

The Role of Mentorship in Orthopedic Professional Development: From Training to Mastery

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Learning Point of the Article:

To understand how mentorship supports professional growth in orthopedics and learn effective strategies for building strong mentor-mentee relationships.

Abstract

Introduction: Mentorship is essential to the professional and personal development of orthopedic surgeons. It promotes continuous learning, supports career development, and helps develop future leaders in the field. Our study explains key aspects of effective mentorship, differentiates mentorship from coaching, and highlights strategies to enhance mentor-mentee relationships.

Materials and Methods: A literature review was conducted to identify best practices in orthopedic mentorship using established models, expert opinions, and real-world training experiences.

Results: Strong mentorship positively impacts skill development, career progression, and overall job satisfaction. Key elements include structured guidance, open communication, and mutual commitment. Differences between mentorship and coaching were elucidated, emphasizing their distinct roles in professional development.

Discussion: Effective mentorship programs require formal structures, clear expectations, and institutional support. Successful mentor-mentee relationships thrive on trust, regular feedback, and goal alignment. Practical strategies to strengthen mentorship in orthopedic training include mentorship training for faculty, structured pairing programs, and promoting a supportive learning environment.

Conclusion: Mentorship is critical in orthopedic education and career development. Establishing strong mentorship programs can enhance learning, improve professional satisfaction, and develop future leaders in the specialty. Institutions should prioritize structured mentorship frameworks to ensure long-term success.

Keywords: Mentorship, professional development in orthopedics, mentor-mentee relationship, career growth, medical education, e-mentorship.

Introduction

The professional development journey in orthopedics requires more than just acquiring technical expertise; it demands the guidance of mentorship to navigate clinical challenges, drive research advancements, foster leadership, and maintain ethical integrity [1]. Mentorship bridges the gap between theoretical learning and real-world application, shaping a surgeon's growth toward mastery [2, 3]. In a field that balances precision,

innovation, and compassion, mentorship becomes indispensable for nurturing not only technical proficiency but also professional resilience and adaptability [4].

Historically rooted in an apprenticeship model where seasoned surgeons imparted their knowledge through hands-on guidance, orthopedic mentorship has evolved into a comprehensive, multifaceted framework [5, 6]. Modern residency and fellowship programs now embed structured mentorship approaches

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Table 1: Comparison of mentor, coach, and teacher roles [25, 26, 27, 28]:

Aspect	Mentor	Coach	Teacher
Focus	Long-term guidance	Goal-oriented performance	Knowledge delivery and skill-building
Relationship	Informal, often personal	Structured, short-term	Formal, usually academic
Approach	Holistic, wisdom-based, nurturing	Skill-based, performance-driven	Content-based, instructional
Duration	Ongoing, lifelong	Short-term, goal-specific	Set academic term/semester
Role	Advisor, guide	Motivator, performance enhancer	Instructor, content provider

alongside traditional experiential learning to address the growing complexities of the profession [7, 8]. This shift highlights the essential role of mentorship in driving personal development, fostering clinical excellence, and promoting innovation [9].

Effective mentorship empowers orthopedic surgeons by refining their decision-making skills, enhancing leadership qualities, and fostering a commitment to lifelong learning [10]. Beyond skill acquisition, mentorship encourages surgeons to contribute to advancements in research, ethical practice, and health-care leadership [1, 11]. Today, mentorship models have expanded to include one-on-one guidance, peer mentoring, and virtual e-mentorship opportunities [12]. These diverse formats cultivate continuous learning, strengthen professional confidence, and open doors to broader career possibilities [13]. Structured frameworks foster inclusivity, champion a growth mindset, and prepare the next generation of orthopedic leaders to meet future challenges and innovations [14]. This review explores the pivotal role of mentorship in building a skilled, resilient, and diverse orthopedic workforce – laying the foundation for enduring excellence in surgical practice, patient care, and research innovation.

Materials and Methods

This review article explores the role of mentorship in professional development in orthopedics, with a focus on building a culture of mentorship in orthopedic programs. A comprehensive literature review was conducted, including primary research studies, systematic reviews, and expert opinion papers related to mentorship in the field of orthopedics. The selection criteria for the reviewed articles were based on relevance to the core themes of mentorship, professional development, leadership, and career growth within orthopedic surgery.

Literature search strategy

A systematic search of academic databases, including PubMed, Google Scholar, and Scopus, was performed to identify relevant studies published between 2000 and 2024. Keywords used in the search included “mentorship,” “orthopedics,” “professional development,” “career growth,” “mentor–mentee relationships,” “leadership,” “clinical training,” “research mentorship,” and “e-mentorship.” The search was refined to include studies focused on mentorship in medical education, specifically within orthopedics, and articles discussing the different models of mentorship, challenges, and strategies for effective mentoring.

Inclusion and exclusion criteria

The inclusion criteria for this review consist of peer-reviewed articles, reviews, and case studies that focus on mentorship in orthopedics. Eligible studies must address the impact of mentorship on clinical competence, career progression, personal development, and leadership within the field. In addition, articles exploring various models of mentorship, such as traditional one-on-one mentorship, peer mentorship, and e-mentorship, are included. Papers discussing mentorship programs or strategies designed for orthopedic residents, fellows, or early-career surgeons are also considered.

The exclusion criteria include non-English language articles and studies that are unrelated to mentorship or focus on other medical specialties. Furthermore, studies that do not specifically address mentorship in orthopedics are excluded from the review.

Data extraction and synthesis

Data were extracted from the selected studies, focusing on key

Table 2: Mentorship models and phases applied to orthopedics [5, 10, 30, 31, 32, 33, 34]

Model	Description	Advantages	Challenges	Ideal for	Phases of mentorship
One-on-one mentorship	Direct, personalized guidance from an experienced mentor to a less experienced mentee	Strong rapport, tailored learning	Limited availability, potential dependency	Junior surgeons, residents	Phase 1: Rapport building Phase 2: Direction setting
Team-based mentorship	A collaborative model where a group of mentors shares expertise across different areas	Diverse perspectives, broad expertise	Requires coordination and communication	Surgeons seeking multifaceted advice	Phase 2: Direction setting Phase 3: Progress making
Peer mentorship	A system where mentees guide each other, providing mutual support and shared learning	Fostered mutual learning, collaborative	Lacks experienced mentorship, learning can be limited	Fellows, senior residents	Phase 1: Rapport building Phase 3: Progress making
E-mentorship	Virtual mentorship overcoming geographical limitations using digital platforms	Flexible, easily accessible	Technology barriers, lack of in-person interaction	Remote or international mentees	Phase 2: Direction setting Phase 4: Winding down
Functional mentoring	Focused mentoring on specific skills or functions in orthopedics	Expertise-driven, skill enhancement	Limited scope, may not cover broader career development	Specialists in specific fields	Phase 2: Direction setting Phase 3: Progress making
Mosaic mentoring	A hybrid model that combines input from multiple mentors for holistic development	Offers well-rounded growth	Complex, may lead to mixed messages	Comprehensive career development	Phase 1: Rapport building Phase 3: Progress making

Table 3: Types of mentors and their roles in professional development [10, 36, 37, 38, 39, 40, 41]

Type of mentor	Role
Masters of the craft	Experts who demonstrate technical and clinical excellence
Champions of the cause	Advocates who support and promote mentee's goals
Co-pilots	Learning partners who navigate challenges alongside mentees
Anchors	Stabilizing figures offering support during turbulence
Reverse mentors	Mentees who guide their mentors, fostering reciprocal learning
Clinical mentors	Senior surgeons supervising and teaching surgical skills in the operating room
Research mentors	Experts guiding research projects, data analysis, and manuscript writing
Subspecialty mentors	Specialists providing focused guidance in areas such as joint replacement or spine surgery
Career development mentors	Advisors on career pathways, fellowship applications, and practice management
Peer mentors	Colleagues offering support and insights specific to their stage of training.

aspects of mentorship in orthopedics. The review examined different mentorship models, including one-on-one, team-based, peer, and e-mentorship, assessing their effectiveness in the field. It also explored the benefits of mentorship, highlighting its contributions to clinical skill development, career guidance,

leadership training, and academic growth. Common challenges, such as time constraints, mismatched expectations, and lack of institutional support, were identified. In addition, strategies for fostering successful mentor-mentee relationships, including setting clear expectations, providing regular feedback, and

Table 4: Comprehensive criteria for selecting an effective mentor [22, 42, 43]

Criteria for finding	Questions to ask	How to find the right mentor
Experience and success	Do they have a proven track record?	Research accomplished individuals in your field
Authenticity and empathy	Are they genuinely interested in your growth?	Look for mentors committed to your development
Creativity and honesty	Will they challenge you constructively?	Seek mentors who encourage learning through feedback
Shared values	Do their values align with yours?	Choose mentors who share your professional and personal values
Communication style	Can you communicate effectively with them?	Ensure compatibility in communication style
Goal alignment	Can they guide you toward your career goals?	Look for mentors who understand your aspirations and can offer relevant guidance
Mentorship experience	Have they mentored others successfully?	Check their track record in mentoring other professionals
Availability	Do they have time for regular mentoring?	Choose mentors who can commit to regular interactions
Career fulfillment	Are they satisfied in their career?	Seek mentors who are fulfilled and motivated in their work
Networking opportunities	Can they introduce you to influential professionals?	Look for mentors with strong professional networks
Constructive criticism	Can they offer honest and helpful feedback?	Choose mentors who provide constructive feedback for growth.

Table 5: Challenges in orthopedic mentorship and strategies to overcome them [46, 47, 48, 49, 50, 51]

Challenges	Impact	Solutions
Time constraints	Limited mentor availability, missed guidance	Schedule structured mentorship during work hours; allow virtual sessions
Mentor–mentee mismatch	Unproductive relationships, frustration	Match based on goals, communication style, and personality
Building trust	Slower progress in mentorship	Foster transparent, consistent communication
Diverse learning needs	Difficulty in tailoring teaching approaches	Adapt mentorship styles to suit individual mentees
Insufficient feedback	Mentee development stagnates	Implement routine evaluation and feedback sessions
Mismatched expectations	Mentee dissatisfaction and disengagement	Clarify objectives, roles, and timelines early
Ethical boundaries	Personal–professional conflicts	Establish clear codes of conduct and boundaries
Low mentor motivation	Reduced program effectiveness	Recognize contributions and provide incentives
Balancing clinical duties	Dual role strain for mentors	Provide institutional time allotments for mentoring
Lack of diversity	Missed opportunities for inclusive growth	Establish programs targeting underrepresented groups
Resource limitations	Limited access to learning materials	Leverage digital platforms and external resources
Resistance to mentorship	Negative perception of mentoring value	Highlight success stories and mentorship benefits
Peer mentoring challenges	Ineffective guidance due to similar experience levels	Offer structured peer mentorship frameworks
Emotional burnout	Decreased mentor engagement	Provide mental health support and wellness programs
Program evaluation gaps	Difficult to measure success	Set measurable objectives and regularly assess outcomes

promoting open communication, were analyzed. The review further evaluated institutional support and formal mentorship programs designed to enhance mentorship in orthopedics [15]. The extracted data were synthesized into thematic categories and analyzed to provide a comprehensive overview of the current state of mentorship. This review also discusses best practices, emerging trends, and the role of technology in facilitating mentorship relationships.

Defining mentorship and its importance

Mentorship is a dynamic, protected relationship where a more knowledgeable or experienced individual guides and nurtures the personal and professional growth of a less experienced mentee [13, 16]. This process, distinct from coaching, tends to focus on short-term, task-specific guidance that fosters a long-term bond that promotes both career and personal development [17, 18]. At its core, mentorship is a collaborative partnership wherein the

mentor imparts wisdom, experience, and expertise while the mentee gains insights tailored to their unique goals and aspirations [19].

The mentor's role is not only to provide guidance but also to offer feedback, support, and the tools necessary for the mentee to thrive in their career. In doing so, the mentor also hones their own skills, growing alongside the mentee [20]. Unlike traditional manager-subordinate relationships, mentorship is free from hierarchical constraints, creating a space for an open exchange of knowledge and ideas [21].

As the mentee progresses, the mentor adapts their approach to meet evolving needs, ensuring that the guidance remains effective and meaningful. Mentorship thus becomes a mutually beneficial relationship, driving the growth of both individuals involved, where learning is a shared, ongoing experience [22, 23].

Table 6: The impact of mentorship on professional development [13, 48, 59, 60, 61, 62]

Area of impact	Benefits	Key mentorship contributions	Role of mentorship in orthopedics
Skill development	Enhanced technical abilities and clinical judgment	Personal guidance, skill refinement, hands-on training	Clinical competence: Direct exposure to surgical techniques, patient management strategies, and decision-making processes under the guidance of experienced mentors helps mentees refine their skills and gain confidence in their clinical abilities
Career progression	Support for leadership opportunities and research	Guidance on career paths, professional goals, and networking	Career advancement: A mentor's support enables mentees to expand their professional network, uncover career opportunities, and navigate challenges effectively, ultimately shaping their career trajectories in orthopedics
Personal growth	Improved resilience, adaptability, and work-life balance	Emotional support and development of soft skills	Leadership and professionalism: Mentorship offers leadership development through exposure to team management, ethical decision-making, and navigating real-world challenges, crucial for becoming a leader in orthopedics
Organizational success	A culture of continuous learning and professional excellence	Knowledge sharing, fostering a collaborative environment	Research and academic growth: Mentors inspire mentees to engage in research, offering guidance on conducting studies, publishing, and presenting findings, thus encouraging innovation and evidence-based practices in orthopedics
Soft skills development	Increased emotional intelligence, conflict resolution, and adaptability	Mentors help mentees build interpersonal acumen and emotional intelligence	Leadership and Professionalism: Mentorship cultivates emotional intelligence, conflict resolution, and adaptability, preparing mentees for leadership roles in the orthopedic field
Self-awareness	Improved understanding of strengths and weaknesses	Mentors assist in setting goals and identifying areas for growth	Self-awareness through mentorship helps mentees refine clinical judgment by reflecting on their strengths and areas of improvement with mentor feedback
Long-term success	Achieving career goals and sustaining personal and professional growth	Ongoing support, mentoring adjustments for mentee development	Career advancement and leadership: Mentors provide long-term support, adjusting guidance to mentees' evolving professional goals, ensuring sustained success in orthopedics.

Comparison of mentor, coach, and teacher roles in professional development

Mentor, coach, and teacher are distinct roles, each with its unique approach and focus in fostering development. A mentor provides long-term guidance based on experience and wisdom, often in a less formal, ongoing relationship. A coach focuses on specific goals or performance improvement, offering structured, short-term, and targeted interventions. A teacher delivers knowledge in a structured environment, focusing on skill-building and content delivery through organized lessons. Below is a comparison table summarizing their key differences [13,24] (Table 1) [25-28].

Mentorship models and phases of mentorship

Mentorship in orthopedics is an evolving process that fosters professional growth through various structured models. These models, such as one-on-one, team-based, and peer mentoring, offer different approaches to development. A critical aspect of effective mentoring is the progression through different phases, ensuring the mentor-mentee relationship remains dynamic and purposeful. These phases help mentees transition from novices to experts [29] (Table 2) [5, 10, 30-34].

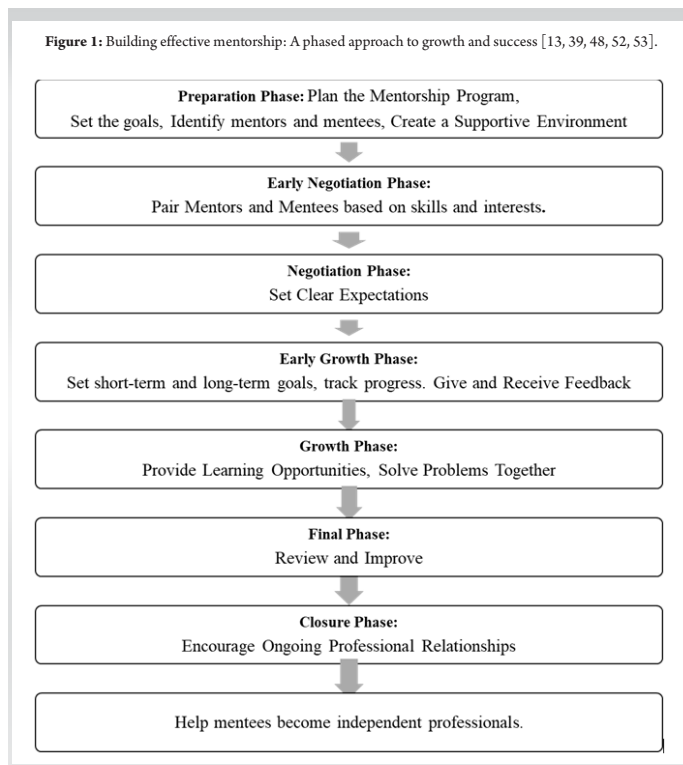
David Clutterbuck's five-phase model for developmental relationships plays a crucial role in shaping the mentorship journey [34]. The first phase, Rapport Building, focuses on establishing trust and understanding between the mentor and mentee. This is

followed by Direction Setting, where the mentor helps the mentee define clear and realistic goals. In the Progress-Making phase, the mentee takes actionable steps toward these goals with continuous guidance and feedback from the mentor. As the mentee gains independence, the relationship enters the Winding Down phase, where direct mentorship gradually decreases. Finally, in the Moving On phase, the mentee transitions into a new stage, either assuming greater responsibilities or taking on a mentorship role themselves.

In addition to the models listed, mentorship can also be categorized based on key mentoring functions. The Kram model, for instance, defines psychosocial functions such as providing acceptance, counseling, friendship, and role modeling. These elements support the mentee throughout the mentorship journey, aligning with different phases of the relationship. This structure highlights how mentorship in orthopedics evolves through structured phases, with each model catering to distinct needs and stages in a surgeon's career, enhancing their professional and personal growth [35].

Types of mentors in orthopedics

Mentors in orthopedics play diverse roles, including clinical supervision, career guidance, and research mentorship. From seasoned experts to supportive peers, they help trainees navigate challenges, develop technical skills, and achieve their goals [10,

Figure 1: Building effective mentorship: A phased approach to growth and success [13, 39, 48, 52, 53].

36]. Effective mentorship fosters collaboration, mutual growth, and a tailored approach to each mentee's needs, enriching their professional journey [37] (Table 3) [10, 36-41].

Finding the right mentor

Finding the right mentor involves aligning career goals, personal values, and the mentor's qualities. Effective mentors have experience, empathy, and a genuine interest in helping mentees grow. They challenge constructively, share values, and foster open communication. While great mentors inspire success, "tormentors" hinder progress by creating obstacles and discouragement [22, 42].

Finding the right mentor is key for professional development. An effective mentor provides guidance, challenges you constructively, and aligns with your values and goals. To find the right mentor, assess their experience, communication style, and commitment [43]. Look for someone who can offer support, challenge you, and help you achieve your aspirations (Table 4) [22, 42, 43].

Successful mentor-mentee relationships thrive when built on mutual respect, shared goals, and open communication. Mentees should seek mentors who challenge their perspectives, encourage growth, and provide guidance without imposing their own career path [44, 45].

Challenges in orthopedic mentorship

Mentorship is vital for nurturing talent in orthopedics, yet it faces

numerous obstacles, such as mismatched expectations, time constraints, and varying mentee needs [46]. Effective solutions require communication, adaptability, and institutional backing to foster impactful relationships. Effective mentorship in orthopedics demands continuous effort to overcome these challenges, ensuring a supportive environment for both mentors and mentees [47] (Table 5) [46-51].

Mentorship protocol: Steps for effective mentorship in orthopedics

Mentorship in orthopedics follows a structured process to help both mentors and mentees grow professionally, develop new skills, and build strong working relationships. The first step is to create a mentorship culture that strengthens trust, respect, and knowledge-sharing, ensuring that both mentors and mentees feel comfortable and supported [52]. Next, mentor-mentee pairs should be carefully matched based on their interests, goals, and experience to maximize the benefits of the relationship. Once paired, it is important to set clear expectations regarding roles, communication, and objectives to maintain a structured and productive mentorship experience [53].

As the mentorship progresses, regular feedback is essential to address challenges, provide guidance, and adjust approaches when necessary. Open discussions between mentors and mentees make the process more effective and supportive. Finally, the mentorship process should be regularly evaluated to track progress and implement improvements. As mentees gain confidence and skills, they gradually transition toward independence while maintaining a professional connection with their mentors. These steps ensure that mentorship in orthopedics remains well-organized, effective, and beneficial for everyone involved (Fig. 1) [13, 39, 48, 52, 53].

Effective mentorship strategies involve establishing a supportive culture, selecting appropriate mentor-mentee pairs, defining expectations, encouraging consistent feedback, and evaluating progress. These strategies guide different phases of mentorship, including preparation (discovery), negotiation (goal setting), enabling growth (learning), and closure (evaluation and wrap-up). A structured approach ensures that mentorship remains a dynamic and evolving process, fostering professional development and strong mentor-mentee relationships in orthopedics [54].

Mentorship benefits in orthopedics

Mentorship in orthopedics has a profound impact on clinical skill development, career guidance, leadership training, and promoting diversity and innovation. It plays a vital role in refining technical abilities, providing guidance in complex clinical

decisions, and offering insights into leadership roles within the health-care environment [55]. Through structured mentorship, orthopedic professionals not only develop their clinical competence but also gain invaluable career advice, preparing them for future challenges and leadership positions [56].

Clinical skill development

Mentorship helps mentees enhance their technical abilities, making them proficient in performing procedures and managing clinical situations. Mentors provide direct guidance during surgeries and complex cases, instilling confidence and competence that help mentees grow into skilled professionals [9]. Through consistent feedback and hands-on practice, mentees learn to make informed decisions and improve their clinical judgment [57].

Career guidance and leadership training

Mentors also offer crucial career advice, helping mentees navigate professional pathways, access career opportunities, and manage work-life balance. Leadership training, including team management, ethical decision-making, and conflict resolution, is an essential part of mentorship [13, 48]. This guidance prepares mentees for higher responsibilities within orthopedic departments, academic settings, or even research roles [10, 51].

Promoting diversity and innovation

Mentorship fosters a culture of inclusion, encouraging diverse perspectives in the field. It ensures that underrepresented groups in orthopedics have access to support and guidance that may not have otherwise been available [55]. Furthermore, mentorship promotes innovation by inspiring mentees to engage in research and evidence-based practice, helping shape the future of orthopedics with new ideas and methodologies [58] (Table 6).

Institutional support and programs for mentorship

Institutional programs create a framework that supports mentorship at various levels of the academic hierarchy. By equipping faculty members with the right skills and providing leadership training, these programs foster a positive environment where both mentees and mentors can thrive [1]. The effectiveness of these programs can significantly impact the development of future orthopedic surgeons and medical professionals. Therefore, regular evaluation of these programs is essential to ensure they meet the evolving needs of mentorship in medical education [63].

Emerging trends in mentorship

Emerging trends in mentorship in orthopedics highlight the growing influence of digital platforms and e-mentorship [64]. These virtual tools offer flexibility, enabling mentees to connect with mentors worldwide, especially in underserved areas [65]. E-mentorship allows continuous learning through online meetings, discussion forums, and video tutorials, expanding access to expertise and fostering global collaboration [66].

Global collaborations in mentorship further enhance the learning experience by promoting cross-cultural exchanges and bridging regional training gaps [67]. These initiatives encourage inclusivity, equity, and the sharing of best practices, ensuring that orthopedic professionals stay updated on emerging techniques and advancements while fostering a more diverse and interconnected global community [68].

Limitations

One limitation of this manuscript is the variability in mentorship models and the lack of standardized definitions of mentorship across studies. Mentorship in orthopedics encompasses diverse models, ranging from traditional one-on-one guidance to more structured approaches such as peer and e-mentorship [69, 70, 71]. The absence of uniformity in defining and categorizing these mentorship frameworks complicates comparisons and evaluations of their effectiveness [72]. This variability is further compounded by regional, institutional, and cultural differences in how mentorship is implemented, which can influence both the mentoring process and its outcomes [13, 73].

Another limitation lies in the potential biases in self-reported data from mentees, a common issue in many mentorship studies. Mentees may overstate the benefits of their mentorship experiences due to social desirability or a desire to maintain positive relationships with mentors, leading to inflated perceptions of the mentorship's impact [74]. In addition, the rapidly evolving nature of mentorship models, particularly in the realm of digital and e-mentorship, means that newer studies and innovations may emerge after this review is conducted [75]. These changes in mentorship delivery could offer new insights that challenge or expand upon the findings of this review [38].

Ethical considerations

As this is a review article, no direct patient data was collected or analyzed. The studies included in the review were selected based on ethical guidelines as described in the original research. The findings from this review are intended to provide insights into the importance and effectiveness of mentorship in orthopedics, with a focus on fostering professional development and leadership within the field.

This approach ensures that the review is both comprehensive and

focused on actionable strategies for improving mentorship within orthopedic programs.

Discussion

Mentorship in orthopedic professional development bridges the gap between formal education and the practical demands of clinical practice [76]. The evolving models of mentorship – from traditional apprenticeships to structured, multidimensional frameworks – highlight the increasing recognition of its importance in nurturing both technical competence and professional growth [9]. Through personalized guidance, mentorship fosters the development of essential skills, supports emotional resilience, and helps orthopedic surgeons navigate complex challenges inherent in patient care, research, and leadership roles [9, 10].

Best practices for mentorship

Effective mentorship in orthopedic surgery relies on several best practices that enhance its impact. Structured mentorship programs integrated within residency and fellowship curricula ensure a consistent approach to skill development and career preparedness [77]. At the same time, personalized guidance tailored to individual learning styles, goals, and challenges fosters deeper engagement and professional growth [78]. Mentorship also plays a crucial role in promoting diversity and inclusion, supporting underrepresented groups, and encouraging diverse leadership roles within the field [79]. In addition, the rise of digital platforms has expanded mentorship opportunities, enabling virtual connections across geographic boundaries and facilitating global knowledge sharing [80]. By combining these strategies, mentorship becomes a powerful tool for professional development and equity in orthopedic surgery.

Studies have demonstrated that mentorship not only accelerates technical and academic progress but also offers critical support in navigating unforeseen challenges [78]. Through cultivating professional networks and fostering collaboration, mentorship helps build a community of orthopedic professionals dedicated to lifelong learning and innovation [76].

Future directions

To further enhance the value of mentorship, several key areas warrant consideration. Practical steps, such as structured mentorship workshops, clear documentation of mentorship goals, and scheduled progress reviews, can provide a more organized framework for mentor-mentee relationships. Formal evaluation and feedback mechanisms are essential for refining mentorship programs, ensuring they align with the evolving

needs of orthopedic trainees [47]. In addition, enhanced digital integration can expand virtual mentorship initiatives, increasing accessibility and inclusivity by connecting mentees with mentors worldwide [65]. Developing dedicated mentorship platforms with interactive features like case discussions, virtual simulations, and live surgical mentoring can further enrich the experience. Interdisciplinary mentorship models that foster collaboration across specialties can provide orthopedic surgeons with a broader perspective on patient care and research strategies [47, 81]. Finally, mentorship training for mentors through standardized programs can equip them with effective communication and leadership skills, ultimately optimizing mentorship outcomes [39, 82]. By addressing these areas, mentorship programs can become more structured, inclusive, and impactful.

By synthesizing best practices and embracing future advancements, mentorship can continue to be a transformative force in orthopedic professional development – shaping the next generation of surgeons and driving progress in surgical innovation, patient care, and health-care leadership [83, 84].

Conclusion

Mentorship plays a crucial role in shaping the professional development of orthopedic trainees and early-career surgeons. Structured mentorship programs have demonstrated significant benefits in skill development, career progression, and professional networking. However, the success of mentorship depends on well-defined roles, institutional support, and continuous assessment of effectiveness. By cultivating effective mentor-mentee relationships and dynamic mentorship practices, the growth of both individuals and the field as a whole is ensured. By prioritizing mentorship, the orthopedic community can build a legacy of excellence and adaptability to meet the evolving demands of patient care and scientific discovery. Future research should focus on optimizing mentorship models and evaluating long-term outcomes.

Clinical Message

Mentorship helps orthopedic surgeons grow by bridging the gap between theory and practice. Strong mentor-mentee relationships support skill development and career advancement. Structured mentorship programs can improve learning and patient care.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

- Choi AM, Moon JE, Steinecke A, Prescott JE. Developing a culture of mentorship to strengthen academic medical centers. *Acad Med* 2019;94:630-3.
- Kerdegari N, Tandanu E, Lee K, Zakri R, Dasgupta P, Chandak P. A prospective cohort study on the role of surgical mentorship on medical students' surgical experience and attitudes towards surgery. *BMC Med Educ* 2024;24:1116.
- Platz J, Hyman N. Mentorship. *Clin Colon Rectal Surg* 2013;26:218-23.
- Treasure AM, Hall SM, Lesko I, Moore D, Sharan M, Van Zaanen M, Yehudi Y, et al. Ten simple rules for establishing a mentorship programme. *PLoS Comput Biol* 2022;18:e1010015.
- Steelman K, Fleifel D, Waheed M, Vaidya R. Mentorship in a surgical residency: A comprehensive review of the literature. *Cureus* 2023;15:e43422.
- Entezami P, Franzblau LE, Chung KC. Mentorship in surgical training: A systematic review. *Hand (NY)* 2012;7:30-6.
- Teo MY, Ibrahim H, Lin CK, Abdul Hamid NA, Govindasamy R, Somasundaram N, et al. Mentoring as a complex adaptive system - a systematic scoping review of prevailing mentoring theories in medical education. *BMC Med Educ* 2024;24:726.
- Joe MB, Cusano A, Leckie J, Czuczman N, Exner K, Yong H, et al. Mentorship programs in residency: A scoping review. *J Grad Med Educ* 2023;15:190-200.
- Burgess A, Van Diggele C, Mellis C. Mentorship in the health professions: A review. *Clin Teach* 2018;15:197-202.
- Mulcahey MK, Waterman BR, Hart R, Daniels AH. The role of mentoring in the development of successful orthopaedic surgeons. *J Am Acad Orthop Surg* 2018;26:463-71.
- Francis J, George J, Peng E, Corno AF. The role of teamwork and mentorship in pediatric and congenital heart surgery. *Transl Pediatr* 2024;13:1870-8.
- Kaufman MR, Levine D, Casella A, DuBois DL. E-mentoring to address youth health: A systematic review. *Adolesc Res Rev* 2022;7:63-78.
- Hill SE, Ward WL, Seay A, Buzenski J. The nature and evolution of the mentoring relationship in academic health centers. *J Clin Psychol Med Settings* 2022;29:557-69.
- Burger E, Ghanayem A, Mulcahey MK. AOA critical issues: Promoting leadership development among orthopaedic faculty. *J Bone Joint Surg Am* 2024;106(15):p 1439-1444
- Jackevicius CA, Le J, Nazer L, Hess K, Wang J, Law AV. A formal mentorship program for faculty development. *Am J Pharm Educ* 2014;78:100.
- Krishna LK, Pisupati A, Teo KJ, Teo MY, Quek CW, Chua KZ, et al. Professional identity formation amongst peer-mentors in a research-based mentoring programme. *BMC Med Educ* 2023;23:787.
- Mohamed I, MacBeth R, Stephens K, Ramaiya N, Plecha D. Women in academic radiology: Barriers and benefits of representation, mentorship, coaching, and advocacy. *Curr Probl Diagn Radiol* 2025;54:108-14.
- Agarwal BB, Agarwal N, Dhamija N, Chintamani. Mentoring in Surgery-Mentor, Parshuram, Dronacharya, Krishan. *Indian J Surg* 2018;80:81-3.
- Nassour I, Balentine C, Boland GM, Chu D, Habermann E, Holscher C, et al. Successful mentor-mentee relationship. *J Surg Res* 2020;247:332-4.
- Niazi M, Mahboob U, Shaheen N, Gul S, Saeed MHB, Kiyani A. Exploring the factors affecting career progression in informal faculty mentoring sessions within mentor and mentee relationships: A qualitative study. *BMC Med Educ* 2024;24:1242.
- Hirsch B, Whittington KD, Walker J. Mentoring in radiologic science. *J Med Imaging Radiat Sci* 2020;51:354-7.
- Wilder FG, Han JJ. Finding the right mentor. *Thorac Surg Clin* 2024;34:1-7.
- Van Patten RR, Bartone AS. The impact of mentorship, preceptors, and debriefing on the quality of program experiences. *Nurse Educ Pract* 2019;35:63-8.
- National Academies of Sciences, Engineering, and Medicine, Policy and Global Affairs, Board on Higher Education and Workforce, Committee on Effective Mentoring in STEMM, Dahlberg ML, Byars-Winston A, editors. The



Science of Effective Mentorship in STEMM. Washington, DC: National Academies Press US; 2019.

25. Taylor DC, Hettrich CM, Dickens JF, Doty J. Coaching, mentorship, and leadership in medicine: Empowering the development of patient-centered care. *Clin Sports Med* 2023;42:15-8.

26. Gwathmey FW, Miller MD. Coaching in sports medicine. *Clin Sports Med* 2023;42:325-33.

27. Schulte EE, Alderman E, Feldman J, Feldman J, Hametz P, Havranek T. Using the "Coach approach": A novel peer mentorship program for pediatric faculty. *Acad Pediatr* 2022;22:1257-9.

28. Abdoler E, Santhosh L. Leadership and professional development: Coach, mentor, sponsor...peer? Cultivating a successful peer mentorship. *J Hosp Med* 2022;17:192-3.

29. Krishna LK, Kwok HY, Ravindran N, Tan XY, Soh J, Wan DW, et al. A systematic scoping review of mentoring support on professional identity formation. *BMC Med Educ* 2024;24:1380.

30. Jenkins S. David clutterbuck, mentoring and coaching: A commentary. *Int J Sports Sci Coach* 2013;8:139-254.

31. Aquino JF, Riss RR, Multerer SM, Mogilner LN, Turner TL. A step-by-step guide for mentors to facilitate team building and communication in virtual teams. *Med Educ Online* 2022;27:2094529.

32. Fatade YA, Osabutey A, Olakunle OE, Crumbs T, Okoh AK, Ogunniyi MO. A novel facilitated peer-mentoring program: Paving the way for a diverse cardiology workforce. *JACC Adv* 2024;3:101044.

33. Knox CJ, Ab Latif FM, Cornejo NR, Johnson MDL. Mentoring across difference and distance: Building effective virtual research opportunities for underrepresented minority undergraduate students in biological sciences. *mBio* 2024;15:e0145223.

34. Khatchikian AD, Chahal BS, Kielar A. Mosaic mentoring: Finding the right mentor for the issue at hand. *Abdom Radiol (NY)* 2021;46:5480-4.

35. Eller LS, Lev EL, Feurer A. Key components of an effective mentoring relationship: A qualitative study. *Nurse Educ Today* 2014;34:815-20.

36. Cioffi SP, Benuzzi L, Herbolzheimer M, Marrano E, Bellio G, Kluijfhout WP, et al. Identifying and addressing mentorship gaps in European trauma and emergency surgical training. Results from the Young European Society of Trauma and Emergency Surgery (yESTES) mentorship survey. *Eur J Trauma Emerg Surg* 2024;50:2539-49.

37. Lysfjord EM, Skarstein S. Empowering leadership: A journey of growth and insight through a mentoring program for nurses in leadership positions. *J Healthc Leadersh* 2024;16:443-54.

38. Stephens EH, Dearani JA. On becoming a master surgeon: Role models, mentorship, coaching, and apprenticeship. *Ann Thorac Surg* 2021;111:1746-53.

39. Nearing KA, Nuechterlein BM, Tan S, Zerzan JT, Libby AM, Austin GL. Training mentor-mentee pairs to build a robust culture for mentorship and a pipeline of clinical and translational researchers: The colorado mentoring training program. *Acad Med* 2020;95:730-6.

40. Mubuke AG, Munabi IG, Mbalinda SN, Kateete D, Opoka RB, Chalo RN, et al. Development of a feedback framework within a mentorship alliance using activity theory. *Afr J Health Prof Educ* 2021;13:252-8.

41. Merga MK, Mason S. Mentor and peer support for early career researchers sharing research with academia and beyond. *Heliyon* 2021;7:e06172.

42. Bekhuis T. Mentors and tormentors on the road to informatics. *J Med Libr Assoc* 2014;102:67-8.

43. Sarabipour S, Hainer SJ, Arslan FN, De Winde CM, Furlong E, Bielczyk N. Building and sustaining mentor interactions as a mentee. *FEBS J* 2022;289:1374-84.

44. Zerzan JT, Hess R, Schur E, Phillips RS, Rigotti N. Making the most of mentors: A guide for mentees. *Acad Med* 2009;84:140-4.

45. Nassour I, Balentine C, Boland GM, Chu D, Habermann E, Holscher C. Successful mentor-mentee relationship. *J Surg Res* 2020;247:332-4.

46. Arora S. Mentorship in orthopaedic surgery. *J Clin Orthop Trauma* 2013;4:155-6.

47. Alidina S, Sydlowski MM, Ahearn O, Andualet BG, Barash D, Bari S, et al. Implementing surgical mentorship in a resource-constrained context: A mixed methods assessment of the experiences of mentees, mentors, and leaders, and lessons learned. *BMC Med Educ* 2022;22:653.

48. Sarabipour S, Hainer SJ, Arslan FN, De Winde CM, Furlong E, Bielczyk N, et al. Building and sustaining mentor interactions as a mentee. *FEBS J* 2022;289:1374-84.

49. Sood N, Hoque F, Slonim AD. Mentorship for non-academic, mid-career hospitalist physicians: The journey taken less often. *J Gen Intern Med* 2025;40:682-6.

50. Ssemata AS, Gladding S, John CC, Kiguli S. Developing mentorship in a resource-limited context: A qualitative research study of the experiences and perceptions of the makerere



university student and faculty mentorship programme. *BMC Med Educ* 2017;17:123.

51. Haft SL, Chen T, Leblanc C, Tencza F, Hoeft F. Impact of mentoring on socio-emotional and mental health outcomes of youth with learning disabilities and attention-deficit hyperactivity disorder. *Child Adolesc Ment Health* 2019;24:318-28.

52. Enson J, Malik-Tabassum K, Faria A, Faria G, Gill K, Rogers B. The impact of mentoring in trauma and orthopaedic training: A systematic review. *Ann R Coll Surg Engl* 2022;104:400-8.

53. Venktaramana V, Ong YT, Yeo JW, Pisupati A, Krishna LK. Understanding mentoring relationships between mentees, peer and senior mentors. *BMC Med Educ* 2023;23:76.

54. Gandhi M, Raj T, Fernandez R, Rispel L, Nxumalo N, Lescano AG, et al. Mentoring the mentors: Implementation and evaluation of four fogarty-sponsored mentoring training workshops in low-and middle-income countries. *Am J Trop Med Hyg* 2019;100 1 Suppl:20-8.

55. Mau M, Chun MB. Mentoring as a means to achieving workforce diversification in orthopaedic surgery. *Hawaii J Health Soc Welf* 2023;82:50-2.

56. Granruth CB, Esantsi ME, Sommi CP, Stamm MA, Mulcahey MK. Mentoring on orthopedic surgery clinical rotations: A survey of mentor effectiveness on student mentees compared to an unmentored control group. *J Surg Educ* 2023;80:697-705.

57. Pérez-Perdomo A, Zabalegui A. Teaching strategies for developing clinical reasoning skills in nursing students: A systematic review of randomised controlled trials. *Healthcare (Basel)* 2023;12:90.

58. Vieira A, Cabri MM, Spijkers S, Vieira AC, Maas M. Mentoring in radiology: An asset worth exploring! *Eur J Radiol* 2022;155:110133.

59. Mikkonen K, Tomietto M, Tuomikoski AM, Kaučič BM, Riklikienė O, Vizcaya-Moreno F, et al. Mentors' competence in mentoring nursing students in clinical practice: Detecting profiles to enhance mentoring practices. *Nurs Open* 2022;9:593-603.

60. Gemmete JJ. Learning from medical errors. *CVIR Endovasc* 2024;7:8.

61. Seery C, Andres A, Moore-Cherry N, Sara O'Sullivan S. Students as partners in peer mentoring: Expectations, experiences and emotions. *Innov High Educ* 2021;46:663-81.

62. Liang J, Kempenaar A, Sequeira N, Becker L. Development of a formalized, multifaceted mentorship program in physical medicine and rehabilitation residency education. *Am J Phys*

Med Rehabil 2022;101:e22-4.

63. Araújo TC, Avram GM, Scarlat MM, Khanduja V. Exploring the role of mentorship in training orthopaedic surgeons. *Int Orthop* 2025;49:1-4.

64. Quan T, Gu A, Agarwal AR, Bernstein SA, Malyavko A, Levine WN, et al. The Impact of a virtual orthopaedic surgery symposium on medical students: Increasing awareness and knowledge of the field. *JBJS Open Access* 2022;7:e22.00077.

65. Ahmed T, Johnson J, Latif Z, Kennedy N, Javier D, Stinson K, et al. MyNRMN: A national mentoring and networking platform to enhance connectivity and diversity in the biomedical sciences. *FASEB Bioadv* 2021;3:497-509.

66. Jan S, Mahboob U. Online mentoring: Challenges and strategies. *Pak J Med Sci* 2022;38:2272-7.

67. Minta KJ, Sescu D, Da Luz D, Kaliaperumal C, GloMNMS Study Group Collaborators. Global mentorship in neurosurgery for medical students study (the GloMNMS study): A multinational multi-institutional cross-sectional audit. *BMJ Open* 2023;13:e071696.

68. Marshall AG, Vue Z, Palavicino-Maggio CB, Neikirk K, Beasley HK, Garza-Lopez E, et al. The role of mentoring in promoting diversity equity and inclusion in STEM education and research. *Pathog Dis* 2022;80:ftac019.

69. Murali S, Harris AB, Snow M, LaPorte D, Aiyer A. The mentee perspective: Evaluating mentorship of medical students in the field of orthopaedic surgery. *J Am Acad Orthop Surg Glob Res Rev* 2023;7:e22.00267.

70. Wu J, Olagunju AT. Mentorship in medical education: Reflections on the importance of both unofficial and official mentorship programs. *BMC Med Educ* 2024;24:1233.

71. Chen A, Harnett J, Kothari P, Ernst M. A review of mentorship in urology: Are We satisfied? *Curr Urol Rep* 2022;23:383-92.

72. Sheri K, Too JY, Chuah SE, Toh YP, Mason S, Radha Krishna LK. A scoping review of mentor training programs in medicine between 1990 and 2017. *Med Educ Online* 2019;24:1555435.

73. Lescano AG, Cohen CR, Raj T, Rispel L, Garcia PJ, Zunt JR, et al. Strengthening mentoring in low- and middle-income countries to advance global health research: An overview. *Am J Trop Med Hyg* 2019;100 1 Suppl:3-8.

74. Latkin CA, Edwards C, Davey-Rothwell MA, Tobin KE. The relationship between social desirability bias and self-reports of health, substance use, and social network factors among urban substance users in Baltimore, Maryland. *Addict Behav* 2017;73:133-6.

75. Scandiffio J, Zhang M, Karsan I, Charow R, Anderson M,



Salhia M, et al. The role of mentoring and coaching of healthcare professionals for digital technology adoption and implementation: A scoping review. *Digit Health* 2024;10: 1–13

76. Levy BJ, Joseph S, Coyner KJ. Fostering mentorship. *Clin Sports Med* 2025;44:97-111.

77. Bhatia K, Takayesu JK, Nadel ES. A novel mentorship programme for residents integrating academic development, clinical teaching and graduate medical education assessment. *Perspect Med Educ* 2016;5:56-9.

78. Eby LT, Allen TD, Evans SC, Ng T, Dubois D. Does mentoring matter? A multidisciplinary meta-analysis comparing mentored and non-mentored individuals. *J Vocat Behav* 2008;72:254-67.

79. Piana LE, Burstein E, Criddle S, He E, Katarincic JA, Owens BD, et al. Diversity, equity, and inclusion in orthopaedic surgery: Local and national efforts. *R I Med J* (2013)

2024;107:22-5.

80. Lall SA, Chen LW, Mason DP. Digital platforms and entrepreneurial support: A field experiment in online mentoring. *Small Bus Econ (Dordr)* 2022;61:631-54.

81. Mancuso CA, Berman JR, Robbins L, Paget SA. Caution before embracing team mentoring in academic medical research training: Recommendations from a qualitative study. *HSSJ* 2021;17:158-64.

82. Gandhi M, Johnson M. Creating more effective mentors: Mentoring the mentor. *AIDS Behav* 2016;20 Suppl 2:294-303.

83. Nair V, Todkar A, Kumar H. The future of orthopaedic education and training: Embracing innovation for a changing landscape. *Cureus* 2024;16:e67146.

84. Aneja K, Machaiah PK, Shyam A. Training of a joint replacement surgeon in India: Past, present, and future perspectives. *J Orthop Case Rep* 2025;15:4-7.

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