 67%; respondents interested in a research career 81%) and career development (all 50%; research 58%), to help with goal-setting (all 56%; research 53%), to assist in networking (all 49%; research 67%), to find complementary expertise to that available at the mentee’s institution (all 45%; research 81%), and to assist in the development of research ideas (all 45%; research 70%). Most respondents suggested communicating with the mentor either monthly (36%) or quarterly (23%) and said that templates for establishing mutual expectations (40%) and a discussion guide/template agenda for meetings (51%)

would be helpful. These survey results have informed several components of the adult rheumatology mentoring program that is currently being developed. Table 3 maps specific themes and survey results to outline how these inform program components.<<T3>>

<<hd1>>**DISCUSSION**

We report the results of a mixed-methods study to better understand relevant priorities for mentors and mentees in adult rheumatology, as well as the facilitators and barriers of a successful mentoring relationship. Important themes emerged from the focus groups and interviews. Successful mentee-mentor relationships were defined by attributes of the mentor, the mentee, and the relationship and not necessarily by any one of these in isolation. Both mentors and mentees in this study provided key attributes for a successful mentee. “Menteeship,” or knowing how to be a good mentee, was defined as an important factor for career development (7,8). Among the facilitators for successful mentoring, establishing a network and having multiple mentors in this network were among the mostly strongly advocated. While the identified themes were generally applicable for mentoring across the spectrum of disciplines and levels of mentoring, defining these themes will inform the development of targeted interventions to improve the mentoring experience for ECIs in adult rheumatology. Furthermore, while these themes may seem generally intuitive to those who have experienced successful mentoring relationships, at the earliest point in a mentee’s development, navigating a mentor-mentee relationship is challenging and sometimes unclear.

A broad range of mentoring programs have been developed and sponsored within institutions and by professional organizations in the US and Europe (9–13). AMIGO is an inter-institutional mentoring program for early career pediatric rheumatologists developed by the ACR Special Committee on Pediatrics together with the pediatric rheumatology research organization CARRA. The success of the AMIGO program demonstrated that such a mentoring program embedded within a professional organization can influence the overall “culture of mentoring” (4). Using the lessons learned from this study and borrowing the framework established by the AMIGO

program, we expect that a similar inter-institutional mentoring program for adult rheumatologists can be successfully created.

An adult inter-institutional mentorship program would need to provide training for both mentors and mentees, templates for mentor-mentee interactions (e.g., how to establish expectations), and an example agenda (already available through AMIGO) (14). Benefits for mentor participation in such a program also need to be considered (15,16). Foundational material for the relationship would be an example “road map” for understanding career development in rheumatology research. A face-to-face meeting in addition to regular meetings via phone will also be important for the success of the program. Additional challenges will need to be considered, such as potential conflicts (and how to resolve conflict) between institutional-based and remote mentors.

In addition to mentoring by more senior investigators, peer mentoring and networking with investigators of all levels were also identified as important elements of career development for early career investigators. The Emerging European League Against Rheumatism Network program exemplifies the opportunity for peer mentoring among ECIs in Europe (13). We expect that a similar program would be an excellent complement to the mentor-mentee relationship facilitated by this effort.

Strengths of this study were the clearly defined discussion guide for the focus groups and interviews, the training of the facilitators, and the investment and enthusiasm of the participants. Additionally, by using both qualitative and quantitative methods, we obtained information that was complementary to addressing our objectives. A limitation of this study was the inclusion of a group of participants from a single conference already performing research and only a limited number of junior faculty at the assistant professor level, potentially leading to selection bias. Participants in the Rheumatology Research Foundation RRW conference were necessarily engaged in some form of research and had thus identified at least 1 mentor. Additionally, we refrained from collecting individual-level data on participants, primarily because we wanted participants to be able to discuss mentorship and menteeship freely, without concern for retribution. The lack of individual data resulted in an inability to describe the demographics of participants relative to the themes they contributed. Finally, there were relatively few subjects in this study, but

saturation of themes was achieved, suggesting that this was a sufficient sample size to address the questions of interest.

In summary, using interviews, focus groups, and surveys of mentees and mentors, we established a framework for attributes, facilitators, and barriers/challenges for successful mentor-mentee relationships. Through this framework, the need for a mentoring network was identified as fundamental to improving early career success. Participants identified features of an inter-institutional mentoring program that would be most effective. The themes identified will help shape the development of such a program for adult rheumatologists through the ACR.

<<hd1>>ACKNOWLEDGMENTS

<<akn>>The authors thank all of the focus group, interview, and survey participants for their time and thoughtful comments. They also thank Lindsey Hunter and Adam Marc for their administrative assistance and Drs. Lou Bridges and Richard Siegel for helpful discussions.

<</akn>>

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Ogdie had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Ogdie, Sparks, Angeles-Han, Bush, Castelino, Golding, Jiang, Kahlenberg, Kim, Lee, Machireddy, Ombrello, Shah, Wallace, Nigrovic, Makris.

Acquisition of data. Ogdie, Sparks, Angeles-Han, Makris.

Analysis and interpretation of data. Ogdie, Sparks, Angeles-Han, Bush, Castelino, Golding, Jiang, Kahlenberg, Kim, Lee, Machireddy, Ombrello, Shah, Wallace, Nigrovic, Makris.

<<hd1>>REFERENCES

<<ref1>>

1. American College of Rheumatology. Rheumatology workforce study. 2015. URL: <http://www.rheumatology.org/Learning-Center/Statistics/Workforce-Study>.
2. Ogdie A, Shah AA, Makris UE, Jiang Y, Nelson AE, Kim AH, et al. Barriers to and facilitators of a career as a physician-scientist among rheumatologists in the US. *Arthritis Care Res (Hoboken)* 2015;67:1191–201.
3. Wilkes M, Feldman MD. Mentoring clinical trainees: a need for high touch. *Lancet* 2017;389:135–7.
4. Moorthy LN, Muscal E, Riebschleger M, Klein-Gitelman M, Nigrovic LE, Horon JR, et al. Efficacy of an interinstitutional mentoring program within pediatric rheumatology. *Arthritis Care Res (Hoboken)* 2016;68:645–51.
5. Nigrovic PA, Muscal E, Riebschleger M, Moorthy LN, Brunner HI, Eberhard BA, et al. AMIGO: a novel approach to the mentorship gap in pediatric rheumatology. *J Pediatr* 2014;164:226–7.
6. Nigrovic PA. Building an ARC to grant success: the Aims Review Committee [editorial]. *Arthritis Care Res (Hoboken)* 2017;69:459–61.
7. Chopra V, Edelson DP, Saint S. A piece of my mind: mentorship malpractice. *JAMA* 2016;315:1453–4.
8. Vaughn V, Saint S, Chopra V. Mentee missteps: tales from the academic trenches. *JAMA* 2017;317:475–6.
9. Kashiwagi DT, Varkey P, Cook DA. Mentoring programs for physicians in academic medicine: a systematic review. *Acad Med* 2013;88:1029–37.
10. Silet KA, Asquith P, Fleming MF. Survey of mentoring programs for KL2 scholars. *Clin Trans Sci* 2010;3:299–304.
11. Meagher E, Taylor L, Probsfield J, Fleming M. Evaluating research mentors working in the area of clinical translational science: a review of the literature. *Clin Trans Sci* 2011;4:353–8.
12. Chen CM, Lou MF. The effectiveness and application of mentorship programmes for recently registered nurses: a systematic review. *J Nurs Manag* 2014;22:433–42.

13. The Emerging EULAR Network (EMEUNET). EMEUNET peer review mentoring for rheumatology journals. 2016. URL: http://emeunet.eular.org/peer_mentoring.cfm.
14. American College of Rheumatology. American College of Rheumatology/ACR Special Committee on Pediatric Rheumatology and the Childhood Arthritis and Rheumatology Research Alliance Mentoring Interest Group for Pediatric Rheumatologists. 2016. URL: <http://www.rheumatology.org/GetInvolved/Mentoring/AMIGO>.
15. Maisel NC, Halvorson MA, Finney JW, Bi X, Hayashi KP, Blonigen DM, et al. Institutional incentives for mentoring at the US Department of Veterans Affairs and universities: associations with mentors' perceptions and time spent mentoring. *Acad Med* 2017;92:521–7.
16. Feldman MD, Steinauer JE, Khalili M, Huang L, Kahn JS, Lee KA, et al. A mentor development program for clinical translational science faculty leads to sustained, improved confidence in mentoring skills. *Clin Trans Sci* 2012;5:362–7.

<</ref1>>

<<label>>

Figure 1. Themes identified through focus groups and interviews with mentors and mentees. Mentors and mentees reported factors pertinent to each party associated with an ideal mentor-mentee relationship, as well as factors that facilitated success for the mentee and barriers and challenges to a successful mentee-mentor relationship.

Figure 2. Ways in which fellows and early career rheumatologists would use an inter-institutional mentoring program. In a survey of US and Canadian rheumatology fellows and early career rheumatologists, respondents (n = 187) indicated that they would use an inter-institutional mentoring program to help shape their career. The specific ways in which they would use the program varied according to whether they intended to pursue a research career (n = 43) or a clinical path (n = 118 [included clinical educator or private practice job]). For all groups, however, gaining insight into the career path was most important.

<</label>>

Table 1. Current mentorship resources for trainees and early career rheumatology investigators in the US

Program	Description
Intrainstitutional programs	Each academic rheumatology program may have its own internal mentoring program depending on the size and number of senior investigators. Examples of these programs include matching fellows-in-training with senior faculty, oversight committees, grant review committees, formal lectures, and formal research training programs.
American College of Rheumatology (ACR) Rheumatology Research Workshop (RRW)	The RRW is an annual meeting designed to promote interactions between young and established investigators to foster collaboration and career mentoring. The meeting includes scientific lectures, oral abstract presentations, poster sessions, and scheduled time for interaction with senior investigators attending a parallel Rheumatology Research Foundation meeting to exchange ideas with trainees and other early career investigators. Applicants must be actively performing research and submit an abstract in order to attend.
ACR/Childhood Arthritis and Rheumatology Research Alliance Mentoring Interest Group (AMIGO)	AMIGO supports the career development of fellows and junior faculty in pediatric rheumatology via educational services, facilitated networking, and a one-on-one mentoring program through which interested mentees are matched with mentors at other institutions. Mentee-mentor dyads meet at the ACR Annual Meeting and are encouraged to develop a longitudinal relationship. All pediatric rheumatology fellows and junior faculty in the US and Canada are encouraged to participate in AMIGO.
US Bone and Joint Institute (USBJI)	This grant mentoring workshop series is aimed at junior faculty, senior fellows, or postdoctoral researchers applying for research grants. Investigators selected to take part in USBJI attend 2 workshops, 12–18 months apart, and work with faculty between workshops to develop their grant applications. In addition to grant-writing skills, attendees learn about mentorship and career development. Attendees maintain a formal longitudinal relationship with a mentor through the program until their application is funded.
Other ACR/Association of Rheumatology Health Professionals (ARHP) meetings*	These annual ACR meetings provide scientific updates and networking opportunities for early career investigators. Some lecture sessions are specifically devoted to career development, scientific writing, and cultivating the mentee-mentor relationship.

ACR/European League Against Rheumatism (EULAR) exchange program	The program supports junior academic rheumatologists and rheumatology health professionals to travel from the US to Europe to experience the EULAR Annual Congress, engage in a half-day exchange program with European colleagues at the Congress, and participate in a subsequent site visit at a local institution.
ACR online materials	The ACR website (www.rheumatology.org) hosts materials for early career investigators, including webinars on grantsmanship, road map for career development for fellows-in-training, and instructions on signing up for the Young Investigators e-mail listserv.
* Annual Meeting, State-of-the-Art Clinical Symposium, Winter Rheumatology Symposium, and Pediatric Rheumatology Symposium.	

Table 2. Survey of trainees and early career investigators in rheumatology to address the development of an inter-institutional mentorship program

	All (n = 187)	Research (n = 43)*	Clinical (n = 118)*	Not sure (n = 26)
Female		27 (63)	73 (62)	15 (58)
Professional status				
Fellow, year 1	69 (37)	11 (26)	43 (36)	15 (57)
Fellow, year 2	83 (44)	13 (30)	62 (53)	8 (31)
Fellow, year 3	16 (9)	8 (19)	6 (5)	2 (8)
Fellow, >year 3	2 (1)	0	2 (2)	0
Instructor/junior faculty	7 (4)	7 (16)	0	0
Assistant professor/junior faculty	10 (5)	4 (9)	5 (4)	1 (4)
Advanced degrees				
MD only	141 (75)	20 (47)	99 (84)	22 (85)
MD and Master's degree	36 (19)	14 (33)	19 (16)	3 (12)
MD and PhD	10 (5)	9 (21)	0	1 (4)
Communication with mentor				
Weekly	4 (2)	2 (5)	1 (1)	1 (4)
Every other week	14 (7)	2 (5)	14 (12)	0

Monthly	68 (36)	18 (42)	40 (34)	10 (38)
Quarterly	43 (23)	16 (37)	24 (20)	3 (12)
Semiannually	9 (5)	3 (7)	5 (4)	1 (4)
As needed	15 (8)	1 (2)	8 (7)	6 (23)
No answer provided	32 (17)	1 (2)	26 (22)	5 (19)
How should mentees to be matched to mentors? [†]				
Career area (basic, clinical science, private practice, academic medicine, industry)	121 (65)	33 (77)	75 (64)	13 (50)
Scientific/content area	97 (52)	81 (79)	14 (12)	2 (8)
Career stage (e.g., preference for an earlier career versus later career mentor)	89 (48)	11 (26)	28 (24)	6 (23)
Personality style	51 (27)	22 (51)	54 (46)	13 (50)
By geographic region (e.g., Northeast)	45 (24)	8 (19)	38 (32)	2 (8)
Communication style	48 (26)	8 (19)	34 (29)	9 (35)
Materials desired [†]				
Discussion guide or template agenda for your mentoring sessions	96 (51)	26 (60)	57 (48)	13 (50)
Formal expectations of mentor-mentee program	74 (40)	25 (58)	38 (32)	11 (42)
Webinar about mentor-mentee relationship	60 (32)	17 (40)	36 (31)	7 (27)
Mentor-mentee contract/agreement template	34 (18)	11 (26)	19 (16)	4 (15)
* Research = physician scientist; clinical = clinical educator, academic clinician, private practice clinician, or administrator.				
[†] Respondents were able to select more than 1 option, so total does not add to 100%.				

Table 3. Application of focus group themes identified and results of nationwide survey of early career investigators to development of a mentoring program*

Broad topic and themes	Lesson for building mentoring program
Mentor-mentee relationship	

Shared interests and goals	Matching mentors and mentees on interests and goals (similar to the process in AMIGO) Facilitate local and distant relationships
Accessibility and communication	Matching on preferred communication method†
Regular meetings; understand goals	“Rules of engagement” and best practices template‡
Assess progress toward meeting milestones/ goals	Career development milestones template
Importance of communication in successful mentor-mentee relationship	Webinar for mentors and mentees/RRW sessions
Mentee role§	
Respect for time	“Rules of engagement” and best practices template
Be proactive	Webinar for mentees/RRW sessions
Focus	Webinar for mentees/RRW sessions
Accountability	Webinar for mentees/RRW sessions
Challenges/pitfalls	Webinar for mentees/RRW sessions
Mentor role	
Successful mentor qualities	Webinar for mentors
Mentor’s roles	Webinar for mentors “rules of engagement” template
Authorship/challenging situations	Webinar, session at the ACR Annual Meeting
Mentor network building	
Building and strengthening your mentoring network	Webinar for mentees Peer mentoring/networking RRW ACR/ARHP Annual Scientific Meeting/SOTA YI listserv Mentorship program

* AMIGO = American College of Rheumatology (ACR)/Childhood Arthritis and Rheumatology Research Alliance Mentoring Interest Group; RRW = Rheumatology Research Workshop; ARHP = Association of Rheumatology Health Professionals; SOTA = State-of-the-Art (annual winter meeting held by the ACR); YI = Young Investigator.

† Communication methods may include e-mail, phone, Skype, FaceTime, etc.

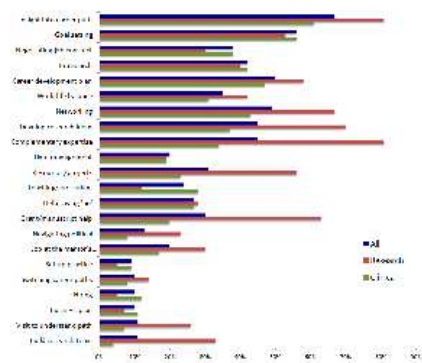
‡ The rules of engagement template would include a mentoring contract as well as other materials, including an example agenda for a mentoring meeting. Example materials are available on the AMIGO website (14).

§ In general, mentors and mentees wanted to know more about “being a good mentee” and believed that this should be explicit. Some characteristics are listed here, but these topics could be included in a more general “being a good mentee” webinar or RRW session.

Author Manuscript



acr_23286_f1.jpg



acr_23286_f2.jpg