ORIGINAL RESEARCH

Educating Our Future Medical Leaders: An Innovative Longitudinal Course Across Surgical and Medical Specialties in Graduate Education

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Problem: Increasing healthcare system complexity, multidisciplinary care delivery, and the need to deliver high-quality, cost-effective care drive a critical need for leadership development. Currently, few examples of multidisciplinary leadership development exist in the medical education literature. The Accreditation Council for Graduate Medical Education (ACGME) has identified leadership domains as essential milestones in residency education, encompassing areas such as interpersonal communication, quality improvement, and systems-based practice. Presently, published GME leadership curricula vary widely in content, delivery, and duration and rarely include multispecialty cohorts.

Approach: The study authors designed and implemented a longitudinal leadership curriculum for a multispecialty cohort of senior residents and fellows from multiple hospitals within a large integrated GME program. Between July 2022–June 2023, authors delivered 12 monthly sessions on core leadership concepts. Sessions delivered relevant work-based content via large-group didactics with embedded opportunities for small-group interactive experiential and reflective practice, critical thinking, and application.

Outcomes: Thirty GME trainees participated in the longitudinal curriculum. Interval pre-/post-session assessments demonstrated significant improvement in composite scores for 6 of 9 sessions assessed. Participants rated each module's overall importance, applicability, and acceptability highly on a summative program evaluation.

Next Steps: This longitudinal leadership curriculum adheres to best leadership development practices, demonstrates improvement in knowledge and self-reported attitudes and behaviors related to cognitive, character, and emotional leadership domains, and develops a psychologically safe community of practice for GME participants.

Keywords: medical education, leadership, curriculum, professional development

Problem

The increasing complexity of the healthcare system, importance of multidisciplinary teams, high-stakes outcomes, and need for practicing physicians to deliver high-quality, cost-effective care drive an ongoing and critical need for physician leadership development.[1] Observational data indicate that effectual physician leadership can improve patient outcomes, highlighting the significance of cultivating influential leaders within medicine.[2] In response to this and additional challenges, such as discrepancy between professional competencies and patient needs, persistent gender stratification in professional advancement, and poor understanding of the structure and function of health systems, efforts have been made to align medical education with shifting socio-economic demands and the evolving needs of complex healthcare structures.[3–5]

Graduate medical education (GME) trainees frequently find themselves in frontline clinical leadership positions, yet infrequently receive the dedicated leadership development training necessary to meet these aforementioned challenges.

The Accreditation Council for Graduate Medical Education (ACGME) has acknowledged the significance of leadership training for residents and promotes leadership curricular development through published educational policies and guidance.[6] Despite the urgency to develop clinician leaders that effectively oversee and work within interdisciplinary teams, foster innovations in care delivery, facilitate effective communication, engage in successful advocacy within complex healthcare systems, and promote a culture that supports the feedback and growth necessary to support safe practices, published postgraduate leadership curricula are few.

Best practices for GME leadership development programs include a grounding conceptual leadership framework(s), an emphasis on emotional intelligence and character domains in addition to cognitive and intellectual competencies, and prioritization of coaching, discussion and reflection as methods for content delivery.[2,4] However, published GME leadership curricula vary with respect to career stage, timing, duration, content, and mode of delivery.[2,7–9] Data also suggest that healthcare leadership training is most impactful when conducted longitudinally, encompassing a comprehensive and interdisciplinary approach, and including opportunities to immediately apply newly acquired skills in practical settings.[7] Finally, though healthcare is multidisciplinary in nature and there is a need to train leaders who are well-equipped to work in multidisciplinary teams, multispecialty leadership development curricula are rare.[10]

We aim to describe an innovative 12-month clinical leadership curriculum among senior residents and fellows from a breadth of medical and surgical specialties from multiple hospitals within a large integrated GME program. This longitudinal program set out to develop future leaders in clinical medicine, health sciences education and research, who are well-poised to face the challenges and demands of the evolving healthcare landscape, equipped to lead diverse, multidisciplinary teams aimed at providing high-quality and cost-efficient care, and overturn disparities within leadership structures of academic medicine. It is our goal that this curriculum and evaluation may serve as a model for future curricular development efforts designed specifically for GME trainees, given their unique clinical leadership roles.

Approach
Setting and Participants
We implemented a 12-month leadership curriculum among 30 senior residents and fellows (PGY 3–6) from various medical and surgical specialties (Table 1).

The curriculum was implemented July 2022–June 2023. Participants were selected from 5 unique hospitals within an integrated healthcare network including a quaternary referral hospital, a free-standing pediatrics hospital, and 3 community-based hospitals. The initial cohort was recruited using a 2-step process. First, we emailed department chairs and program directors an overview of the program with a request to nominate senior residents and fellows who had differentiated themselves as future leaders, as evidenced by past and current leadership roles and accomplishments. As a part of the nomination process, program leadership was asked to guarantee that the resident/fellow would be protected from clinical duties to attend curricular sessions. Forty-three residents and fellows were nominated.

We notified this cohort of their nomination via Email in March 2022 and assessed willingness to participate. Interested nominees then completed an application including personal goals, perspectives on leadership in medicine, and descriptions of current/prior leadership roles and training. Subsequently, course directors together identified a final cohort of thirty participants through review of curriculum vitae and application materials, with the overarching goal of selecting a cohort from diverse training and experiential backgrounds.

The curriculum comprised 12 monthly 4-hour in-person evening sessions held at a university-affiliated venue. Dinner and course materials were provided. Participants were expected to attend at least 80% of sessions in person. A hybrid option was available to those unable to attend due to medical or parental leave.

Curricular Design
We designed this curriculum using fundamentals of adult learning theory,[11] which prioritizes self-directed, skill-centric learning contextualized within work-based scenarios, and cognitivist learning orientation,[12,13] which centers problem solving, critical thinking, and application as the means to create new knowledge. Both frameworks have been demonstrated as effective for physician learning.[14,15] As such, each session prioritized delivery of immediately relevant content

Table 1 Demographic Characteristics of Thirty Participants in an Inaugural GME Leadership Development Program, 2022–2023

Characteristic	Mean/Count (SD/%)
Age (years)	37.2 (3.7)
Training Level	
PGY-3	6 (20%)
PGY-4	2 (6.7%)
PGY- 5	10 (33.3%)
PGY- 6	6 (20%)
PGY- 7	2 (6.7%)
PGY- 8	4 (13.3%)
Gender	
Female	19 (63.3%)
Male	11 (36.7%)
Degree	
MD	29 (96.7%)
DO	1 (0.3%)
Advanced Degree	8 (26.7%)
Prior Leadership Training	
Yes	14 (53.8%)
No	12 (46.2%)
Participating Specialty/ Subspecialty	Anesthesia, Cardiology, Critical Care Medicine, Neurology/Epilepsy (Adult/Pediatric), Cytopathology, Emergency Medicine, Family Medicine, Internal Medicine, Hematology/Oncology, Nephrology, Rheumatology, Neurosurgery, Obstetrics/Gynecology, Otorhinolaryngology, Pediatrics, Pediatric Gastroenterology, Plastic Surgery, Physical Medicine and Rehabilitation, Radiology, General Surgery, Vascular Surgery

via large-group didactics with opportunities for interactive small-group application, experiential and reflective practice, and critical thinking. Where applicable, we included pre-session preparatory readings and self-assessments.

We reviewed the literature on leadership development in postgraduate medical education to guide curricular content[2,4,9,16,17] (Table 2). Early sessions were designed to highlight core leadership concepts such as leadership style, emotional intelligence, and integrity;[18,19] we presented the servant leadership framework to set the tone for subsequent sessions.[20] To promote reflection and application of these high-level concepts, participants also completed two validated self-assessment tools during early curricular sessions. A trained facilitator with experience in physician leadership development led discussions aimed at reflecting upon and applying results of each inventory to clinical practice. Subsequent sessions attended to skills development (e.g., upstander training, conflict resolution, coaching, negotiation) and career development (e.g., business of medicine, careers in medical education and research, overview of academic promotions). Skills-based sessions incorporated various pedagogical methods, including small-group, case-based learning, interactive workshops, gamification, and applied reflection. The final session concluded with a discussion of the future of healthcare and academic medicine, delivered by high-level university and healthcare leadership.

Our curriculum was taught by clinical faculty representing a diversity of medical specialties, race, gender, and career focus (i.e., expertise in healthcare administration, education, and research). Additionally, we employed an outside

Table 2 Topics Presented in an Inaugural GME Leadership Development Program, 2022–2023

Session	Session Title	Topics and Referent Materials
Session 1: July	Introduction to and Reflections on Leadership	• What is Leadership? • Leadership Style • Emotional Intelligence and Psychologic Safety • Wiley Everything DiSC® Workplace Assessment
Session 2: August	Coaching Skills for Leaders	• Coaching, defined • Goal setting • Therapeutic Listening • Powerful Questioning
Session 3: September	Effective Communication and Conflict Resolution	• TKI assessment • Conflict Resolution • Crucial Conversations Crucial Conversations: Tools for Talking When Stakes Are High, Second Edition: Patterson, Kerry, Grenny, Joseph, McMillan, Ron, Switzler, Al: 8,580,001,040,288: Amazon.com: Books.
Session 4: October	The Business of Medicine	• Profit and Loss statements • Developing a business plan • Clinical data analytics • Financial management
Session 5: November	Racism in Medicine, Diversity and Inclusion	• Unconscious and structural bias • Responding to microaggressions • Upstander training
Session 6: December	Building a Successful Career Arc in Academic Medicine	• Promotion • Graceful self-promotion • Goal-setting • CliftonStrengths® Assessment
Session 7: January	Leadership and Scholarship in Medical Education	• Clinician-Educator Careers (panel discussion) • Approach to struggling medical learners • Science of Learning • How to build an effective workshop
Session 8: February	Shared Leadership Development and Servant Leadership	• Introduction to shared and servant leadership frameworks • Reflection on own leadership style as it relates to these models • Outcome vs Problem focused goals • Moving from reactive to creative thinking
Session 9: March	Negotiating for Success and Satisfaction	• What do you need to be successful? • How to frame an effective "ask" • BATNA • Obstacles in negotiation
Session 10: April	Providing and Receiving Feedback	• Appreciative feedback • Formative feedback • Summative feedback, written and verbal
Session 11: May	Research Fundamentals and Success as a Physician Scientist	• Basic, translational, and clinical research • Physician-Scientist careers (panel discussion) • Collaboration • Grant funding
Session 12: June	Graduation and Wrap-up	• Well-being and resiliency • Time-management • Participant feedback

consultant with expertise in servant leadership, a certified executive coach for physicians, and a certified Wiley Everything DiSC® and Clifton Strengths® trainer to teach corresponding aspects of the curriculum.

Curricular Evaluation

We evaluated the curriculum using (1) interval pre-/post assessments corresponding to each session and (2) a summative pre-/post survey distributed electronically to all participants.

We used interval assessments to evaluate 9 of 12 individual sessions (exceptions: first session, a session on the future of healthcare and academic medicine, and the final session, during which the summative evaluation was disseminated). These were comprised of up to approximately 5 questions – most often true/false, multiple choice, or Likert 1–5 (strongly disagree to strongly agree) – which were developed specifically to assess each session's content. Individual session faculty leaders developed these questions to assess immediate changes in participants' knowledge and/or self-reported confidence. Each session evaluation also included opportunities for free-text comment on perceived importance and relevance of the session for developing physician leaders. Pre-session assessments were sent via Email 1 week before each session; post-session assessments were delivered 24 hours after the session and remained open for 1 week.

Study authors developed, piloted, and refined pre- and post-summative survey by consensus. Participants completed the pre-survey electronically 1 week before the first session. It included demographic data in addition to items evaluating perceived importance and applicability of curricular content (5-point Likert scale; 1 = strongly disagree, 5 = strongly agree). To preserve anonymity within a small cohort, we intentionally did not include questions about race or sexual orientation within surveyed demographic characteristics. Participants completed the post-summative survey during the final session. In addition to the above, the post-survey included items related to the acceptability and impact of curricular content and free text items that prompted participants to identify (1) one change that they made to improve their clinical leadership because of program participation and (2) opportunities for curricular improvement.

All surveys were completed voluntarily and anonymously; responses were linked using unique identifiers.

The University of Pittsburgh Institutional Review Board deems studies of curricular innovation with no risk of harm IRB exempt.

Statistical Analysis

Demographic characteristics were summarized using descriptive statistics, means and standard deviations and compared those by Wilcoxon Signed Rank test. For individual session assessments percentage correct responses (pre- and post-) were compared using a matched paired t-test of a composite score. All statistical analyses were performed using R, version 4.1.2 (2021–11-01) (The R Foundation for Statistical Computing).

Outcomes

Thirty participants representing medical and surgical specialties in pediatric and adult medicine enrolled, matriculated, and completed in the program (Table 1). Notably, 26.7% (n = 8) had previously completed an advanced non-MD degree, and 40% (n = 12) endorsed some prior leadership training (unspecified).

Response rates for individual session evaluations were robust and we saw significant improvements in self-reported attitudes/behaviors and knowledge for 6 of 9 assessed sessions (Table 3). Participants rated overall importance, applicability, and acceptability of every module highly in summative program evaluation. After the training, all (n = 19, 63%) respondents reported they would recommend the program to colleagues, and six (31.6%) recommended in free text response that it be required for all residents and fellows, which speaks to the impact on their journey as physician leaders.

In response to open-ended prompts asking participants about areas of practice change resulting from program participation, participants most frequently indicated an increased dedication to creating psychological safety by providing effective feedback, improved time allocation, and incorporation of more effective negotiation techniques within both job searches and their role as health system advocates. Many remarked upon the impact of the in-person aspect of the leadership program, citing contributions to improved audience engagement, interactivity, overall networking, and lasting relationships with other participants and faculty. Participants most frequently recommended that future iterations of the leadership program shorten session duration and continue to leverage opportunities for interactivity and real-time skills practice.

Table 3 Pre- and Post-Evaluation Survey Responses from Participants in an Inaugural GME Leadership Development Program, 2022–2023

Pre- and Post-Session Knowledge Assessment, by Session				
Session	**Pre-Session Composite knowledge Score (mean/SD)**	**Post-session Composite Knowledge Score (mean/SD)**	**p-value**	**Response Rate (%)**
Session 2 – Coaching Skills for Leaders	3.47(0.41)	4.32(0.21)	<0.01	Pre: 76.7% Post: 76.7%
Session 3 – Conflict Resolution	3.34(0.43)	4.31(0.20)	<0.01	Pre: 80% Post: 80%
Session 4 -Business of Medicine	2.40(0.28)	3.48(0.03)	0.106	Pre: 93.3% Post: 90%
Session 5 – Racism in Medicine: Diversity & Inclusion	3.66(0.69)	4.73(0.16)	0.02	Pre: 76.7% Post: 76.7%
Session 7 – What Physicians Need to Know About Medical Education	3.04(0.33)	4.51(0.26)	<0.01	Pre: 83.3% Post: 66.7%
Session 8 – Shared Leadership Development & Servant Leadership	3.75(0.29)	4.49(0.08)	0.015	Pre: 63.3% Post: 83.3%
Session 9 – Negotiating for Success and Satisfaction	4.06(0.34)	4.38(0.22)	0.01	Pre: 83.3% Post: 76.7%
Session 10 – Performance Evaluation: Providing and Receiving Feedback	1.10(NA)	1.80(NA)	NA	Pre: 76.7% Post: 73.3%
Session 11 – Research Fundamentals: Success as a Physician Scientist	3.66(0.18)	4.50(0.44)	<0.01	Pre: 73.3% Post: 73.3%
Summative Evaluation				
Question				**Mean/Count (SD/%)**
I feel ready to move into a leadership position. (5-point Likert scale; 1 = strongly disagree, 5 = strongly agree)				4 (0.5)
Being a part of this Leadership Academy will positively impact my future career development. (5-point Likert scale; 1 = strongly disagree, 5 = strongly agree)				4 (1.7)
Taking this leadership course has increased my interest in pursuing additional leadership training and development opportunities. (5-point Likert scale; 1 = strongly disagree, 5 = strongly agree)				5 (0.4)
How would you rate the importance of the ideas, concepts, and skills covered to the development of your clinical skills? (5-point Likert scale; 1 = unimportant, 5 = very important)				5 (0.4)
Overall, how applicable to your job are the ideas, concepts and skills covered in the Leadership Academy? (5-point Likert scale; 1 = completely unapplicable, 5 = very applicable)				5 (0.3)
How would you rate the audiovisual materials and activities? (5-point Likert scale; 1 = completely ineffective, 5 = highly effective)				4 (0.5)
How would you rate the duration of the sessions? (Too long, just right, too short)				Too long: 11 (57.9%) Just right: 8 (42.1%)
Would you recommend this training to other residents/fellows? (Yes/No)				Yes: 19 (100%)

Abbreviations: GME, graduate medical education; SD, standard deviation.

Lessons Learned

Based on our experience in designing, implementing, and evaluating the curriculum, we offer several recommendations for those who aim to develop similar programming. First, securing a commitment to protect residents' and fellows' time to attend in-person sessions is crucial. In-person attendance minimizes distraction, fosters a sense of community, and builds the psychological safety necessary to engage in deep reflection and skills building. In keeping with this idea, holding longitudinal sessions outside of clinical spaces and during evening hours with dinner seemed to enhance attendance and focus. Participant feedback highlighted the need for shorter sessions to optimize cognitive load; limiting sessions to 3 hours was strongly recommended.

We designed the program intentionally, with an early focus on servant leadership to center and carry forward the character and emotional intelligence domains of leadership. We found that focused pre-readings and targeted self-assessments adequately prepared participants to deeply engage with session content. Our experiences and participant feedback underline the value of leveraging interactivity and discussion in in-person sessions. Incorporation of realistic, case-based content with facilitated debriefing of self-assessments were successful strategies to increase content relevance and to encourage engagement and reflection.

Regarding program evaluation, we found that interval electronic assessments garnered a high response rate, provided immediate feedback on knowledge acquisition, and were critical in enabling real-time adjustments to the curriculum. As one example, assessment data from the module on the business of healthcare delivery allowed us to better balance high-level content with increased interactivity for a more engaging learning experience in future iterations of the curriculum. The summative pre-post survey was necessary to offer a broader perspective on programmatic impact and acceptability. Finally, engaging a diverse cohort of faculty and participants is essential to enrich the curriculum with varied perspectives, leadership styles, and experiences – all in direct alignment with an overarching goal of developing future leaders representing diverse communities.

Limitations included delivery and evaluation within an integrated healthcare delivery system in one geographic region with a small sample size. While individual session assessments were mapped to session objectives, they varied in degree of difficulty, and we did not include a delayed-post knowledge assessment to evaluate for retention and long-term impact on practice. Given the longitudinal nature of the curriculum, we can account for neither maturation bias or the impact of informal workplace-based leadership development on program evaluation. Our program involved invited speakers, paid access to individual self-assessments, and multiple protected evening curricular hours with dinner across several months. We recognize that similar resources may not be readily available in other settings.

While there has been an acknowledgment of the need for formal clinical leadership skills development for medical trainees, few published curricula exist to guide development of such programming. This work describes our experiences developing and implementing such a program to fill this gap, to include lessons learned. We hope this study will serve to inspire further innovation in this space and serve as a stepping-stone to guide future curricular development designed specifically for early clinician leaders.

Conclusion

This in-person longitudinal leadership curriculum adheres to best leadership development practices, demonstrates improvement in knowledge and attitudes related to cognitive, character, and emotional leadership domains, and develops a psychologically safe community of practice for GME participants. Further, this program addresses a critical need for GME physician development within increasingly complex healthcare systems and bridges the gap between professional competencies and patient needs. Future work should include longer-term assessments of participants' knowledge and attitudinal changes, the impact of such programs on career and leadership trajectory of program graduates, qualitative exploration of its impact on participants' growth and decision-making as physician leaders, and potentially also 360° patient-outcome-centered evaluations to assess real-time leadership performance.

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Disclosure

The authors report no conflicts of interest in this work.

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