

Tracks and Pathways in Graduate Medical Education: Toward a Shared Mental Model

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Introduction

Over the past 25 years, tracks and pathways have expanded among residency programs in response to the growing interest for specialized training in graduate medical education (GME).¹⁻⁴ Factors leading to more tracks and pathways include the increasing complexity of medicine,¹ need for career-oriented training and structured professional development,²⁻⁴ and recognition of physicians as change agents for health care systems.⁵ Expertise in fields such as primary care, rural surgery, hospital medicine, and global health are needed to serve diverse patient populations, improve health care quality, and develop physician leaders.^{1,6-8} Simultaneously, residents increasingly seek opportunities to align training with their individual goals through personalized rotations, curricula, research, and mentorship.⁹ For internal medicine, in 2021 the Accreditation Council for Graduate Medical Education requirements mandated “at least 6 months of individualized educational experiences ... relevant to [a resident’s] future practice.”¹⁰

Specific guidance for *how* residency programs can structure curricula to optimize individualized educational experiences is less clear. An informal review of GME program websites suggests that tracks and pathways are often used interchangeably, with no clear criteria to distinguish one from the other. Standardized definitions for tracks and pathways, and associations with appropriate conceptual frameworks could establish a shared mental model between residents and residency programs. A mental model could help trainees select curricula to suit their clinical and professional goals, and help residency leaders allocate necessary resources and personnel. We propose an organizing framework to differentiate tracks from pathways, which is grounded in the communities of practice and self-determination theory models, respectively (TABLE).

Tracks Build Communities of Practice

We define tracks as longitudinal, structured curricula that integrate residents into a professional community through mentorship and *shared* educational experiences. With roots in Lave and Wenger’s work, communities of practice (CoPs) are groups of individuals with shared work interests who improve their practices through regular collaboration.^{11,12} Using the CoP model, tracks can offer residents with similar interests opportunities to build skills and expertise through structured, collaborative learning. The 3 underlying elements of CoPs are domain, community, and practice.¹³ The *domain* of a track underscores the collective understanding of and commitment to a shared interest and creates clear boundaries surrounding this focus, which provides a sense of identity and purpose within a specialty. The presence of a *community*, created by a track, potentially fosters a safe learning environment to guide trainees from peripheral participation to active membership. This enables joint activities with collective learning, which allows the community to flourish. The *practice* of the track promotes shared knowledge and skill development, which contributes to the community’s collective expertise.

Tracks should deliberately select training components that emphasize communal, longitudinal learning and bring residents together at regular intervals. For instance, the Internal Medicine Clinician-Educator Track at Beth Israel Deaconess Medical Center is designed for residents interested in medical education leadership. The track comprises 2.5 years focusing on clinical teaching, curriculum design, and educational research within a CoP.¹⁴ The Hospitalist Training Program at the University of Colorado offers a 3-year track that focuses on clinical skills for hospitalist practice, mentorship, and system improvement and cultivates a community for hospital medicine.¹⁵ The Rural General Surgery Residency Track at the University of Wisconsin-Madison is a 5-year track that provides residents with rural general and subspecialty surgical training, mentorship to identify community practice goals, and networking opportunities with community surgeons.¹⁶

TABLE

Creating a Shared Mental Model for Tracks and Pathways in Graduate Medical Education

Feature	Tracks	Pathways
Definition	Longitudinal, <i>structured</i> curricula that integrate residents into a professional community through mentorship and <i>shared</i> educational experiences	Longitudinal, often <i>flexible</i> , curricula that facilitate resident autonomy and emphasize <i>individualized</i> education and professional development
Conceptual framework	Communities of practice ¹¹⁻¹³	Self-determination theory ¹⁷⁻²⁰
Educational model	Residents progress from peripheral participation to full engagement in a professional field through collective learning that builds community expertise	Residents develop autonomy, competence, and relatedness through self-directed learning and tailored career mentorship
Examples from US residency programs	1. The Clinician-Educator Track (Beth Israel Deaconess Medical Center)¹⁴ 2. The Hospitalist Training Program (University of Colorado)¹⁵ 3. The Rural General Surgery Residency Track (University of Wisconsin-Madison)¹⁶	1. The Global Health Pathway (Columbia University)²² 2. The Health Equity Across Populations Pathway (Boston University Medical Campus)²³

Pathways Promote Self-Determination Theory

In contrast, we define pathways as longitudinal, often flexible, curricula that facilitate resident autonomy and emphasize *individualized* education and professional development. Deci and Ryan's self-determination theory (SDT) contends that intrinsic motivation—engagement in an activity out of genuine interest—is the most powerful type of motivation as it optimizes deeper learning and well-being.¹⁷ SDT proposes 3 innate psychological needs as the basis for intrinsic motivation: autonomy, competence, and relatedness.¹⁸ Pathways are often modular, allowing residents to select from electives and rotations that align with their individualized educational needs and career interests; this process bolsters *autonomy*.¹⁹ Pathway leaders also cultivate autonomy through autonomy-supportive behaviors such as facilitating individual goal setting, promoting self-directed learning, and asking residents what they hope to achieve.²⁰ Pathway participation provides residents with structured feedback, graduated responsibility, and desirable difficulty, which build *competence*.¹⁹ Pathway leaders nurture resident *relatedness* by providing them with dedicated mentorship and engagement in scholarly projects that will add value to the field.²¹ Clinical experiences, in which residents work alongside faculty as active participants, and consistent emotional support from these preceptors further bolster relatedness in pathways.²⁰

Pathways offer focused training and mentorship tailored to an individual's aspirations but may not necessarily emphasize the development of a community. For example, the Global Health Pathway at Columbia University allows residents the flexibility

to choose electives and rotations relevant to global health while they also receive mentorship, focused on individual interests, from pathway directors.²² Similarly, the Health Equity Across Populations Pathway at Boston University Medical Campus encourages residents to “craft their own learning goals” and provides opportunities for them to “explore the range of what a career in health equity can look like and find potential mentors.”²³

Integrating and Optimizing Tracks and Pathways

To effectively integrate tracks and pathways, each should provide distinct yet complementary opportunities for individualized educational experiences in GME. Tracks can afford residents structured professional identity development and experiential learning activities that help them move from peripheral participation to the center of the community, while pathways facilitate self-directed exploration within a field and offer residents the flexibility to choose experiences and goals that suit their career needs.

The curricula for both tracks and pathways should provide dedicated mentorship, though the purpose and scope may differ. Tracks may emphasize longitudinal group mentorship, aimed at development of shared knowledge and skills, and collaboration on scholarly projects. In contrast, pathways may be suitable for a combination of coaching and mentorship—coaching to ensure progress and provide feedback on self-directed goals, and focused mentorship for scholarly projects. Additionally, tracks and pathways overlap in that they both require meaningful interactions with faculty preceptors, an emphasis on active learning techniques, cultivation of a safe learning environment, and regular

reflection on curricular experiences to ensure that residents flourish.^{13,20} Residency programs can optimize tracks and pathways to balance structure and flexibility, to ensure community-based and individualized training opportunities.

Specialty-specific factors, program size and composition, and available resources will influence the decision to implement a residency track or pathway. Tracks require regular, communal learning; thus, procedural specialties such as general surgery and anesthesia, with potentially unpredictable operating times, may struggle with developing tracks. Also, GME programs with multiple clinical sites and resident schedules may face implementation barriers. Pathways, with their increased flexibility, may provide a better option for these scenarios. Both pathways and tracks require dedicated administrative support. Residency programs with limited funding could seek to modify these models by selecting components that can be integrated into existing curricula such as electives, rotations, and research time.

Implications for Residents and Residency Program Leadership

We recommend a 3-step approach for residency programs to implement or optimize a track or pathway: (1) perform an initial assessment of program needs through surveys and focus groups of residents, faculty, and program leaders; (2) synthesize these results with the existing residency curriculum map to identify opportunities for new pathways or tracks, or to revise existing curricula; and (3) assemble a task force to apply this framework, develop a specific track/pathway implementation plan, and obtain Program Evaluation Committee review and feedback.

Note that we do not advocate for mass changes for existing tracks and pathways. Rather, the proposed definitions and associated conceptual frameworks for tracks and pathways can be applied as an organizing framework to reevaluate existing curricula or plan for new curricula designed for individualized GME.

Equally important, our approach creates a shared mental model for tracks and pathways between residency program leaders and residents. For residency program leaders, our model may inform improvements to curriculum design, namely, refining program objectives, selecting suitable educational strategies, and soliciting feedback from key stakeholders. For residents, the model should help in selecting a suitable track and/or pathway for their unique future practice goals, whether clinical expertise, research, education, global health, etc. For program leaders and residents, a shared mental model may facilitate a more informed track and

pathway recruitment process by helping trainees to recognize (and faculty to explain) their similarities and differences.

Conclusion

Tracks can build communities of practice by providing a structured curriculum that progresses residents from peripheral participation to full engagement through collective learning. Pathways foster SDT by allowing residents to develop autonomy, competence, and relatedness through personalized goal setting and tailored career mentorship. Resident engagement and residency program investment in tracks and pathways can help to develop future leaders in areas such as primary care, underserved populations, global health, hospital medicine, and medical education.^{14,15,24} Our framework outlines *how* to elevate tracks and pathways to the mutual benefit of key stakeholders: residents and residency program leadership.

References

1. Charap MH, Levin RI, Pearlman RE, Blaser MJ. Internal medicine residency training in the 21st century: aligning requirements with professional needs. *Am J Med.* 2005;118(9):1042-1046. doi:10.1016/j.amjmed.2005.06.009
2. Jardine D, Correa R, Schultz H, et al. The need for a leadership curriculum for residents. *J Grad Med Educ.* 2015;7(2):307-309. doi:10.4300/JGME-07-02-31
3. Ogunyemi D, Solnik MJ, Alexander C, Fong A, Azziz R. Promoting residents' professional development and academic productivity using a structured faculty mentoring program. *Teach Learn Med.* 2010;22(2):93-96. doi:10.1080/10401331003656413
4. Frank JR, Snell L, ten Cate O, et al. Competency-based medical education: theory to practice. *Med Teach.* 2010;32(8):638-645. doi:10.3109/0142159X.2010.501190
5. Reinertsen JL. Physicians as leaders in the improvement of health care systems. *Ann Intern Med.* 1998;128(10):833-838. doi:10.7326/0003-4819-128-10-199805150-00007
6. Glasheen JJ, Siegal EM, Epstein K, Kutner J, Prochazka AV. Fulfilling the promise of hospital medicine: tailoring internal medicine training to address hospitalists' needs. *J Gen Intern Med.* 2008;23(7):1110-1115. doi:10.1007/s11606-008-0646-5
7. Williams TE Jr, Satiani B, Ellison EC. A comparison of future recruitment needs in urban and rural hospitals: the rural imperative. *Surgery.* 2011;150(4):617-625. doi:10.1016/j.surg.2011.07.047
8. Drain PK, Primack A, Hunt DD, Fawzi WW, Holmes KK, Gardner P. Global health in medical education:

- a call for more training and opportunities. *Acad Med.* 2007;82(3):226-230. doi:10.1097/ACM.0b013e3180305cf9
9. Neacy K, Stern SA, Kim HM, Dronen SC. Resident perception of academic skills training and impact on academic career choice. *Acad Emerg Med.* 2000;7(12):1408-1415. doi:10.1111/j.1553-2712.2000.tb00499.x
 10. Accreditation Council for Graduate Medical Education. ACGME Program Requirements for Graduate Medical Education in Internal Medicine. Updated July 1, 2022. Accessed February 6, 2025. https://www.acgme.org/globalassets/PFAssets/ProgramRequirements/140_InternalMedicine_2022.pdf?ver=2021-02-19-152614-193
 11. Lave J, Wenger E. *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press; 1991.
 12. Wenger E. Communities of practice and social learning systems: the career of a concept. In: Blackmore C, ed. *Social Learning Systems and Communities of Practice*. Springer; 2010:179-199.
 13. Creuss RL, Creuss SR, Steinert Y. Medicine as a community of practice: implications for medical education. *Acad Med.* 2018;93(12):185-191. doi:10.1097/ACM.0000000000001826
 14. Smith CC, McCormick I, Huang GC. The clinician–educator track: training internal medicine residents as clinician–educators. *Acad Med.* 2014;89(6):888-891. doi:10.1097/ACM.0000000000000242
 15. Limes J, Gottenborg E, Anstett T, Brandenburg S, Diaz MJ, Glasheen JJ. A novel hospital medicine training track for internal medicine residents. *J Grad Med Educ.* 2022;14(3):318-325. doi:10.4300/JGME-D-21-00730.1
 16. University of Wisconsin Department of Surgery. Rural General Surgery Residency Track. Accessed July 31, 2025. <https://www.surgery.wisc.edu/education-training/residencies/general-surgery-residency/rural-general-surgery-residency-track/>
 17. Deci EL, Ryan RM. The “what” and “why” of goal pursuits: human needs and the self-determination of behavior. *Psychol Inq.* 2000;11(4):227-268. doi:10.1207/S15327965PLI1104_01
 18. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol.* 2000;55(1):68-78. doi:10.1037//0003-066x.55.1.68
 19. Kusurkar RA, Croiset G, ten Cate TJ. Twelve tips to stimulate intrinsic motivation in students through autonomy-supportive classroom teaching derived from self-determination theory. *Med Teach.* 2011;33(12):978-982. doi:10.3109/0142159X.2011.599896
 20. ten Cate TJ, Kusurkar RA, Williams GC. How self-determination theory can assist our understanding of the teaching and learning processes in medical education: AMEE guide no. 59. *Med Teach.* 2011;33(12):961-973. doi:10.3109/0142159X.2011.595435
 21. Thammasitboon S, Darby JB, Hair AB, et al. A theory-informed, process-oriented resident scholarship program. *Med Educ Online.* 2016;21:31021. doi:10.3402/meo.v21.31021
 22. Columbia University Vagelos College of Physicians and Surgeons. Global Health Pathway. Accessed July 31, 2025. <https://www.vagelos.columbia.edu/education/residencies-fellowships-and-training/internal-medicine-residency-program/professional-pathways/global-health-pathway>
 23. Boston University Medical Center. Health Equity Across Populations Pathway. Accessed July 31, 2025. <https://www.bumc.bu.edu/im-residency/categorical-training-program/pathways/>
 24. Erayil SE, Lopez H, Shaughnessy M, et al. Global is local: does formal resident global health medical education improve clinical care in the United States? *Am J Trop Med Hyg.* 2021;105(6):1602-1607. doi:10.4269/ajtmh.21-0503



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