

Interstitial Skills: Preparing Trainees for All Aspects of Clinical Practice

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During an annual senior resident retreat, a training program's program director and chief residents explore which anticipated practice skills cause the most anxiety in the soon-to-graduate residents. Some residents mention upcoming moves to new cities; others anticipate stress around not having an attending to "co-sign" plans. Several residents worry that there is more about practicing medicine that they will have to learn on the job, such as billing/coding, understanding relative value units (RVUs), appealing insurance coverage denials, tactfully navigating microaggressions in the workplace, and optimizing electronic note templates.

In a June 2022 *Journal of Graduate Medicine* (JGME) editorial, Carek and Mainous called for greater attention to whether existing training models sufficiently prepared residents and fellows for their *actual* future clinical practice.¹ This is a fundamental graduate medical education (GME) question and is emphasized in the Accreditation Council for Graduate Medical Education (ACGME) Common Program Requirements.^{2,3} These requirements state that "graduate medical education occurs in clinical settings that establish the foundation for practice-based and lifelong learning."³ Training programs generally endeavor to accomplish these goals by setting expectations around specialty-relevant curricula, scope of trainee activities (eg, care encounters, procedures, or operative cases germane to the field), and supervised workplace experiences. At the same time, many specialties have training requirements that do not align with actual clinical practice. For example, pulmonary and critical care medicine fellows must gain competence in right heart catheterization, though only a fraction of graduating fellows actually perform this procedure.⁴ A similar disconnect exists for many pediatric procedures.⁵

Likewise, while supervised workplace experiences give residents and fellows an authentic sense of the knowledge, skills, and behaviors necessary for

professional practice, many of the skills inherent to daily physician work remain underexplored or underemphasized in GME training. We call these *interstitial skills*, as they often fall in between the core skills emphasized and assessed in training programs. That these interstitial skills receive less formal recognition and assessment during training may reflect, in part, a top-down vs bottom-up approach to determining residency program content. Yet these less-explored skills in communication, documentation, and system navigation vitally impact physicians' workplace effectiveness, efficiency, and relationships. Unfortunately, there may be an implicit assumption that trainees will "figure out" these skills through workplace experiences, such as working alongside senior residents, fellows, faculty, and other health professionals. We worry that this status quo is out of alignment with the overarching purpose of GME—to prepare physicians for competence and success in all aspects of their future careers—and that more deliberate attention to defining and teaching these interstitial skills may better prepare trainees for future practice.

To highlight some of these interstitial skills for readers, we queried the JGME Editorial Board, a group that spans a broad range of educational niches, medical specialties, and clinical practice environments. We asked JGME editors to highlight the skills they used on a regular basis in the workplace, that were learned without formal training or instruction. Their responses reflect a broad range of skills identified as currently underrepresented in most training programs. We have divided these interstitial skills into 2 groupings: *workplace operations* and *workplace communication*. These categories are deliberately broad to encompass the work and associated expertise required to function effectively as a clinician in complex health care environments.

Some clinical and administrative domains lie just beyond the typical vantage points of trainees yet have profound impact on practicing physicians' work experiences. We have termed these skills "workplace operations," to reflect the many tasks done by practicing physicians as members of complex health care

TABLE 1
Workplace Operations

Themes	Skills
Administrative systems	▪ Billing and coding ▪ Prior authorizations ▪ Managing electronic health record (EHR) inbox
Clinical documentation	▪ Context-specific documentation ○ Procedures ○ Death notes ▪ Efficiently optimizing templates and dictation ▪ Handwriting prescriptions/orders during EHR downtime
Clinical financial literacy	▪ Understanding relative value units ▪ Common reimbursement models

systems (TABLE 1). These include understanding the fundamentals of clinical reimbursement, such as RVUs—a central way in which practicing physicians' productivity is captured, yet largely invisible to trainees. Workplace operations also include clinicians' experiences navigating the larger health care infrastructure, such as the challenges of insurance approvals or practice management. Within training programs, these roles are typically delegated to attending physicians, which limits opportunities for trainees to learn vital lessons about how to approach these complicated

situations. The editors also identified tools relevant for academic work, such as how to use dictation software or reference managers, manage ballooning email inboxes, and deploy other tools regularly used for collaborative work. Lacking these workplace operations skills, newly graduated physicians face steep learning curves in new jobs. This contributes to what is already a high-stress, high-stakes transition, with a high potential for burnout.

Our editors also highlighted skills pertaining to the ways in which they interact with and explain their thinking to others in daily work. We have termed these “workplace communication skills” (TABLE 2). These skills are the central means by which physicians interface with colleagues, other health professionals, and patients. These skills include sending pages, instant electronic messages, electronic clinical documentation, and virtual communications with patients. Other skills pertain to more high-stakes communication, such as documenting or disclosing medical errors to patients, peers, and supervisors. These high-stakes forms of communication and documentation are often left to individuals to learn through observation, trial and error, or personal experience rather than formal instruction. Other skills reflect some of the realities of medical practice, such as managing micro- and macroaggressions, recognizing when one needs help for fatigue, impairment, or stress, and building the necessary skills to manage conflicts in the workplace. ACGME

TABLE 2
Workplace Communication

Themes	Skills
Clinical communication and negotiation	▪ Sending/answering pages ▪ Communication with patients ○ Electronic health record, phone, email ○ Accounting for low health literacy ▪ Formulating consult questions and consult recommendations ▪ Communication with allied health professionals (nurses, respiratory therapists, physical therapists, pharmacists) ▪ Filing patient safety reports ▪ Conflict resolution ▪ Emotional intelligence for communicating
Upstander training	▪ Advocating for patients ▪ Advocating for learners and colleagues ▪ Responding to micro- or macroaggressions
Clinical collaboration	▪ Cross coverage ▪ Transferring care ▪ Inter-visit or post-discharge care
Resilience at work	▪ Managing and communicating fatigue ▪ Stress reduction/mindfulness training
Risk management	▪ What, how, and where to document ▪ How to disclose medical errors to peers, supervisors, or patients ▪ Role of risk management

TABLE 3

Examples of Curriculum for Developing Physician Interstitial Skills

Interstitial Skill	Intervention	Population
Billing, coding, and supportive documentation ⁶	Interactive multimodal curriculum with lectures on billing, coding, and documentation best practices, and feedback on simulated assessments and plans composed by participants	Internal medicine residents
Clinical documentation efficiency ⁷	Orientation day documentation curriculum training participants to proficiently document an emergency department patient encounter	Medical students on an emergency medicine clerkship
Death certification training ⁸	Virtual workshop teaching how to correctly complete death certificates	Internal medicine residents
Efficiency in communication via the electronic health record ⁹	Four-part workshop curriculum focusing on communication strategies for preclinical preparation, rapport building, encounter initiation, agenda setting, and visit closure	Family medicine residents and faculty
Leadership within health care systems ¹⁰	Physicians, medical educators, and industrial and operational engineering professionals delivered a longitudinal curriculum	Radiology residents
Teamwork in high-stakes clinical environments ¹¹	"Pit crew" resuscitation model for advanced cardiac life support was introduced through computer-based modules and lectures, and emphasized at institution-based code blue training events	Physicians and non-physicians who participate in "code blue" response teams
Communication between referring physicians and consultants ¹²	Review of 3 referral-consultation communication frameworks: • 5C: Contact, communicate, core question, collaborate, close loop • PIQUED: Prepare, identify, question, urgency, educational modifications, debrief • CONSULT: Contact courteously, orient, narrow question, story, urgency, later, thank you	Application to emergency medicine residents
Emotional intelligence ¹³	Individual emotional intelligence coaching over a 10-month period	Family medicine residents
Responding to microaggressions ¹⁴	Workshop training to recognize and respond to microaggressions in the clinical environment, using the VITALS framework	Medical students and pediatrics residents

requirements already mandate that programs prepare their trainees for competence in many of these workplace communication skills, but the default instructional method tends toward passive observation and mimesis. It is also worth noting that the status quo brings risk, with trainees observing and mimicking supervisors who may or may not employ best practices.

In TABLE 3, we provide examples of interventions and curricula developed to teach these interstitial skills to trainees. Prior systematic reviews have highlighted the paucity of robust curricula for such

skills.¹⁵⁻¹⁷ Given the high-stakes nature of many of these operational and communication skills, we encourage program directors and program director organizations to take a lead in designing educational interventions and tools for effectively navigating everyday clinical practice work.¹⁸ Although GME trainee interstitial skills development may occur through lectures, conferences, or simulation, they must be practiced and assessed in workplace settings. Therefore, we recommend educators embrace the guiding frameworks of workplace learning and

learning via participation, so that learners gain adaptive expertise—the ability to handle new situations not previously encountered.¹⁹ With overfull residency curricula, it is likely that innovative educational interventions will need to consider integrating content with existing experiences as well as longitudinal methods for sustained learning.

Finally, emergent technologies and system innovations will undoubtedly continue to shape the ways that physicians work, as evidenced by advances in electronic medical record platforms, new technologies such as artificial intelligence, or novel patient care tools. This churn requires program leaders to continually re-evaluate emerging knowledge or skills that may have fallen into the interstitium and solicit feedback from trainees and graduates around skills requiring deliberate program support.

Competency-based medical education has helped GME hone the process of training clinically competent, independent physicians. As medical educators, we owe it to our learners, patients, and health care systems to look beyond traditional clinical skills when reviewing and updating curricula. We posit that the concept of interstitial skills—encompassing skills that reflect workplace operations and communications—represents a useful lens for educators to use when examining whether their curricula continues to prepare graduates for real-world practice. Interstitial skills undergird the practice of modern medicine in ways too often ignored in current medical training.

References

- Carek PJ, Mainous AG. Are we preparing residents for their actual practices? *J Grad Med Educ*. 2022;14(3):251-253. doi:10.4300/JGME-D-22-00310.1
- Accreditation Council for Graduate Medical Education. ACGME Common Program Requirements (Fellowship). Accessed May 9, 2023. https://www.acgme.org/globalassets/pfassets/programrequirements/cprfellowship_2022v3.pdf
- Accreditation Council for Graduate Medical Education. ACGME Common Program Requirements (Residency). Accessed May 9, 2023. https://www.acgme.org/globalassets/pfassets/programrequirements/cprresidency_2023v3.pdf
- American Board of Internal Medicine. Pulmonary disease policies. Accessed May 20, 2023. <https://www.abim.org/certification/policies/internal-medicine-subspecialty-policies/pulmonary-disease/>
- Iyer MS, Way DP, Kline J, Wallihan R, Stanley RM. A comparison of national pediatric procedures training guidelines with actual clinical practice in Ohio. *J Grad Med Educ*. 2019;11(2):159-167. doi:10.4300/JGME-D-18-00746.1
- Patel A, Ali A, Lutfi F, Nwosu-Lheme A, Markham MJ. An interactive multimodality curriculum teaching medicine residents about oncologic documentation and billing. *MedEdPORTAL*. 2018;14:10746. doi:10.15766/MEP_2374-8265.10746
- Lai J, Tillman D. Curriculum to develop documentation proficiency among medical students in an emergency medicine clerkship. *MedEdPORTAL*. 2021;17:11194. doi:10.15766/MEP_2374-8265.11194
- Wykowski JH, Luks AM, Berger G, Marshall DA. Death certification: an interactive teaching session. *MedEdPORTAL*. 2023;19:11296. doi:10.15766/MEP_2374-8265.11296
- Skelly K, Shen W, Wilbur J, et al. A curriculum for teaching clinical efficiency focusing on specific communication skills while maximizing the electronic health record. *MedEdPORTAL*. 2020;16:10989. doi:10.15766/MEP_2374-8265.10989
- Brandon CJ, Mullan PB. Teaching medical management and operations engineering for systems-based practice to radiology residents. *Acad Radiol*. 2013;20(3):345-350. doi:10.1016/j.ACRA.2012.09.025
- Spitzer CR, Evans K, Buehler J, Ali NA, Besecker BY. Code blue pit crew model: a novel approach to in-hospital cardiac arrest resuscitation. *Resuscitation*. 2019;143:158-164. doi:10.1016/j.resuscitation.2019.06.290
- Baylis J, Miloslavsky EM, Woods R, Chan TM. Conquering consultations: a guide to advances in the science of referral-consultation interactions for residency education. *Ann Emerg Med*. 2019;74(1):119-125. doi:10.1016/j.ANNEMERGEMED.2018.12.004
- Webb AR, Young RA, Baumer JG. Emotional intelligence and the ACGME competencies. *J Grad Med Educ*. 2010;2(4):508-512. doi:10.4300/JGME-D-10-00080.1
- Walker VP, Hodges L, Perkins M, Sim M, Harris C. Taking the VITALS to interrupt microaggressions. *MedEdPORTAL*. 2022;18:11202. doi:10.15766/MEP_2374-8265.11202
- Sadowski B, Cantrell S, Barelski A, O'Malley PG, Hartzell JD. Leadership training in graduate medical education: a systematic review. *J Grad Med Educ*. 2018;10(2):134-148. doi:10.4300/JGME-D-17-00194.1
- McCulloch P, Rathbone J, Catchpole K. Interventions to improve teamwork and communications among healthcare staff. *Br J Surg*. 2011;98(4):469-479. doi:10.1002/BJS.7434
- Chan T, Bakewell F, Orlich D, Sherbino J. Conflict prevention, conflict mitigation, and manifestations of conflict during emergency department consultations. *Acad Emerg Med*. 2014;21(3):308-313. doi:10.1111/ACEM.12325
- Johnson GJ, Kilpatrick CC, Zaritsky E, et al. Training the next generation of obstetrics and gynecology leaders, a multi-institutional needs assessment.

J Surg Educ. 2021;78(6):1965-1972. doi:10.1016/J.JSURG.2021.06.010

19. Billett S. Learning through work: workplace affordances and individual engagement. *J Workplace Learn.* 2001;13(5):209-214. doi:10.1108/EUM0000000005548



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