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1. **The Empirical Challenge of 21st-Century Medical Education**

   Authors: Wartman, Steven A. MD, PhD

   Abstract
   Medical education is at a crossroads. Facing challenges wrought by science and technology as well as societal change, the curriculum is increasingly out of synch with new needs in teaching content and medical practice. The path to significant curricular reform is difficult because of a variety of factors, including deeply entrenched values, the natural resistance to change, and the accreditation process. Indeed, even the very definition of what it means to be a professional is changing with profound implications for the future role of the physician and the sacrosanct doctor–patient relationship. In this Invited Commentary, the author enumerates challenges facing medical education in the current era. To address these challenges, the author recommends specific curricular emphases for 21st-century medical education: knowledge capture and curation, collaboration with and management of artificial intelligence applications, a deep understanding of probabilistic reasoning, and the cultivation of empathy and compassion in accordance with ethical standards. Given these needs, it is imperative that schools act today to undertake significant curricular reform and, in so doing, strive to make the hard changes necessary to produce optimal practitioners in a rapidly transforming 21st century. The author provides first steps an institution can take to begin to address these challenges.

2. **Building Provider–Caregiver Partnerships: Curricula for Medical Students and Residents**

   Authors: Blackie, Michael PhD; Baughman, Kristin R. PhD; Palmisano, Barbara MA; Sanders, Margaret MA, LSW; Sperling, David MD; Scott, Erin MD; Radwany, Steven MD; Drost, Jennifer DO, MPH; Thomas, Jon PhD

   Abstract
   Problem A disconnect exists between caregivers and health care providers, resulting in fragmented communication, which increases caregiver stress and compromises patient care. Although providers have a responsibility to recognize caregiver burden, they receive scant training on issues important

to caregivers. **Approach** From 2014 to 2017, as part of the Building Caregiver Partnerships Through Interprofessional Education project—a collaborative effort between Northeast Ohio Medical University and Summa Health—the authors developed curricula to foster effective partnerships between health care providers and caregivers by exposing medical students and residents to highly personal caregiving narratives. The curricula center on a short film featuring 4 families representing diverse caregiving experiences. The authors crafted several discussion guides, case-based learning exercises, structured clinical encounters, team-based simulations, and clinical cases as companion educational tools for the film. **Outcomes** Medical students reported the educational tools piloted to be valuable in broadening their understanding of caregivers' needs, while residents reported the educational tools piloted to also be valuable in improving their communication and building partnerships with caregivers. Undergraduate and graduate faculty reported finding the pilots valuable. **Next Steps** Future goals include conducting an outcome evaluation, based on ACGME milestones, to identify and examine clinical outcomes to determine whether communication increases and quality of care improves as a result of the project. The authors would also like to include caregivers in the evaluation. Finally, because caregiving is best addressed from a team approach, the authors plan to pilot the project at other health professions programs.

3. **Social Interactions of Clerks: The Role of Engagement, Imagination, and Alignment as Sources for Professional Identity Formation**

    Authors: Adema, Marieke MSc; Dolmans, Diana H.J.M. MSc, PhD; Raat, Janet (A.N.) PhD; Scheele, Fedde; Jaarsma, A. Debbie C. DVM, PhD; Helmich, Esther MD, PhD

    Abstract
    Purpose Participating in clinical practice shapes students' identities, but it is unclear how students build meaningful relationships while "dipping into" various social contexts. This study explored with whom students interacted, which social relationships they built, and how these relationships contributed to the formation of a professional identity. **Method** In this longitudinal study at University Medical Center Groningen, University of Groningen, the Netherlands, 9 undergraduate medical students recorded experiences of thinking about themselves as future professionals (September 2015 to March 2017). The authors conducted template analysis using both open coding and a priori themes derived from Wenger's modes of belonging to communities of practice: engagement, imagination, and alignment. **Results** The authors received 205 recorded experiences. While rotating, students used engagement, imagination, and alignment to give meaning to clinical workplace social interactions. Participants considered relationships with doctors, patients, and peers as preconditions for engaging in meaningful experiences. Although imagination and alignment were less represented, discussing imagination with peers and physicians stimulated a deeper understanding of what it means to become a physician. Explicitly being invited "to the table" and awareness of the benefits of being a clerk were instances of alignment that stimulated the development of identities as future doctors. **Conclusions** To understand the nature of professional identity formation, Wenger's modes of belonging must be considered. Where engagement is very prevalent, imagination and alignment are less spontaneously mentioned and therefore more difficult to foster. Looking for ways to support imagination and alignment is important for students' sensemaking process of becoming a doctor.

4. **Understanding Professional Identity Formation in Early Clerkship: A Novel Framework**

Authors: Jarvis-Selinger, Sandra PhD; MacNeil, Kimberley A. MA; Costello, Gregory R.L. MD, CCFP; Lee, Kenneth MD; Holmes, Cheryl L. MD, FRCPC, MHPE

Abstract
Purpose Medical educators should foster students' professional attitudes because individuals are more likely to act in accordance with medicine's professional values if these values have been internalized. Still, there is much to be learned about how students examine and negotiate their emerging identities. This study examined third-year medical students' experiences of professional identity formation (PIF) during clinical clerkship. **Method** The authors relied on an interpretivist perspective, informed by a grounded theory approach, to analyze data, which were collected from a pilot course designed to support medical students' efforts to "unhide" the hidden curriculum in relation to their development as medical students and emerging professionals. **Results** Twelve third-year medical students engaged in 10 collaborative discussions with 3 faculty members, a resident, and a fourth-year student (2015–2016). Discussions facilitated students' reflection on their professional journeys. Analysis of transcribed discussions resulted in a conceptual framework useful for exploring and understanding students' reflections on their PIF. Through analyzing students' experiences, the authors identified 4 components that constituted PIF stories: context, focus, catalyst, process. **Conclusions** The analysis resulted in the development of a conceptual framework and distinct identity formation themes. Discrete reflections focused on either students' current identity (being) or their sense of future self (becoming). The study identified catalysts that sparked participants' introspection about, or their processing of, identity. The moments that generate profound feelings of awareness in students are often moments that would not be recognizable (even post hoc) as remarkable by others.

5. **Which Student Characteristics Are Most Important in Determining Clinical Honors in Clerkships? A Teaching Ward Attending Perspective**

Authors: Herrera, Lauren Nicholas MD; Khodadadi, Ryan MD; Schmit, Erinn MD; Willig, James MD, MSPH; Hoellein, Andrew MD; Knudson, Christopher MD; Law, Karen MD; Mingioni, Nina MD; Walsh, Katherine MD; Estrada, Carlos MD, MS; Williams, Winter MD

Abstract
Purpose To explore faculty perspectives on which characteristics of high-performing clerkship students are most important when determining an honors or top grade designation for clinical performance. **Method** In 2016–2017, the authors surveyed faculty (teaching ward attendings) for internal medicine clerkships and 1 pediatrics clerkship in inpatient settings at 5 U.S. academic medical centers. Survey items were framed around competencies, 24 student characteristics, and attitudes toward evaluation. Factor analysis examined constructs defining high-performing students. **Results** Of 516 faculty invited, 319 (62%) responded. The top 5 characteristics as rated by respondents were taking ownership, clinical reasoning, curiosity, dependability, and high ethical

standards (in descending order). Twenty-one characteristics fit into 3 factors (Cronbach alpha, 0.81–0.87). Clinical reasoning did not fit into a factor. Factor 1 was the most important (mean rating, 8.7/10 [95% confidence interval (CI), 8.6–8.8]). It included professionalism components (ownership, curiosity, dependability, high ethical standards), presentation and interviewing skills, seeking feedback, and documentation. Factor 2 (mean, 7.9 [95% CI, 7.7–8.0]) included aspects of teamwork and communication, such as positive attitude and comments from others. Factor 3 (mean, 7.6 [95% CI, 7.4–7.7]) addressed systems-based thinking, including patient safety and care transitions. **Conclusions** Professionalism components, clinical reasoning, and curiosity were among the most important characteristics distinguishing high-performing clerkship students. These may represent behaviors that are highly valued, observable, and relevant to training stage. Improved definition of the characteristics associated with clinical honors would assist students, faculty, and residency program directors when interpreting clinical performance within core clerkships.

6. **Setting defensible standards in small cohort OSCEs: Understanding better when borderline regression can 'work'**

   Authors: Matt Homer, Richard Fuller, Jennifer Hallam & Godfrey Pell

   Medical Teacher. Published online: 26 Oct 2019 https://doi.org/10.1080/0142159X.2019.1681388

Abstract
Introduction: Borderline regression (BRM) is considered problematic in small cohort OSCEs (e.g. $n < 50$), with institutions often relying on item-centred standard setting approaches which can be resource intensive and lack defensibility in performance tests. **Methods:** Through an analysis of post-hoc station- and test-level metrics, we investigate the application of BRM in three different small-cohort OSCE contexts: the exam for international medical graduates wanting to practice in the UK, senior sequential undergraduate exams, and Physician associates exams in a large UK medical school. **Results:** We find that BRM provides robust metrics and concomitantly defensible cut scores in the majority of stations (percentage of problematic stations 5, 14, and 12%, respectively across our three contexts). Where problems occur, this is generally due to an insufficiently strong relationship between global grades and checklist scores to be confident in the standard set by BRM in these stations. **Conclusion:** This work challenges previous assumptions about the application of BRM in small test cohorts. Where there is sufficient spread of ability, BRM will generally provide defensible standards, assuming careful design of station-level scoring instruments. However, extant station cut-scores are preferred as a substitute where BRM standard setting problems do occur.

7. **Humans and machines: Moving towards a more symbiotic approach to learning clinical reasoning**

   Authors: Ralph Pinnock, Jenny McDonald, Darren Ritchie & Steven J. Durning

   Medical Teacher. Published online: 28 Oct 2019 https://doi.org/10.1080/0142159X.2019.1679361

Abstract
Artificial intelligence is a growing phenomenon that is driving major changes to how we deliver healthcare. One of its most significant and challenging contributions is likely to be in diagnosis. Artificial intelligence is challenging the physician's exclusive role in diagnosis and in some areas, its diagnostic accuracy exceeds that of humans. We argue that we urgently need to consider how we will incorporate AI into our teaching of clinical reasoning in the undergraduate curriculum; students

need to successfully navigate the benefits and potential issues of new and developing approaches to AI in clinical diagnosis. We offer a pedagogical framework for this challenging change to our curriculum.

8. **There is no shortcut to de-biasing biases**

Authors: Jerome I Rotgans, Henk G Schmidt

Medical Education. First published: 24 October 2019 https://doi.org/10.1111/medu.13958

Summary
Rotgans and Schmidt put forth an argument that knowledge gain is the only true antidote for problematic clinical biases. In doing so, they suggest that a case-based curriculum is possibly the best way to create bias-resistant heuristics.

9. **Reasonable adjustments for clinical examinations: process and solutions**

Authors: Rachel Williams, Rachel Demery, Richard Davies, John Harding

Medical Education First published: 24 October 2019 https://doi.org/10.1111/medu.13979

Excerpt
The *Equality Act 2010* of the United Kingdom requires universities to make 'reasonable adjustments' (RAs) for disabled students. If a university has a provision, criterion or practice which places a disabled student at a substantial disadvantage, the university must take reasonable steps to amend the provision, criterion or practice to remove that effect. This duty can apply to modes and methods of formal assessment.

10. **Patient perspective on the good doctor**

Authors: Izabel Cristina Rios

Medical Education First published: 24 October 2019 https://doi.org/10.1111/medu.13988

Excerpt
Patient-centred medicine includes the patient's perspective for improving confidence and effective communication in the doctor–patient relationship. It also allows shared decision making, security of the patient, best clinical outcomes and good patient experiences. Medical students must be trained in developing empathy and communication skills in order to practise patient-centred medicine. However, notwithstanding this, as medical training proceeds, the students' empathetic tendency tends to decrease. To foster empathy and to introduce patient-centred medicine in medical training, we developed an educational activity for first-year students during the welcome week at one medical school. The activity aims to create a symbolic moment in the student's life focused on what it is to be a good doctor from the patients' perspective.

11. **Training OSCE examiners: minimal effort with far-reaching results**

Authors: Katrin Schüttpelz-Brauns, Kathrin Nühse, Renate Strohmer, Jens J Kaden

Excerpt
In spite of a high degree of standardisation, examiner errors remain a common problem. Therefore, examiner training is crucial for objective structured clinical examination (OSCE) quality. Conventional training is time consuming and resource intensive for faculty members and examiners. Notably, examiners find it difficult to fit additional training sessions into their busy schedules.