NexBioHealth

Shaping Futures

November 2025 | ISSUE 5

AI in Medical Education: The Future of Learning

MEDICINE 2040

Students Envision Medicine 2040

Prevention First: Rebalancing a Century-Old Medical Curriculum

The Future Healthcare is in the Home

The Age of Prevention

CAREER DEVELOPMENT

Dr. Mun K. Hong's Reflection

Every Patient Tells a Story

STUDENT HUB

Dear Mentor

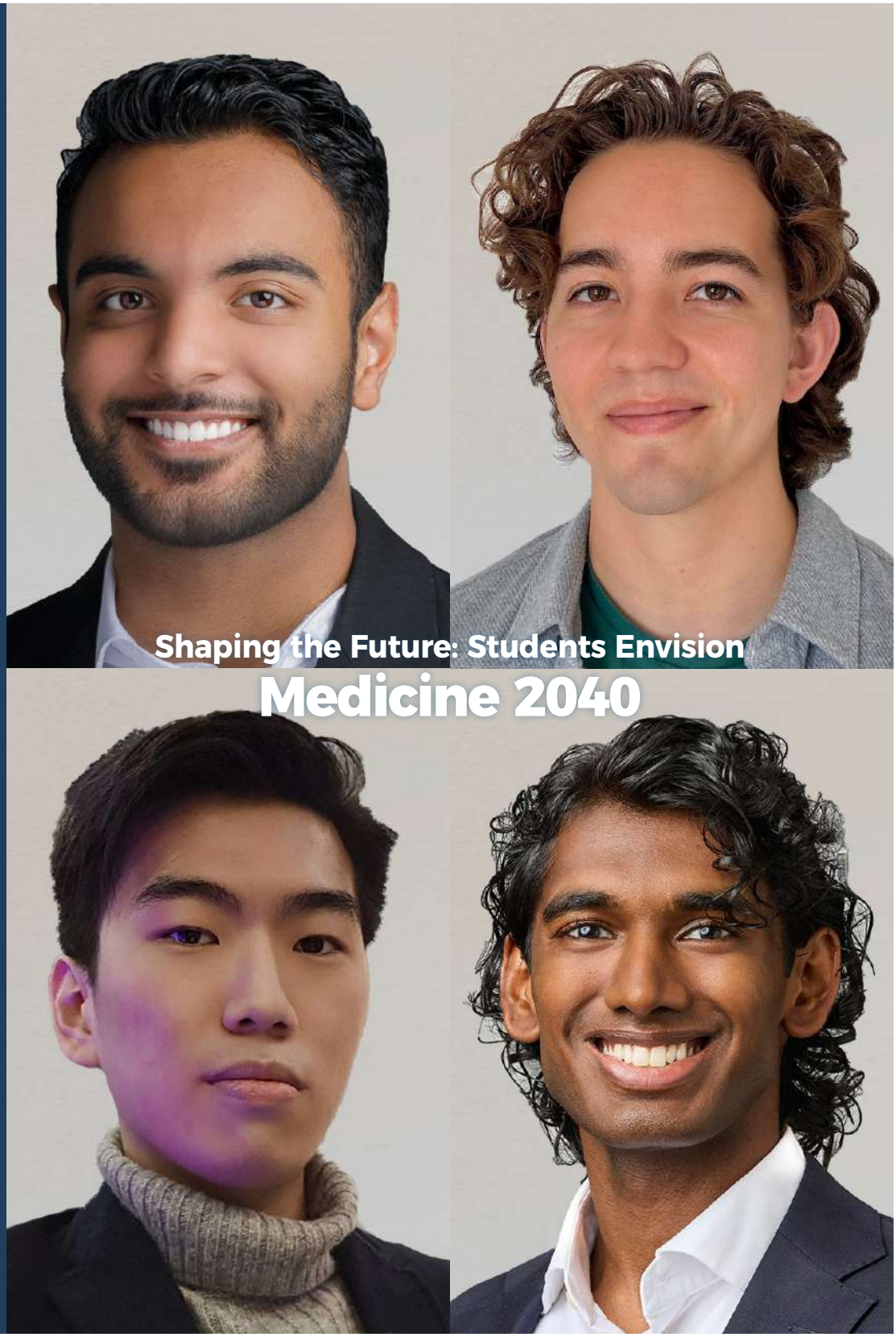
Utilizing AI for Medical Student Success

The Power of Story in Medicine

Sharma's Claims for Inclusive Comprehensive Sex Education Are Contestable

UPCOMMING ISSUE

Medical Education



Shaping the Future: Students Envision Medicine 2040

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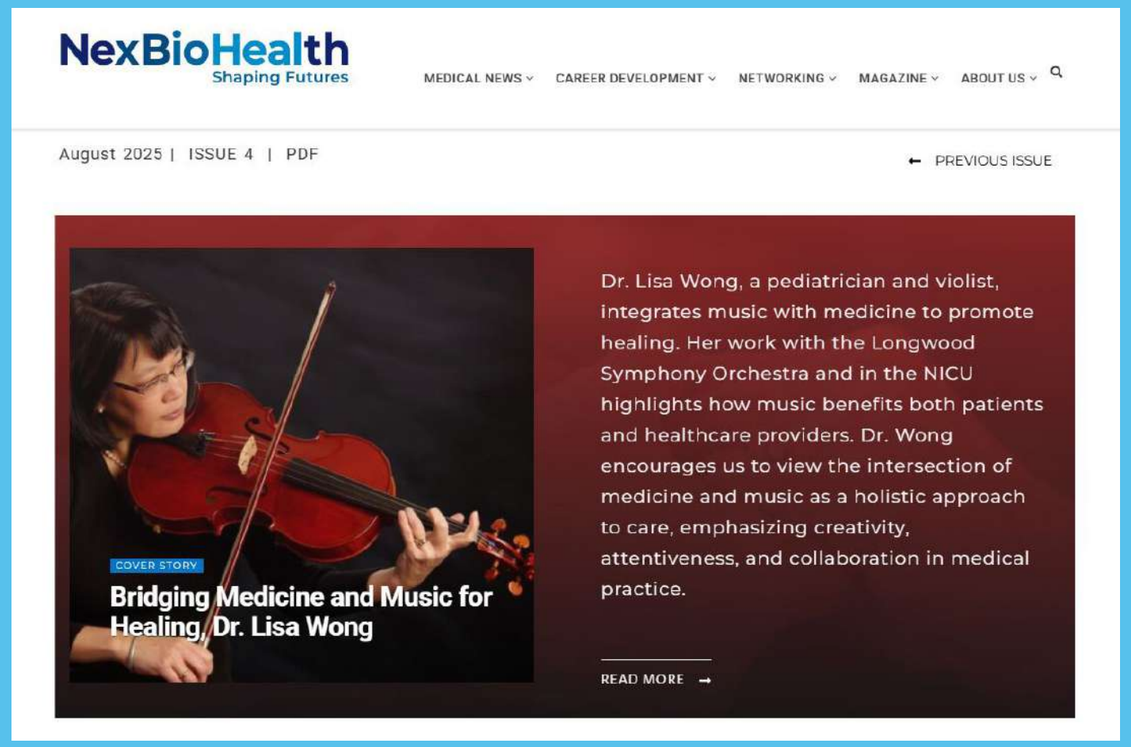
Cover photo: Yale medical students featured in "Medicine 2040." Clockwise from top Saahi Chadha, Diego Perez Aracen, Rohan Mekala, Chanseo(CS) Lee

NexBioHealth: What Makes It Unique

NexBioHealth is a global magazine dedicated to empowering and connecting medical students, residents, and budding physicians worldwide. The magazine is a dynamic platform designed to foster global networking, knowledge sharing, research collaboration, and professional growth for young healthcare professionals.



Vision

NexBioHealth aims to foster an international community where future leaders in medicine can learn, collaborate, and grow together. Building on the 10-year legacy of the World Asian Medical Journal (WAMJ), NexBioHealth expands its scope to engage a broader, global audience, creating a platform for medical professionals worldwide.

Key Features

01. Career Development & Mentorship:

This section offers guidance and mentoring to help young medical professionals navigate their career paths. It includes contributions from experienced physicians and focuses on professional growth, education, and research opportunities.

02. Diversity, Equity, and Inclusion (DEI):

Focused on addressing health equity and global health, this section highlights innovations in public health, healthcare delivery, and international healthcare innovations. Through in-depth articles and interviews with global health leaders, we aim to promote discussions around equitable healthcare access and inclusion worldwide.

03. Global Networking for Physicians:

NexBioHealth connects medical students, residents, and physicians worldwide by featuring leading organizations, providing networking opportunities, and facilitating international collaborations.

Conferences: This section highlights important medical conferences and events around the world, providing readers with opportunities for learning and professional development.

04. Medical Report & Healthcare Updates:

A comprehensive section delivering the latest news in medicine and healthcare, covering advancements, policy changes, and industry trends.

05. Student and Resident Engagement:

NexBioHealth is committed to representing the interests of medical students and residents through the formation of the Student Advisory Committee (SAC). These committees help shape the magazine's content, organize events, and promote mentorship opportunities.

NexBioHealth is more than just a publication-it's a vibrant community and resource hub for the next generation of medical professionals. By bringing together students, residents, and physicians from across the globe, NexBioHealth is dedicated to supporting the growth and development of future leaders in the medical field.

Our Editorial Board

PUBLICATION NEXUSHEALTH MEDIA, INC.

EDITORIAL STAFF June Baik, Raveena Baskaran, Mariam Farag, Grace Ham, Kaity Kim, Kendrick Yu, Design Camp

MAIN OFFICE 161 Tweed Blvd, Nyack, NY 10960 — www.nexbiohealth.org, Info@Nexbiohealth.org

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The NexBioHealth Editorial Board comprises a diverse group of physicians and healthcare professionals from various specialties who are recognized as thought leaders with innovative ideas and notable accomplishments.

This distinguished group is united by a shared mission: to make NexBioHealth a unique platform for addressing the most pressing issues in medicine and healthcare today and into the future. Their goal is to nurture, motivate, and inspire the next generation of healthcare professionals.

Diverse Expertise

Unlike the typical editorial boards of academic journals, the NexBioHealth Editorial Board is intentionally diverse. It includes physicians from major university settings, private practices, and community health centers, not only in the United States but also globally. This diversity ensures that the magazine reflects a wide range of perspectives and experiences, making it relevant and impactful for a global audience.

Interdisciplinary Approach

In addition to physicians, the board includes prominent individuals from the scientific, legal, health industry, and public health fields. This interdisciplinary approach is crucial for interpreting and providing insights into medicine and healthcare from unbiased and diverse viewpoints. By integrating expertise from these various fields, NexBioHealth is positioned to offer comprehensive and balanced coverage of the issues that matter most to healthcare professionals and the communities they serve.

Supporting Young Minds:

To further enrich the content and ensure it resonates with the emerging generation of medical professionals, NexBioHealth has established two additional boards:

Student Advisory Committee (SAC)

- The SAC is designed to represent the interests and perspectives of medical students. Members provide feedback on articles, suggest relevant topics, and help tailor the content to meet their peers' needs. They also liaise between NexBioHealth and medical schools, assisting with student outreach and event coordination. Their involvement ensures that NexBioHealth remains a vital resource for students, providing content that is both educational and inspiring.

Resident Physicians Advisory Committee (RPAC)

- The RPAC represents residents across all specialties, offering valuable insights into the challenges and opportunities faced by physicians in training. The RPAC helps guide the magazine's content by contributing articles, organizing networking opportunities, and supporting mentorship programs. Their participation ensures that the magazine addresses the specific needs of residents, helping them navigate their careers with confidence.

A Growing and Evolving Board:

Our editorial board is in the beginning phase and continues to grow, inviting more great minds to join us in our mission. As we expand, we are committed to bringing together a broader range of expertise and perspectives to enhance the magazine's quality and impact. We seek thought leaders and innovators who share our vision to join us in making NexBioHealth a powerful voice in medicine and healthcare.

A Truly Unique Platform:

NexBioHealth's combination of a diverse, interdisciplinary editorial board and the inclusion of the SAC and RPAC makes it a truly unique platform. It is a magazine that not only raises important issues in medicine and healthcare but also fosters a collaborative environment where young minds are nurtured, motivated, and inspired.
NexBioHealth is committed to being more than just a publication-it is a community and a resource for those who aspire to lead and innovate in the healthcare field. Through the collective efforts of its editorial board, students, and residents, NexBioHealth aims to be the best platform for shaping the future of medicine and healthcare.

Shaping the Future: Students Envision Medicine 2040

Meet the next generation of physicians redefining medicine in an AI-powered era. In this special feature, Yale medical students share how technology, empathy, and innovation converge to shape the future of healthcare in "Shaping the Future: Medicine 2040."

Prevention First: Rebalancing a Century-Old Medical Curriculum

Calls for rebalancing medical education to prioritize prevention and communication alongside technology and treatment.

The Future Healthcare is in the Home

Predicts a 2040 healthcare landscape where technology, AI, and value-based care shift medicine from hospitals to homes-bringing treatment, prevention, and connection closer to patients.

The Age of Prevention

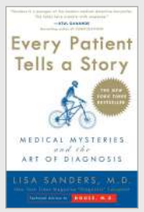
Envisions a 2040 world where prevention eclipses treatment, precision medicine replaces waiting rooms, and healthcare finally puts itself out of business.

Dear Mentor

Resident psychiatrist Dr. Philip Wang responds to students' questions about AI's growing role in medicine and the challenge of balancing clinical work with personal well-being.

Utilizing AI for Medical Student Success

Examines how AI empowers medical students to learn smarter and think critically, without losing the human touch essential to medicine.



Every Patient Tells a Story by Lisa Sanders, MD

Dr. Lisa Sanders' *Every Patient Tells a Story* illuminates the art of diagnosis through attentive listening and human connection, reminding us that every symptom begins with a story to be heard.

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From the Publisher

Chul S. Hyun, MD, PhD, MPH
Div. of Digestive Diseases
Yale School of Medicine

Dear Readers,

Every issue of NexBioHealth begins with a question that keeps us awake at night. This time, it was: Who should speak about the future of medicine shaped by *artificial intelligence*?

After much deliberation-and more than a few late-night debates-we realized the answer was right in front of us: those who will actually live and lead that future.

So, for this fifth issue of NexBioHealth, themed **AI in Medical Education**, we turn the spotlight not only on seasoned experts and educators but also on the next generation of physicians and thinkers. At the heart of this issue are four remarkable Yale medical students whose reflections capture both the excitement and uncertainty of a field in transformation. Yet surrounding their voices are those of clinicians, mentors, and innovators-each exploring how AI is reshaping how we teach, learn, and care.

AI in medicine remains as exhilarating as it is uncertain. It will change how we teach, how we learn, and how we care-but it may also test what it means to be human in the practice of medicine. That is why it's so important to listen-not only to the algorithms, but to the people learning, teaching, and practicing medicine in this transformative time. The reflections gathered here are candid, questioning, and deeply hopeful.

This theme will carry forward into our February 2026 issue, broadening from AI to the larger landscape of medical education-how we train the next generation to think critically, act compassionately, and remain human in a rapidly changing world.

For now, I invite you to listen to the voices across these pages-offering a glimpse of how medicine's next chapter might be written, not by machines but by imagination, empathy, and the enduring will to heal, alongside insights on prevention, mentorship, and the art of teaching itself-threads that continue to define the heart of NexBioHealth.

With gratitude,

Chul S. Hyun, MD, PhD, MPH

From the Editor-in-Chief

Joseph P. McMenamin, MD, JD, FCLM
Christian & Barton Group, LLP

Dear Reader,

Welcome to the 5th Edition of *NexBioHealth*. We bring you an exploration of healthcare fifteen years hence, as envisioned by our contributors. None of us has a crystal ball, of course. And as the great sage Yogi Berra is said to have said: "It's tough to make predictions, especially about the future." Our intrepid authors have sallied forth nevertheless with their ideas of what lies ahead. We hope you find the discussions invigorating, stimulating, and even inspiring.

Several of our seers are medical students. Most come to the forecasting task with education not only in medicine, albeit still in progress, but in other fields as well. Their articles reflect the versatility and intellectual agility that result from cross-fertilization. In an era when far too many practitioners are discouraged or burned out, these young people bring fresh enthusiasm to the field, and a predominately optimistic view of the future.

Engineer Christian Milaster paints a vivid futuristic picture where waiting rooms exist only in museums; with the aid of AI and a genome defined at birth care is individualized; pills are 3-D printed; and organs are autotransplanted in advance of need.

NexBioHealth does not flee controversy. Readers may recall from the 4th edition Sanjana Sharma's op-ed "Inclusive Education is Life-Saving," arguing that comprehensive sex education should include LGBTQ materials. Here, Michelle Cretella, MD and Andre Van Mol, MD provide a vigorous, heavily cited rebuttal. We suggest you read both, and form your own conclusions.

NexBioHealth encourages young people, including students, to offer their thoughts. Pharmacy student Elizabeth Speight reviews *Every Patient Tells a Story: Medical Mysteries and the Art of Diagnosis, by Lisa Sanders, MD.* In an approach few other publications have yet taken, we juxtapose Elizabeth's review with one from Sanghyun Alexander Kim, MD, a practicing colorectal surgeon. This gives readers an unusual if not unique opportunity not only to read about Dr. Sanders's book, but to compare its impact on two reviewers at different stages of their careers.

Brook A. Hubner, Psy.D., Assistant Professor in the UAB Heersink School of Medicine Department of Medical Education, and Director of the Academic Success Program there, offers her thoughts on how med students can benefit from using AI. Cardiologist Mun Hong, MD, explains why he boldly provides his cell phone number to both referring physicians and to patients. In our "Dear Mentor" section, psychiatry resident Philip Wang, MD, responds to two student submissions: one on the evolving role of AI in patient care, and another on the difficult transition into clinical rotations. Grace Ham, *NexBioHealth's* Student Advisory Committee Coordinator, describes our first writing workshop on narrative medicine with Dr. Shanda McManus, an evangelist for the power of story in medicine.

I have an especially strong, personal interest in this issue. I have had the pleasure to know and collaborate with Christian Milaster for more than a decade. My friend and colleague Dr. Hyun, our publisher, offers a thoughtful, well-reasoned argument for making prevention primary. With my good friend business partner Joel Embry, I myself submit a piece asserting that the future of healthcare will include a far heavier emphasis on management at home.

May you enjoy this issue as much as I do.

Joseph P. McMenamin, MD, JD, FCLM

Connect with Future Medical Leaders Worldwide!

www.NexBioHealth.org

We invite you to become part of a vibrant community of medical professionals, where experienced leaders and emerging physicians from around the world collaborate, share knowledge, and drive the future of healthcare. This global network fosters mentorship, research collaboration, and leadership development across generations, ensuring that the next wave of medical leaders is well-equipped to tackle the challenges of tomorrow.

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Shaping the Future

Students Envision Medicine 2040

Artificial intelligence is not something we are waiting for-it is already woven into our lives. It answers our questions, drafts our messages, and, increasingly, interprets medical images and data. For many of us who came of age in a pre-digital world, this transformation can feel both remarkable and disorienting. But for today's medical students, who began their training alongside the rise of generative AI, technology is not an add-on to medicine. It is part of the landscape they have always known.

This generational difference is striking. Where older physicians may wonder what risks lie ahead, these students move more fluidly between the human and the digital, approaching AI not as a disruption but as a given. Yet this brings its own responsibility: ensuring that the efficiencies of technology do not come at the expense of humanism, compassion, and the deeply relational heart of care.

Medicine has always advanced through new tools-the stethoscope, the microscope, the X-ray-each one extending our senses and reshaping education. AI is the next such leap, but it is not merely a tool we hold; it is a system that sees, analyzes, and reasons alongside us. That reality is already reshaping how young physicians learn, think, and imagine the future of their profession.

In this issue of NexBioHealth, we invite you into the perspectives of Yale medical students who are coming of age in this AI-driven era. Their voices represent more than youthful enthusiasm; they signal how a new generation will define medicine in a digital-first world. Listening to them is not just about understanding students' views-it is about glimpsing the values, questions, and possibilities that will shape healthcare in the decades to come.

To help us frame these voices and their meaning, we also invited Dr. Joe McMenamin to share his reflections on the interviews and what this moment reveals about the future of medicine.

Chul S. Hyun, MD, PhD, MPH.

Saahil Chadha

Saahil Chadha is a fourth-year medical student at Yale School of Medicine. Originally from Excelsior, Minnesota, he studied computer science at University of California, Berkeley, before working as a software engineer at Amazon. He later brought this technical foundation into medicine, where his interests lie at the intersection of artificial intelligence, cancer imaging, and clinical care.

At Yale, Saahil conducts research in the Aneja Lab, where he develops AI models to analyze radiologic and pathologic data with the goal of creating imaging-based biomarkers that can personalize treatment and improve outcomes for cancer patients. His current work focuses on how multiple data sources can be integrated to improve prognostication, with particular attention to patients with brain metastases.

Looking ahead, Saahil plans to pursue residency in internal medicine while continuing his research on AI applications in medicine. Beyond research and clinical training, he is interested in medical education and community-building. He also plays viola in the Yale Medical Symphony Orchestra.

Chanseo (CS) Lee is a medical student at Yale with a focus on digital health, artificial intelligence, and biotechnology. He is a co-founder of Sporo Health, where he develops solutions addressing critical challenges in healthcare workflow and access. His team has created AI tools for chart abstraction in tertiary cardiothoracic centers, innovative scribe technologies for private practices, and multilingual communication to support under-resourced patient populations.

In addition to his entrepreneurial work, Chanseo has over eight years of experience in translational biotechnology research. Drawing on his academic training in chemistry and biology at MIT and his research tenure at Harvard and Mass General, he has contributed to projects advancing therapeutic delivery systems, including hydrogels, ultrasound-assisted lipid nanoparticles, and computationally guided models of single-cell drug penetration. At Yale, he works in applying machine learning and computational models on patient data to predict and improve perioperative outcomes in cardiac anesthesia.

Beyond academia, Chanseo remains active in the venture capital and biotechnology ecosystem, collaborating with early-stage founders and investors through roles at Civilization Ventures and Nucleate to help scale impactful healthcare innovations.

Chanseo (CS) Lee

Diego Perez Aracena

Diego Perez Aracena is a Yale MD/PhD candidate, currently working on tissue systems biology, trying to understand the underlying logic that will one day help us control cell networks. Before Yale, he spent two years at the Harvard Stem Cell Institute in Dr. Fernando Camargo's lab using lineage-tracing and multi-omic tools, and his undergraduate degree was in Integrative Neuroscience.

Diego is interested in longevity medicine and, long-term, aims to translate tissue-control principles into practical tools that bend multiple disease curves at the population level. He thinks a lot about virtual tissues, AI, complexity theory, regenerative biology, BCIs, and a world where death isn't mandatory.

In the past, Diego was a photorealistic oil painter and a Division-I springboard diver, and he honestly uses the lessons from both basically every day. If there weren't a million ways to improve human health using science and technology, you might find him around campus slacklining or planning his next highlining trip.

Rohan Mekala was born and raised in Edison, New Jersey. He went to Georgetown for his undergraduate studies, where he was a finance major on the premed track, interested in understanding healthcare from both a clinical and systemic point of view. His activities in undergrad reflected these interests-his main activity during most of the year was serving as an EMT with Georgetown EMS, while his summers were spent in healthcare investing roles.

Towards the end of college, Rohan developed an interest in healthtech, which he pursued after graduation by working in investment banking, mostly with technology companies. This was around the time ChatGPT was released to consumers and AI was generating widespread excitement.

After banking, he spent his final gap year at Oxford completing a master's in Applied Digital Health. While at Oxford, he worked in a lab focused on AI/ML in healthcare and wrote his dissertation on using ML to identify proteomic predictors of glioblastoma development. He only recently arrived at Yale and is hoping to get involved in ML-focused research, as well as the innovation scene.

Rohan Mekala

Q&A Responses

What inspired you to pursue medicine, and what keeps you motivated today?

Saahil: I've always wanted to pursue medicine; when I was a kid, I would say that I wanted to be a doctor when I grew up. I loved that medicine combines intellectual rigor with human connection. During clinical rotations in medical school, I've been motivated by the privilege of developing my own relationships with patients and being part of their lives at critical moments. At the same time, my research keeps me motivated, showing me how innovation is driving medicine forward.

Chanseo: My journey toward becoming a physician reflects a dissonance of the tension between two powerful influences in my life: my training in science and "Big Data"-driven research, and my personal experience of how illness ripples beyond just the patient, but to those around them. On one hand, my academic path has been grounded in translating biology and chemistry into novel technologies. On the other, my grandmother's struggle with Alzheimer's and its rippling effects on my family connected the science to the human phenomenon. Bridging these two perspectives, scientific innovation and human experience, has shaped my commitment to medicine.

Diego: I was a philosophical teen, so I aimed my sights at consciousness early on, which I thought was the hardest unsolved problem. That led me to an undergrad in neuro, but epigenetics really widened my interests out towards tissues and systems: questions on how living matter senses, computes, heals... and how it fails too, giving us things like fibrosis, cancer, and even death. I realized that solving the hardest problems might exceed one lifetime, so the most pressing issue seemed to be time. And, I learned that not every patient gets to make peace with death; I thought if we could postpone our tissues failing, or even in our wilder fantasies, make death optional, then many people would choose more time with their loved ones, more time to be healthy, and more time to live out bigger projects and dreams. I want to build tools that give people more of that sort of optionality. The problems in medicine are hard, but the possibilities and how cool the science is? That keeps me incredibly optimistic and endlessly motivated.

Rohan: Honestly, I had no clear idea what I wanted to do going into undergrad, and getting to where I am now was a very gradual process. I chose finance because it's what my sister had studied, and I signed up for premed courses because they interested me. I took those interests and worked backwards, figuring it might be neat to work at the intersection of them. Even still, it took a few years of working to go "all in" on medicine rather than pursuing investing or policy. What finally pulled me in was the day-to-day work of caring for patients-something you only fully appreciate after doing a non-clinical job.

How do you see AI transforming the landscape of cancer diagnosis, research, and treatment?

Saahil: AI has the potential to make diagnosis not only faster and more accurate but also more personalized. In oncology, the number of therapeutic options continues to grow, which creates both opportunity and complexity. I see AI as an essential tool for synthesizing vast amounts of imaging, molecular, and clinical data, helping physicians identify patterns that aren't visible to the human eye and guiding them toward the most effective treatment strategies. Rather than replacing clinical judgment, AI can serve as an intelligent partner, allowing doctors to focus on the human side of care.

Chanseo: Even after years of the "AI bubble," artificial intelligence still boils down to extremely large neural networks and transformer architectures. Large language models and their derivatives, whether small language models, AI agents, or specialized systems, are essentially extensions of these foundations, optimized for domain-specific tasks, cost-efficiency, autonomous systems, and performance. Because LLMs are fundamentally trained to "predict the next word" across vast datasets, they are remarkably well-suited to identifying patterns across the broad spectrum of disease phenotypes. This makes them especially powerful in fields like oncology and

imaging, where prior deep learning advances like CNNs extract interpretable features for LLMs to generate clinical insights, especially in the context of patient data from EHRs.

While these models excel at statistical learning, current medical applications still lack true reasoning and the uniquely human capacity for intuition and insight. These qualities remain central to medicine, not only in patient care but also in driving research and innovation. For now, AI serves as a transformative augmentation: an indispensable tool that enhances precision care and expands physicians' capabilities, but not a replacement for the clinician's judgment in diagnosis and treatment. Finally, LLMs are not the central, "end-all-be-all" artificial intelligence the public makes it to be. Investments must also be heavily diverted to broadening and deepening the science in other sectors of machine intelligence, including frontiers in computer vision.

Diego: AI will probably fuse radiology, pathology, and -omics into some sort of patient-specific risk and response models. More compressed, usable information means earlier detection, less overtreatment, and smarter trials. I think future treatments won't just be "one drug, one target," but something more like coordinated cocktails and perturbations that shift whole tissues into where they need to be, optimized by continuous data tracking. There's sooooo much ambient data as well,

it makes me think the invasiveness of diagnostics and treatments will decrease dramatically over the coming decades.

Rohan: AI is going to transform how we approach disease. It will accelerate research, shorten timelines for innovation, and enable earlier diagnosis. With faster drug development and more precise genomic tools, I think we'll finally be able to deliver personalized treatment at scale.

What gaps do you notice in medical education right now? If you could redesign the curriculum, what would you add or change?

Saahil: I began medical school in Fall 2022, just as ChatGPT was released, and it has already completely transformed how medical students learn. Rather than relying solely on memorization, AI can now summarize information, generate practice questions, and simulate clinical reasoning. I would redesign the curriculum to include training in AI, data literacy, and digital tools, while emphasizing the limitations of AI, including issues with generalizability and hallucinations. In my role as Associate Course Director of the Clinical Reasoning course, I am working with Drs. Thilan Wijesekera and Jaideep Talwalkar to integrate these concepts into Yale's curriculum.

Chanseo: One of the most striking gaps in medical education is how little formal, centralized training exists at the intersection of medicine, data, and technology (of any kind, not just AI). Physicians are expected to navigate electronic health records, use new digital health tools, and interpret data-driven decision support systems, yet few curricula offer structured training in any IT or data vertical. Furthermore, medical students and residents are dropped head-first into varying levels of technical adoption, from pre-2000 MS-DOS legacy systems at Veterans Affairs to impossible integrations of digital health tools. We have created a disconnect -- we are preparing students for 20th-century medicine while practicing in a rapidly evolving 21st-century healthcare system.

If I could redesign the curriculum, I would integrate three key elements. First, data literacy and AI fluency: not to make every physician a programmer, but to help them critically evaluate algorithms, understand bias, and responsible tool use. Second, interdisciplinary collaboration: creating opportunities for medical students to work directly with engineers, computer scientists, and policy experts on real-world healthcare problems. Finally, human-centered care and communication: ensuring that while technology grows in importance, students also train deeply in empathy, cultural humility, and the relational aspects of care that no algorithm can replace.

Diego: I think there's not enough retrieval practice in classrooms. Not enough personalization too, but that's harder to solve. We know that group teaching is about two standards deviations worse on average that personalized tutoring. The dream would be that every student gets a tailored tutor, who somehow encourages them to drill with a spaced repetition system and perfect scaffolding. AI's will help with that, but in 2025, we're still a ways away from the chatbots doing this all for us. That doesn't stop students from trying to jerry-rig this, though (I try to get LLMs to quiz me using voice mode while I walk between buildings). I'd probably look to "Math Academy" as the best example of a personalized training program that scaffolds students well. For now, I'd just encourage the professors to constantly be drilling the students live on things they know, showing them examples when they get things wrong, and interleaving spaced repetition of topics, rather than doing long lectures.

Rohan: Many med schools talk about AI as a priority, but very few actually teach students how to use it. It's not enough to describe what AI is-we need to show how it fits into our daily work. Even something as simple as using AI to study more efficiently could be transformative. Once you learn to wield the hammer, you start seeing all the nails.

Prevention often gets less attention than diagnosis and treatment. As a future physician, how do you see your role in prevention?

Saahil: I see prevention as central to medicine. Whether through counseling patients, advocating for healthier systems, or using data to identify risks early, physicians can help shift the focus from reacting to disease to preventing it.

Chanseo: Our current healthcare system is still largely oriented toward reactive rather than preventive medicine. Yet in an era of big data, digital twins, and advanced population science, we know that most diseases are not random events. Many have identifiable, intervenable causes, or at the very least, early warning signs that can be detected long before clinical symptoms appear. As both a future physician and a data scientist, I see my role as bridging these two worlds: using insights from data and risk modeling to identify vulnerabilities earlier, while also educating and empowering patients to take preventive steps. By shifting the focus upstream, we can reduce disease burden, ease strain on physicians, and create a healthcare system that emphasizes maintaining health rather than simply responding to illness.

Diego: I think a lot of prevention often feels like the burden is being thrown back on patients. Getting 10k steps, eating healthy, sleeping 8 hours, etc. Going in for screenings and checkups. I think as medicine evolves, we're hopefully going to take a more passive role in the lives of patients, using ambient data to detect risk factors earlier, and pinging patients with easier and easier fixes. I think if we can take an example from GLP1 drugs, we can probably find ways to make it easier for people to self-actualize the ways they want and help make the healthy choice the default. Even with things as hard to crack as say social media addiction. Refined therapeutics will probably erase all the stigma of "better living through chemistry," so I think physicians will get better at finding elegant solutions without damaging side effects, and we'll find ways to redefine prevention into something like context engineering for people.

Rohan: I'm going to go against the grain here and say prevention is always going to be an uphill battle. Just like the healthcare system, people are resource-

constrained. They aren't going to devote effort to things until they become definitive problems. I think the most pragmatic way to bolster prevention is to invent better predictive tools, allowing providers to put very specific risks on patients' radars early on so they can act accordingly.

What do you think the doctor–patient relationship should look like in the age of AI and big data?

Saahil: AI should enhance, not replace, the human bond. Doctors will still be the interpreters, advocates, and listeners, ensuring that technology serves patients' values rather than overshadowing them.

Chanseo: AI and Big Data tools are essentially another partner in the room with the doctor and the patient. It provides the scale, pattern recognition, and predictive insight, while the physician offers judgment, empathy, and narrative understanding. AI should expand the time physicians can spend listening, counseling, and building trust. If used well, it can restore some of what has been lost in modern medicine: the ability to focus less on the screen, and more on the human being across from us.

Diego: I used to think doctors would always be there to help translate things to patients, but honestly, at a certain point, the chatbots will probably do a lot of that for us too. I think our role is probably going to shift to that of guiding the value system of medicine, and of helping to promote trust in the treatments. Until you can trust AI's with your life, there's going to be a team of professional humans vetting the pipeline and all the treatments. A lot might become more automated, but people in the loop will help it become less of a black box, and patients will feel better if the transition is stamped with a seal of approval that the medical institutions are certifying all these new tools and techniques. Hopefully, visits will be shorter, but I'm also thinking that trust, transparency, and outcomes will get stronger too as we get better at implementing.

Rohan: While people often view AI as a "dehumanizing" force, it might be quite the opposite. With AI and big data, patient care will become more tailored to the individual and, thus, personal. Patients with the same issue may be given different treatment plans and providers will need to explain the rationale. Additionally, AI will greatly reduce administrative burden-I hope that this will allow providers to look away from their screens and devote their attention to the person in front of them, as once used to be the case.

If you could share one message with today's healthcare leaders about how to prepare for the future of medicine, what would it be?

Saahil: Invest equally in technology and people. The tools are advancing quickly, but the future of medicine depends on training clinicians who can use them wisely and keep compassion at the center of care.

Chanseo: Prepare for a future where medicine is inseparable from data and machine intelligence. The next generation of care will be defined by technology, yet these tools will only succeed if they are integrated thoughtfully, equitably, and with human-centered design. Technology has rarely been impeded by fear and gatekeeping of its potential. This has only led to irresponsible practices and poor adoption, a process that takes exponentially more time to reverse. Instead, I'd ask our leaders to centralize and expand education at an even more rapid rate, equipping physicians with tools that allow them to be more present, more precise, and ultimately more human in the care they deliver.

Diego: Learn the new tools and learn fast. We'll help more patients that way. There used to be a time when we could get stuck in our ways and our elders were fine being out of touch. Change is coming faster, and there's no way to just opt out. I think it'll be a great wonder to see the new therapeutics and tools used for good, I do think a rising tide raises all boats. But still, make sure you're building yourself a sturdy boat with a good foundation.

Rohan: One quote I heard at Oxford that really stuck was, "AI won't replace doctors, but doctors who use AI will replace doctors who don't." Fighting progress is never wise. When Excel first appeared, people in finance thought it was the end of the world; instead, it became a tool to make their work better. AI will do the same in medicine-it will raise expectations of care, shift some duties, and enhance our role rather than erase it.

Dr. McMenamin:

The comments of these students are refreshing. Maybe even rejuvenating. A cause for optimism.

Both professionally and personally, I know a lot of doctors, in nearly every specialty and subspecialty, in many parts of the country and even, to a smaller degree, abroad. They are a talented, bright, thoughtful, highly trained and deeply educated group. They have done great things for, collectively, tens of thousands of patients, many of whom would no longer be on the right side of the grass but for the efforts of their physicians. Many of my doctor contacts have interests and talents outside medicine, stable home lives, and incomes sufficient to permit security and a measure of comfort.

But discouragingly, alarmingly, few of them are happy.

Oceans of ink (or toner) and googols of electrons have been pressed into service to explain why. Burnout is a disorder, to borrow from my old textbooks, of multifactorial etiology. The erosion if not destruction of professional autonomy; the Sisyphean clerical struggle; the stupefying mass of regulation; the crowding at the bedside from the invisible but constant, jostling scrum of administrators, bureaucrats, insurers, accountants, regulators, and yes, lawyers; in short, the Hassle Factor, all distract, detain, demoralize. For all too many physicians, the effect has been as deleterious as it has been inescapable.

Doctors are miserable. After all those years of merciless self-discipline, all those sleepless nights, all that effort, all that expense, they say to themselves: this is not what I signed up for. The joy is gone. One client of mine is a former FP who is now very busy running a business that exists to help other doctors find non-clinical work. The theory: if I can get away from clinical medicine, yet use my knowledge and skills in other

ways, maybe I can finally be happy. I am pleased for my client, but saddened for the profession.

Enter the students.

Apart from their remarkably broad array of capabilities and evident intellectual firepower, what impresses me in reading these interviews, even more than the gee-whiz sophistication in AI and other scientific matters, is optimism, confidence, excitement. These young people exude the enthusiasm the profession, or much of it, has lost. Part of that, doubtless, is youth. We mossbacks were once young, too, hard thought that may be to believe. But I sense there is more to it than that, and I hope I am right.

Our interviewees seem both to recognize the potential of AI and other cutting-edge tech to change the world, and the practice of medicine, for the better, as well as their capacity for mischief. It's critical but difficult to recognize both, yet they seem to have managed it. Their cross-training in other fields seems to have enabled them to connect dots in ways not yet attempted. Some of those connections might turn out to be short circuits, but that is the nature of progress. It is said that Edison made over 1000 attempts before finally finding the filament he needed for his lightbulb. Others will usher in new ways to help us in our species' perpetual battle against disease, paving the way to earlier, more accurate diagnoses, better, more powerful therapies, and improved prognoses and life spans.

While I personally do not believe that death will ever be "optional," I am confident it can be postponed. History proves it. Medicine proves it. I have high hopes that that these young professionals and their peers will add to the trove of evidence we already have.

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Medical Report - Medical Education

Prevention First: Rebalancing a Century-Old Medical Curriculum

U.S. medicine has often been described as largely reactive, shaped in part by the biomedical training model established by the 1910 Flexner Report. While Flexner's reforms were revolutionary for their time, the modern curriculum still prioritizes biomedical sciences and diagnostics over prevention, communication, and lifestyle medicine. Obesity - now a leading driver of liver cancer and multiple chronic diseases - illustrates the imbalance: we invest heavily in surgery and medications while neglecting prevention. To realign with today's health challenges, medical education must integrate prevention as a core competency, complementing technological advances rather than trailing behind them.

"Can you tell me what is wrong with me?" Patients have asked me this question countless times over my career. Too often, even after seeing multiple doctors, they remain confused, unheard, and anxious. Many describe visits where the physician never looked up from the computer screen, or where explanations were so fragmented that understanding was impossible. These encounters highlight a deeper failure: our system excels at diagnosing and documenting disease, but falters in educating, preventing, and empowering patients.

For over 30 years, I practiced medicine - first as a solo practitioner serving a community, later in a larger group practice, and eventually within a private equity–driven system. Now, back in academia, I see how these different environments, despite their differences, share a common challenge: medicine that too often remains reactive. To be sure, not all care is reactive - there are important preventive efforts and screening initiatives - but the balance tilts heavily toward treating disease after it emerges rather than preventing it in the first place.

The Flexner Report: A Century-Old Foundation

This mindset is reinforced by how we train physicians. U.S. medical education is still rooted in the Flexner Report of 1910, commissioned by the Carnegie Foundation to address a national crisis: a proliferation of low-quality proprietary medical schools, a lack of standards in hospitals, and poor public confidence in medical care.

Abraham Flexner, hired to conduct a sweeping survey of American and Canadian medical schools, exposed the absence of rigor, poor facilities, and minimal science in many institutions. His report was transformative: grounding curricula in scientific rigor, integrating schools with universities and teaching hospitals, and eliminating substandard programs. These reforms created the modern American medical system. This was exactly what was needed at the time, when the greatest threats were uncontrolled infections and unregulated care.

Yet more than a century later, the structure Flexner helped create has not meaningfully evolved. Premedical students still spend years mastering organic chemistry, physics, and calculus - subjects that remain foundational, yes, but rarely balanced with equally rigorous exposure to nutrition, behavioral science, or public health. Medical students devote most of their energy to anatomy, physiology, and pathology, while prevention, communication, and lifestyle medicine remain peripheral. The result is a system where the biomedical model thrives, but the prevention model languishes.

Obesity as a Case Study

Obesity is a striking example. Once, hepatitis B and C were the dominant drivers of liver cancer in the United States and globally; today, obesity and metabolic dysfunction–associated steatotic liver disease (MASLD) have surpassed them. Current estimates suggest that 30–40% of U.S. adults have MASLD, and obesity now accounts for more than one-third of new liver cancer cases in the country. Beyond liver cancer, obesity contributes to at least 13 different cancers recognized by the National Cancer Institute - including colorectal, pancreatic, breast, and endometrial cancers - and is projected to overtake smoking as the leading preventable cause of cancer in the coming decades. And we don't need to be reminded of all those numerous conditions obesity leads to: heart disease, stroke, vascular disease, diabetes, and other metabolic conditions.

The medical response has been powerful: bariatric surgery, which now exceeds 250,000 procedures annually in the U.S., and new pharmacologic therapies such as semaglutide and tirzepatide (Ozempic, Wegovy, Mounjaro). Never mind the soaring healthcare costs associated with these treatments. They are transformative for some patients - lifesaving, even. But for the vast majority, the crisis could be mitigated earlier through effective prevention: healthier diets, physical activity, and structural changes to food and built environments. Yet medical education devotes little time to nutrition or prevention, leaving physicians far better prepared to prescribe medication after obesity takes hold than to prevent it in the first place.

A Reactive System in a Preventable Era

Meanwhile, the landscape of disease has shifted. Infections are no longer the dominant killers in the U.S.; instead, chronic diseases - obesity, diabetes, cardiovascular disease, and cancer - now lead. These conditions are shaped by lifestyle, social determinants, and structural inequities. Yet we continue to equip physicians with the tools of a 20th-century biomedical system to solve the problems of a 21st-century chronic disease epidemic.

Much of today's medicine still waits for disease to appear before acting. We step in after arteries clog, stomachs ulcerate, or tumors grow-deploying extraordinary diagnostics and treatments when it is already late. Patients deserve more. They need physicians who can explain not only what is wrong but how it might have been prevented. Even better, they deserve physicians who intervene earlier, offering clear guidance to keep arteries open, stomachs intact, and tumors from forming at all.

Toward a Prevention-First Future

If prevention were woven into the very fabric of medical education, physicians would graduate with as much fluency in addressing lifestyle, behavioral, and structural risks as they have in interpreting scans or prescribing medications. This would not compete with innovation - it would complement it. Artificial intelligence, genomics, and precision therapeutics could then be used not only to treat disease, but to predict, prevent, and reduce risk before disease takes hold.

The future of medicine cannot rest solely on diagnostics and therapies. It must be anchored in prevention, taught from the first year of premedical education through residency and beyond. Otherwise, we risk continuing to train doctors for yesterday's challenges while today's patients - still asking "Can you tell me what is wrong with me?" - leave without the answers, guidance, and preventive strategies they truly need.

Chul S. Hyun, MD, PhD, MPH

Medical Report - Medical Education

The Future of Healthcare is in the Home

By Joe McMenamin and Joel Embry

Why Care is Moving Home

In 2040, health professionals will care for patients primarily in their homes, in person and virtually. There will still be hospitals, of course, including emergency departments, especially at academic medical centers and level I trauma centers. There will still be nursing homes, urgent care centers, and doctors' offices, and from time to time patients will still need them. But they will be fewer in number and secondary, not primary locations for care. In fact, many of these changes are already underway, and may be largely complete well before 2040.

There are several reasons.

First, the United States simply cannot afford to continue to devote 18% of GDP to healthcare. Our debt is already a stupefying, ominous $3.7 X 10^{13}$ and growing at a rate of 10^{13} every 100 days.[24] Interest on the national debt already exceeds annual spending on Medicare, as well as on national defense. Barring a radical change in federal government behavior, the debt is expected to exceed 145% of GDP by 2040; some say 200%. Deloitte projects that, if we continue current trends, health spending could reach a staggering $1.2 X 10^{13}$ by 2040.[25] This is untenable.

One solution, among the many needed, is to move care whenever possible to its cheapest location: the home.

CMS has determined that by 2030 all Medicare and most Medicaid services will be paid for on a value-based care (VBC) principles.[26] Healthcare providers will need to contain costs aggressively, so the drive to VBC will augment the other pressures pushing more care to the home.

Second, as the population grows, the imbalance between demand for and supply of healthcare professionals and institutions will increase even faster. Hospitals and SNFs are closing for financial and staffing problems. Those remaining open have difficulty attracting and retaining nursing and medical professionals. Many members of those professions are abandoning them for other fields.

Third, Americans are living longer, and so managing chronic illnesses longer, and will demand care at home. AARP surveys routinely find that by majorities of 75% and higher seniors prefer to remain at home.[27]

Finally, as health and healthcare improve across the population, there will be less need per capita for healthcare facilities. Evidence-based medicine will enhance the quality and safety of healthcare while reducing its cost and risk. Advances in genetics will permit fast, accurate identification of undiscovered illnesses, permitting modification of behavior to reduce risk. Personalized medicine, using an individual's unique genetic, environmental, and lifestyle information, will promote disease prevention, diagnosis, and treatment. Inevitably, healthcare facilities, especially those not keeping up with the frenetic pace of change, will close their doors.

Benefits of Moving Care Home

Moving care to the home is not an unhappy development. Ninety percent of US healthcare dollars go to pay for management of chronic disease.[28] For much of that, care in the home is perfectly adequate; as technology improves, the quality of home care will improve along with it. Already, we can provide dialysis, x-rays and intravenous therapy at home. AI-powered chatbots now act as first points of contact for patients, gathering information and offering basic guidance before a virtual visit with a professional. Specialists of all descriptions can see patients virtually. The hospital-at-home concept permits management of even very sick patients in their own homes, and diminishes the patient's exposure to the microbial milieu of the hospital and its risks of infection. Smart homes permit health monitoring, safety features such as automatic stove shut-offs, medication reminders, and connectivity to family and emergency services. The future will bring exponential expansion of these trends.

Stimulated by the pandemic, distance care continues to grow more capable, accessible, and accepted. Remote monitoring, which can be done as readily from home as in a hospital, can provide a cost-effective way to track the progression of chronic illness and to identify decompensation early, before it requires admission. Such prevalent and consequential conditions as diabetes, COPD, hypertension, some dysrhythmias, and heart failure can be readily monitored with relatively inexpensive, off-the-shelf devices already on the market. Traditional videoconferencing telemedicine can address many acute problems; that capability will only increase with time.

Care at home will also help rectify the isolation problem so common among seniors. Loneliness and isolation have serious effects, and remaining at home with loved ones, close to neighbors and friends, is an antidote.[29] The home will grow not only more attractive as a site of care, but, increasingly, a superior one. To be surrounded by one's loved ones and friends is a bulwark against isolation.

Falls are a serious problem, often in seniors a cause of not only serious morbidity but even mortality.[30] Falls can occur at home. The probability of a fall is higher in unfamiliar environments such as hospital or SNF rooms, however. In the home, we will see risk assessments personalized for both the patients themselves and their environment, exercise programs to improve balance and health, and tailored safety features. Falls will remain a problem, but will become less prevalent.

Communities will increasingly be designed to make it easier for patients to gain access to the outdoors and engage in safe, healthful activities such as walking or bike-riding.[31] The benefits of exercise are well-established, and neighborhoods of the future will be constructed to encourage residents to enjoy and thrive from more interaction with nature.

24) Michelle Fox, "The U.S. national debt is rising by $1 trillion about every 100 days," CNBC 4 March 2025, https://www.cnbc.com/2024/03/01/the-us-national-debt-is-rising-by-1-trillion-about-every-100-days.html

25) Deloitte, "Breaking the cost curve," 2021, https://www.deloitte.com/us/en/insights/industry/health-care/future-health-care-spending.html

26) CMS Innovation Center Strategic Refresh, 2021, https://www.cms.gov/priorities/innovation/strategic-direction-whitepaper ("All Medicare beneficiaries with Parts A and B … [and] [t]he vast majority of Medicaid beneficiaries will be in a care relationship with accountability for quality and total cost of care by 2030.")

27) See, e.g., AARP Press Room, "New AARP Report: Majority of Adults 50-plus Want to Age in Place, But Policies and Communities Must Catch Up," 12.10.24, https://press.aarp.org/2024-12-10-New-AARP-Report-Majority-Adults-50-plus-Age-Place-Policies-Communities-Catch-Up

28) CDC, "Fast Facts: Health and Economic Costs of Chronic Conditions," 8 August 2025, https://www.cdc.gov/chronic-disease/data-research/facts-stats/index.html

29) See, e.g., Vivek H. Murthy, "Our Epidemic of Loneliness and Isolation," 2023, https://www.hhs.gov/sites/default/files/surgeon-general-social-connection-advisory.pdf

30) Vaishya R, Vaish A. Falls in Older Adults are Serious. Indian J Orthop. 2020 Jan 24;54(1):69-74. doi: 10.1007/s43465-019-00037-x. PMID: 32257019; PMCID: PMC7093636.

31) CDC, "Strategies for Access to Places for Physical Activity," 27 Jan. 2025, https://www.cdc.gov/physical-activity/php/strategies/access-to-places.html

AI will further enable care in the home. Existing AI systems can combat loneliness, falls, hypertension, diabetes, and heart failure, to name just a few. New uses are being developed every day. As AI improves, dependence on in-person services, and certainly in-person services at clinics and other official healthcare locations, will decline. And AI will benefit seniors in ways beyond classic healthcare. AI systems can recognize speech, filter sounds, find objects or patterns, remember forward and remind on time, detect common mistakes, and so forth. As we move towards generative AI, RPM will grow capable of predictive risk assessment, caregivers will enjoy streamlined work flows (documentation, scheduling, training), and patient care will become ever more patient-specific (treatment plans, medication management, etc.)

Community development will evolve

Mixed-use, walkable neighborhoods will be planned and developed and homes will be built to specially accommodate the requirements of seniors preferring to remain at home. Universal design is already a common feature of many residences in communities for seniors. AI and Virtual/Extended Reality will create more personalized, adaptable, and accessible products and environments. The concept will be expanded beyond individual homes to entire neighborhoods. Different types of housing, such as tiny houses and compounds, will become home to more people. There will be more thoughtful and abundant green space to encourage walking and human interactions. These features will not only make it easier to remain at home longer; they will contribute to the health of residents.

CONCLUSION

For many reasons, in future much more care will be provided in the home. Patients, their families, their providers, and the payers, private and governmental, will all benefit. We should prepare now.

Joseph P. McMenamin, MD, JD, FCLM

Joseph P. McMenamin is a physician-attorney who advises healthcare providers on the law of digital health and of artificial intelligence. With his collaborator, real estate developer, Joel Embry, Joe is also the co-founder of Civic Telehealth, which aims to enable seniors to remain in their homes longer and in better health than they otherwise could.

Joel Embry

CEO of Civic Software

Joel Embry is a community developer and consultant based in Jacksonville, Florida. He has over 35 years' experience in commercial, office and residential community development as owner and CEO of Civic Software, Inc. He has led the planning, entitlement and implementation of mixed-use projects in Florida and Georgia. In addition to developing 8 residential communities and commercial properties on Amelia Island, Florida, including the award-winning New Urbanism neighborhood Amelia Park, Joel has served as Owner's Representative in the planning and permitting of the 400-acre Summer Beach Resort and Ritz-Carlton Hotel on Amelia Island, Clark's Grove Traditional Neighborhood in Covington, GA, and the 2,000-acre mixed-use Welaunee Critical Area Plan in Tallahassee, FL.

Currently, as Managing Member of Civic Telehealth LLC and Oceanic Data Centers LLC, Joel is engaged in community health care applications and development of data center facilities + telecommunications infrastructure.

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Medical Report - Medical Education

The Age of Prevention:
When Healthcare Puts Itself Out of Business

by Christian Milaster

It's April 20, 2040, and traditional outpatient care has just passed away.

The last waiting room closed its doors in Washington, DC, in March. An exact replica now sits in the Smithsonian Museum of Healthcare History, complete with its original magazines from 2025 - their pages yellowed, their house keeping advice quaint. Visitors stare at the uncomfortable chairs, the reception desk, the plastic sign-in clipboard. They struggle to imagine why anyone would have driven, sometimes hours, to sit in a room with sick strangers, waiting to spend eight minutes with an overworked physician who ordered tests to confirm what algorithms already knew.

In 2040, healthcare exists only for births, injuries, and preventive surgeries. Ninety percent of care is DNA-based, hyper-proactive prevention. The age of treatment has ended. The age of prevention has begun.

Let me show you what this looks like.

The DNA-Driven Future

Christian Jr. is born on June 6, 2040. Within hours, his complete genomic sequence has been analyzed against 40 years of accumulated health trajectory data. The AI system knows, with unsettling precision, which diseases await him. It knows his liver will function beautifully until his early forties, then begin to deteriorate based on a specific genetic marker. It knows he carries genes that predispose him to obesity unless certain interventions begin in adolescence. It knows which medications will work for him and which will be useless.

Right away, Christian Jr. is assigned healthcare management for life: an AI system, charged to manage everything that improves, affects, or impedes Christian Jr.'s health. No more fragmented care. No more repeating your history to seventeen different specialists. No more begging for medical records. Christian Jr. owns all his health data, and his AI decides what information each provider needs. His endocrinologist doesn't get access to his psychiatric health records. His dentist gets exactly one data point from his cardiologist: that the medication he is on thins his blood, relevant when the dental instruments might nick his gums.

But here's where it gets interesting: Christian Jr. will receive individualized medicine that makes our current pharmaceutical approach look barbaric.

Consider how we practice medicine today. We say a drug is "40% effective" (e.g., by reducing mortality) when it reduces risk from, say 20% to 12%. We celebrate this. But look at the mathematics more honestly: 80 people taking that medication experience zero benefit. The drug does nothing for them -doesn't change their mortality, doesn't change their outcome. Yet all 80 take it, pay for it, experience its side effects. The pharmaceutical industry is thrilled because they sell 80 unnecessary prescriptions for every 8 people who actually benefit. And the 12 people that still died? They did not benefit either.

This is not individualized medicine. This is profitable one-drug-for-all medicine heralded as breakthrough innovation.

By 2040, we've moved past this expensive theater. Christian Junior's medications are 3D-printed at his local pharmacy - or more likely, delivered by a drone. Each pill is customized to his exact genetic profile, his current biomarkers, his environmental exposures. Not 50 milligrams or 100 milligrams because those are the only options the manufacturer produces. He gets 73.4 milligrams of the active ingredient, because that's what his body needs today.

When his DNA indicates his liver will begin failing in his forties, he doesn't wait for symptoms. At age 38, he receives a stem-cell-grown liver, cultivated from his own cells. It's preventive organ replacement - analogous, in a way, to how we now remove all wisdom teeth in America because we've concluded they cause more problems than they're worth. Your body came with parts that will fail? We replace them (or remove them) before they do.

The "Easy Button" Principle

Here's the crucial insight that makes this scenario plausible: prevention cannot rely on behavior change.

Current "preventive" care beyond screenings and vaccinations is mostly ineffective. We tell patients to exercise more, eat less, manage stress, get eight hours of sleep, end toxic relationships. We offer this advice knowing full well that there is no health coach to assist at 11 PM when the ice cream in the freezer beckons. We're not there when the alarm goes off at 6 AM for that well-intended gym session and we hit the snooze button, patting ourselves on the back for our good intentions. We've designed a system that requires sustained willpower from people already exhausted by modern life, then we blame them when they fail.

In 2040, prevention is almost automatic and much more focused on prophylaxis. Christian Jr. takes a single pill each morning - easy enough to become a habit, like brushing your teeth. Inside that pill are vitamins and medications at the right dose. Given his genetic risk for obesity, another pill contains nano-bots that break down carbs before his body can store them as fat. Or perhaps he receives quarterly injections that adjust his metabolism. Or maybe there are medications that suppress the genetic markers leading to his predicted diseases. The specifics don't matter. What matters is that staying healthy requires no more willpower than staying alive requires willing your heart to beat.

If a fifteen-year-old must walk 8,000 steps daily to avoid obesity owing to the way his body processes carbs, we haven't achieved prevention. We've just created a lifetime of behavioral burden. True prevention means Christian Jr. eats foods he enjoys, lives the life he wants, and remains healthy through interventions so seamlessly integrated, he barely notices them.

Why This Won't Happen

Now let me tell you why this beautiful scenario is almost certainly fantasy.

One of my favorite quotes that I use almost every day is by Dr. Paul Batalden, often repeated by Dr. Donald Berwick: "Every system is perfectly designed to get the results it gets."

Our current healthcare system produces exactly what it's designed to produce: massive profits from treating disease, minimal investment in preventing it. The scenario I've just described would require pharmaceutical companies to dispense 10% of their current medication volume. That's not a business model adjustment. That's an extinction event.

But where would research funding come from when you've eliminated 90% of revenue? Yes, pharmaceutical companies charge egregious prices and executive compensation is obscene. But even accounting for that excess, the current system does fund the research that creates new interventions. Cut the revenue by 90% and you gut the innovation pipeline.

Next, insurance companies in the United States have no incentive to keep you healthy long-term. In commercial insurance, patients stay for an average of three years. In Medicaid, maybe three to five years. In Medicare, seven years, mostly because people die. Why would an insurance company invest in preventing a disease that will manifest in fifteen years when you'll likely be someone else's problem by then?

Compare this to the German healthcare system I grew up in. Germans typically stay with the same insurance company for life. Employers pay 50% of premiums, employees pay 50%, and coverage is mandatory. Insurance companies have every incentive to keep you healthy at 40 so you don't cost them a fortune at 60 and 80. Prevention isn't altruism -it's financial self-interest aligned with patient outcomes.

The American system is designed for maximum extraction of profit from sick people. Keeping people healthy is bad

business. The age of prevention would require burning down the economic foundations of modern medicine and rebuilding from scratch.

I don't see that happening by 2040. Do you?

The Roadmap: How We Get There

The age of prevention isn't science fiction waiting on breakthrough discoveries. The foundational technologies exist today or are emerging rapidly. What's missing is systems change and political will.

Precision medicine is the cornerstone. DNA sequencing cost $100 million in 2001. By 2016, it was $1,000. Today, it's around $200 - with some platforms approaching $100 - and increasingly integrated into clinical practice. We can already identify genetic markers that indicate disease proclivity or drug incompatibilities. The next fifteen years will transform this capability from specialized research to standard care.

But precision medicine is more than genomics. It's 3D bioprinting of custom organs uniquely fitted to a patient's biology. It's adoptive cell transfer, where a patient's own genetically modified immune cells are weaponized against cancer. It's health data analytics that cross-references millions of de-identified patient records with genetic profiles to discover which treatments work for which populations - not just "do statins reduce heart attacks?" but "do statins reduce heart attacks in patients with these specific genetic markers?"

This is the shift from population-based medicine to truly individualized care. Not mammograms for every woman over 40, but targeted screening for women whose genetic profiles indicate elevated risk. Not beta-blockers for everyone with an arrhythmia, but medications customized to how each patient's unique biology will respond.

The infrastructure is simpler than you think. We need health systems that financially benefit from keeping people healthy long-term, not from treating them when they're sick. We need regulatory frameworks that enable rather than obstruct preventive interventions. We need to compensate pharmaceutical companies for creating medications that fewer people need rather than ones that everyone takes.

None of this is technologically complex. It's politically complex. It requires dismantling economic incentives that profit from illness and rebuilding them around wellness. The Scandinavian countries are doing this. Other countries do this. The United States could do this.

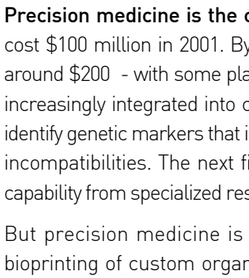
The next generation of clinicians decides what happens next. If you are entering medicine right now, you are doing so at an inflection point. The tools to build the age of prevention will be available during your careers. Whether they're deployed depends on whether you demand and participate in systems change or accept the status quo.

Don't assume the future will be an incremental version of the present. Given the rapid advances with AI, it won't be. The waiting room is not a must-stay feature of healthcare - it's an artifact of a particular moment in history. Previous generations built centralized hospitals and fee-for-service medicine. The next generation can build something radically different.

The last waiting room could close in 2039. The Smithsonian replica could be installed in 2040. Christian Junior could be born into a world where healthcare exists only for births, injuries, and preventive surgeries.

Or you could spend your careers treating preventable diseases in people who should never have gotten sick in the first place.

The technology is ready. The question is whether you are.



Christian Milaster, MS

Founder & CEO Ingenium Consulting Group

Ingenium Digital Health Advisors and Ingenium Healthcare Advisors

Christian Milaster is a telehealth strategist and digital health consultant focused on the intersection of technology and healthcare delivery. He writes the "Telehealth Tuesday" series and serves as a futurist who lives for and contributes to the creation of a better tomorrow. You can find him (virtually) on LinkedIn or via christian@ingeniumadvisors.net.

Addressing Stomach Cancer Disparities

Our Mission

Uniting communities, physicians, and policymakers to create innovative approaches for gastric cancer awareness, prevention, screening, and early detection. SCTF seeks to empower the medical community and governments to ensure equitable access to these services for high-risk populations.

Key Partnerships

Yale School of Medicine
Smilow Cancer Hospital
Lombardi Cancer Center
Georgetown University Medical Center
Cedar Sinai Medical Center
Debbie's Dream Foundation
Hope for Stomach Cancer

Get Involved

Learn more about how you can support stomach cancer prevention and awareness.

Visit: www.stomach-cancer.org Email: SCTFinfo@gmail.com

Dr. Mun K. Hong's Reflection

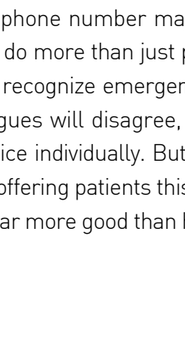
An Open Line of Care; Why I Still Give Patients My Cell Number

When I became the cath lab director at the former St. Luke's-Roosevelt Hospital in Manhattan, I asked my assistant to include my cell phone number on my name card. She hesitated and asked more than once if I was sure -that perhaps it wasn't prudent to give patients and referring physicians direct access at all times. Even my wife was skeptical. But I was convinced that more good would come from this simple gesture than inconvenience from untimely calls.

At the same time, I was also participating in a Korean-language radio call-in program, where listeners could ask me medical questions. I asked the host to announce my cell number at the beginning and end of every broadcast. She was astonished that I would be so open with my contact information.

Over the years, many people did call me -always during the day, always apologetic for "bothering" me, and always grateful. I would reassure them that it was never a burden and that I was glad to help. Only once did I get a call in the middle of the night. It was from a Korean patient who had previously undergone bypass surgery for long-standing diabetes. Her voice alone told me she was in heart failure. I urged her to call 911 and promised to meet her in the emergency room. She was found to have a severe blockage in one of her bypass grafts, but fortunately no heart attack. I was able to perform an urgent stent procedure. Many years later, her brother, having written down my phone number from one of the Korean call-in programs, called to let me know she had passed away from cancer, but he thanked me again for being there that night.

I share this story because physicians often struggle with the question of boundaries -whether to limit conversations to the office or hospital, or whether to extend ourselves beyond those walls. Giving patients (and even strangers) access through a personal phone number may feel risky, but our training allows us to do more than just provide reassurance -we can sometimes recognize emergencies that save lives. I know many colleagues will disagree, and each physician must make that choice individually. But I remain convinced that, in the balance, offering patients this measure of access and comfort can do far more good than harm.



Mun K. Hong, MD, MHCM, FACC

Dr. Mun K. Hong, born in Seoul, Korea, immigrated to America at age 15. He earned his BA-MD from Johns Hopkins University School of Medicine in 1986 and completed residencies and fellowships in internal medicine and cardiology at Johns Hopkins, Georgetown, and the Washington Hospital Center. Dr. Hong has held leadership roles, including Director of Cardiovascular Intervention at Weill Cornell and Chairman of Cardiology at Medstar Southern Maryland Hospital. He currently practices at Bassett Hospital Center as Inaugural Chief of Cardiovascular Services. A dedicated mentor, he sponsored over 10 interventional cardiologists from Korea, helping them achieve significant academic success. During the pandemic, he earned an MHCM from Harvard. Dr. Hong enjoys family time with his wife of 37 years and their three children in New York City.

Every Patient Tells a Story
Medical Mysteries and the Art of Diagnosis

Student Perspective

Lisa Sanders's *Every Patient Tells a Story* is a remarkable book that draws readers into the art of diagnosing a patient's medical condition. Sanders outlines the approaches used by physicians in tackling difficult or rare cases and emphasizes the importance of listening to a patient's full story, consulting colleagues as resources, and looking beyond technology in the search for answers.

Each case is presented as it originally came to the physician, and readers are invited to step into the doctor's mind as they work through the possibilities. We are reminded that diagnosis is not simply about test results, but about careful observation, reasoning, and patient narratives. Sanders challenges us to put on our detective hats, look past modern diagnostic tools when needed, and uncover the truths hidden in each patient's story.

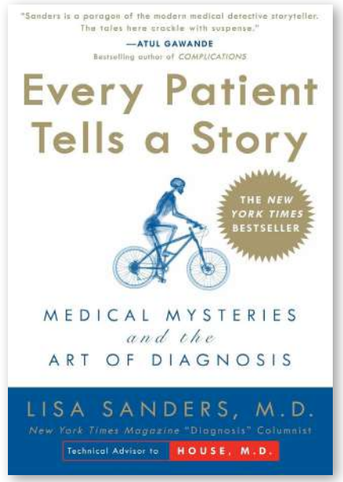
Central to this process is communication-listening to the patient for vital clues, engaging colleagues to share insights, and explaining findings back to the patient in a way that connects their story with the broader body of medical knowledge. Too often, this communication is hindered by the time constraints of appointments or by a lack of rapport between patient and provider, which can make patients hesitant to share their full story. Sanders addresses these barriers and underscores the studies that validate the value of communication in effective diagnosis.

This book is not only for medical professionals but also for patients who tirelessly seek answers and for anyone fascinated by the art and challenge of diagnosis. Sanders, herself a physician, demonstrates empathy and insight as she tells these real-life cases. Readers can expect to be entertained, moved, and intellectually engaged by this compelling and thought-provoking read.

Reviewed by Elizabeth Speight, PharmD Candidate

Elizabeth Speight is a second-year pharmacy student attending the Harrison College of Pharmacy at Auburn University. She is an Albert Schweitzer Fellow working with a partner to provide Internet Safety for children in grades 4-7.

Listening to Stories in Medicine
Reflections from Both Sides of the Stethoscope



By Lisa Sanders, MD.

Expert Perspective

As a practicing surgeon, I found Lisa Sanders' *Every Patient Tells a Story* both refreshing and humbling. In surgery, we often focus on the tangible-the anatomy we can see, the pathology we can remove, the outcomes we can measure. Yet Sanders reminds us that every patient encounter begins long before the operating room, with a story.

Her cases illustrate how diagnosis is rarely straightforward. Patients do not present themselves as textbook examples; instead, they come with fragmented narratives, subtle clues, and emotions interwoven with symptoms. Sanders emphasizes the importance of listening carefully, a skill that is as vital for a surgeon as it is for an internist. A missed detail in the patient's story can sometimes matter as much as a missed finding on a CT scan.

What resonated deeply with me was her insistence on the human side of medicine. In the Korean medical culture, as in many others, efficiency and technical excellence are often prized. But Sanders gently reminds us that medicine is not merely about solving problems-it is about understanding people. Every patient who walks into our clinic or operating room carries not just a disease, but a story that deserves to be heard.

This book reaffirmed something I often try to hold onto in my own practice: behind every diagnosis, behind every surgical decision, is a human being whose story should guide us just as much as our clinical training and technology.

Reviewed by Sanghyun Alexander Kim, MD

Dr. Sanghyun Alexander Kim completed his Colorectal Surgery fellowship at Mount Sinai Medical Center in 2005 and has since been a key member of its surgical faculty. Over nearly 20 years, he has trained fellows and residents in Colon and Rectal Surgery while focusing on Colon/Rectal Cancer, Fecal Incontinence, IBD, Robotic Colon Surgery, and Painless Hemorrhoidectomy. Renowned for expertise in TEMS and Robotic TAMIS for early rectal malignancies, he performs 80-100 robotic colon and rectal resections annually. Dr. Kim directs multiple satellite offices serving diverse populations, including Korean and Hispanic communities, and partners with organizations to treat uninsured and underserved patients in New York and New Jersey.

Your Voice in Medicine: A Space for Career Reflections and Conversations

Medicine is more than a profession - it's a journey, often uncertain, sometimes overwhelming, and always deeply personal. Whether you're a medical student wondering where you belong, an intern wrestling with career choices, or a young physician deciding between academia and private practice, your questions and reflections matter.

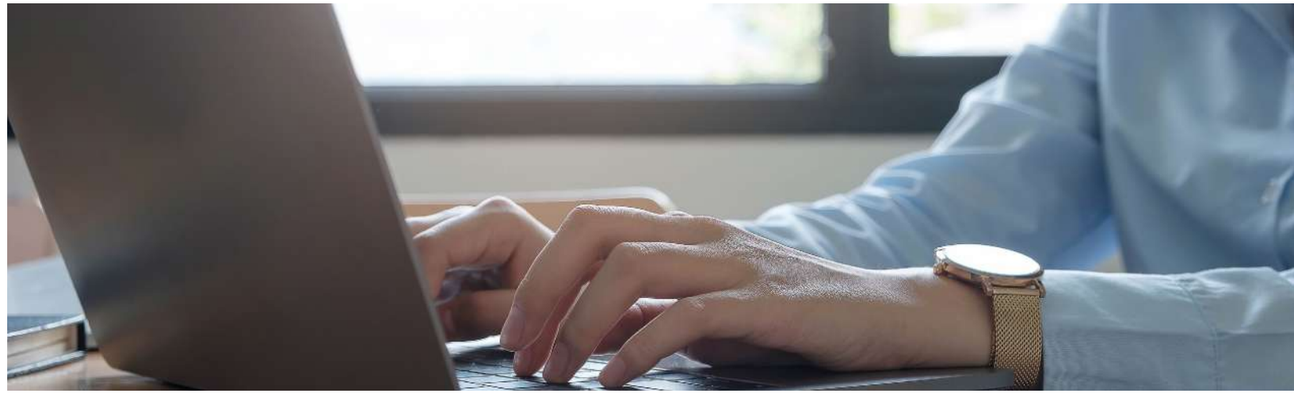
At NexBioHealth, our Career Development section is becoming a space for open dialogue - a place to ask, to doubt, to rediscover passion and purpose. We invite students, residents, and early-career clinicians to write to us with your stories, questions, and reflections on your path in medicine.

Tell us about the moments that made you question your direction, the mentors who changed your course, or the ideas you wish someone had shared earlier. If you're struggling to decide between specialties, or trying to find meaning beyond the daily grind, you're not alone - and this is your space to explore that honestly.

We also welcome thoughtful disagreements or alternative views on any of the topics we publish. Letters to the Editor and short commentaries will be featured in our Correspondence section, because true progress begins with dialogue.

Don't hesitate to write. Your story - and your questions - could help others find their way too.

Send your reflections or questions to:
nexushealthhubed@gmail.com



In our ongoing "Dear Mentor" series, medical students submit anonymous questions about the challenges they face in training and beyond. Our mentors-residents, fellows, and attending physicians-share their perspectives to encourage and guide the next generation of healthcare professionals.

For this issue, Phillip Wang, MD, a psychiatry resident, responds to two student submissions: one on the evolving role of AI in patient care, and another on the difficult transition into clinical rotations.

Question 1: The Challenges of AI in Healthcare

Dear Mentor,

I am currently a second-year student, and I am looking forward to receiving more hands-on experience during my third year. With AI on the rise, I keep hearing "AI will replace doctors" and "AI can diagnose as well as doctors!" While I hope that AI will not eventually take over educating patients in place of doctors, I wonder how AI could work hand in hand with doctors to help bolster patient education.

I am curious to know if you have experience with patients coming in and more often saying they asked AI about a medication or diagnosis. How do you educate patients who may rely on AI for medical knowledge?

Thank you!

Dear X,

Thank you for the fantastic question! I think it is great that you are already thinking about this as a medical student. AI has become so interwoven in our everyday lives, and things are changing so rapidly. This response may not even be relevant when you are a resident or attending, but here goes!

On the patient side, we're already seeing tools like Grok's "Doc" persona and ChatGPT-5 marketed directly as sources of health advice, with language like: "GPT-5 is our best model yet for health-related questions, empowering users to be informed about and advocate for their health." As these tools become more accessible, patients will turn to AI for quick answers

when they can't reach their doctor. On the physician side, AI scribes can automatically generate notes from ambient recordings of office visits, and services like OpenEvidence can help physicians sift through medical literature to answer complex clinical questions. These tools will only become more widely available, and I bet the paperwork burden will have already decreased drastically by the time you're a resident!

Personally, I would rather my patients seek information from AI than rely on TikTok or other platforms that often spread questionable health advice. That said, as a psychiatry resident, I've seen some patterns that give me pause. A few patients have turned to AI to function as a therapist, while others with psychosis have had their symptoms worsen through spiraling interactions with chatbots that unintentionally reinforce delusional beliefs.

When patients bring up information they've gotten from AI, I try to approach it with curiosity rather than immediately dismissing it. Often, the information it gives is accurate and can be helpful in raising concerns that patients would not have had the courage to otherwise. I try to counsel patients on how large language models work- that they generate text by mathematically predicting the next word. While AI may sound confident, it is still prone to hallucinations as it cannot "know" truth because it has no fundamental way of encoding truth as a concept.

I also remind patients that while AI can provide general knowledge, it can't replace the physician–patient relationship. As their doctor, you bring an understanding of their personal history, values, and unique health circumstances that allows you to guide decisions in a way no algorithm can.

Finally, as a harm reduction approach, if a patient wants to continue using AI, I suggest they include a line in their prompt such as: "Please only derive your information from peer-reviewed or medically accepted sources, and cite those sources so I can refer to them." This gives us a starting point to review the actual references together and helps ensure the information they're seeing is accurate.

I hope this helps!

Philip Wang, MD

Question 2: How Can I Manage Everything?

Dear Mentor,

I am a third-year medical student, and I just started my clinical rotations. After hearing from other fourth-year students, it seems that the last two years are the most challenging parts of medical school due to heavy clinic schedules, shelf exams, and intense patient cases. I'm worried about how to manage the long hours, the steep learning curve, and my studies while still maintaining my well-being.

Can you please share some tips or strategies for balancing personal wellbeing with clinical duties and academic workload? How can I make the most of rotations academically, while also preventing burnout and sustaining stability beyond the hospital?

Dear X,

Thank you for the thoughtful question! The transition from the pre-clinical to clinical years in medical school is certainly challenging, and I want to empathize with what you are feeling.

To give some context to my perspective, my clerkship year was a bit different from the typical experience of M3s. I was lucky enough to attend a school that did not have any clerkship grades and where shelf exams were optional, which removed significant stress from the typical clerkship experience. Even without grades, I consistently received strong feedback on my rotations. That being said, the year was still extremely challenging, and I think I have some unique perspectives to share due to my clerkship experience and now being a resident.

First, I want to validate that being an M3 is tough! I was often the least knowledgeable and least experienced person in the room, and I often felt like I didn't have an essential role on the team and was simply in the way of actual healthcare being done. What helped me most was clear communication-at the start of each rotation, talk with your resident about their expectations and how you can function best within the team. This will cause you to second-guess yourself less, which was a big source of my stress.

Second, the most valuable thing you can offer as an M3 is your time, which you have in excess compared to your residents (although it might not feel like it). You will probably be assigned one or two patients to start. Know these patients inside and out. Read their charts closely, study their conditions, and truly understand their care plan.

Finally, find a healthy balance between caring and not caring. Be invested in learning, take excellent care of your patients, and show that you're growing both on and off the wards. But don't hound the residents with constant questions, and absolutely leave when you are dismissed. I think by not having grades, I felt less pressure to be a people pleaser and insert myself unnecessarily, and ironically, my evaluations were better because of that.

The rest of my advice is fairly standard but still important: protect time for the things you love outside of medicine, find a study schedule that fits your learning style, and strike a balance between shelf exam preparation and preventing burnout. Lean on your support system whenever you need to.

As a last bit of advice-and this may vary based on your school-but the last half of M4 year for me was the calmest time I've had in my academic career, so you really only need to lock in for about 1.5 years. It's cliché, but the days are long and the months are short; it will be over before you know it!

Philip Wang, MD

Philip Wang, MD

Dr. Philip Wang is a PGY-2- psychiatry resident at Brigham and Women's Hospital in Boston. He went to Auburn University for college and then completed medical school at the Cleveland Clinic Lerner College of Medicine. Academically, he is interested in psychosis, addictions, palliative care, and psychedelics and some of his hobbies include birdwatching and hiking.

Q&A with Dr. Hubner: Utilizing AI for Medical Student Success

I wrote my responses first, then asked both Claude and ChatGPT for "suggestions to reduce redundancy and improve clarity". I then compared their outputs, selected what was useful, and revised my draft accordingly. In this way AI is the tool that helped me refine my draft.

How would you define "AI" in the medical education context?

AI is an umbrella term for tools that act intelligently by spotting patterns, analyzing data, or generating language. In the medical education context, AI typically refers to tools like GPT chatbots, adaptive learning systems, image recognition tools, or simulators that provide feedback. These are applied across med ed including admissions, teaching, assessment, and clinical training.

What advantages does utilizing AI create compared to not using it?

AI can support teaching and learning when paired with human judgment. AI reduces repetitive tasks (ex., logging procedures or screening applications), helps flag bias, and speeds up literature searches. For learners, it supports personalized study with question generation, feedback, and multimodal content (ex. audio, visuals, mind maps).

Why do you recommend utilizing AI in medical school? How can students implement it? Does it serve as a tool? As a replacement? As a distractor?

Students should learn AI because it is shaping healthcare and academic medicine. AI is a tool that enhances study and supports clinical reasoning. However, AI is not an easy button! It should not be a replacement for human judgment. If overused or used uncritically, it risks undermining learning.

I like to think of AI as another resource in the toolbox. The value for learners comes from how they use it to identify and begin to fill knowledge gaps; evaluate and question outputs, etc.

Are medical schools actively implementing AI into the curriculum? If so, how could/does it look like? Are there any obstacles associated with implementation?

Yes. The AAMC has dedicated resources for the work medical schools are doing in this area. https://www.aamc.org/about-us/mission-areas/medical-education/artificial-intelligence-and-academic-medicine

At UAB, the AI in Medicine Graduate Certificate gives learners foundations in AI applications, ethics, and integration into clinical workflows. UAB also hosts many AI-focused research labs across medicine, neurology, radiology, pediatrics, oncology, and microbiology.

One of our preclinical modules encourages students to generate and critique an AI response to questions on the student/faculty shared Q&A document. The goal is to help students practice critical evaluation and not just accept AI answers at face value and to engage in self-directed study rather than waiting for the professor's response.

Challenges include lack of faculty training, data bias, hallucinations, ethical concerns, cost, uneven student access, and the need to preserve human judgment and empathy.

Is there any research being done that shows AI being more beneficial? From your experience, does using AI seem to have a significant impact on performance?

Yes. Studies show AI models can fairly and accurately screen applications, assess surgical skill, grade

OSCEs, and predict exam performance. Virtual patient simulators and tutoring systems improve clinical reasoning. Large language models already pass some medical exams, and AI-generated multimodal content appears to enhance retention. Generative AI can turn dense text into study aids that support retention. Long-term impacts, however, are still unclear.

Even though there are many advantages to AI, are there any situations where using AI should be limited? Are there any limitations to AI?

AI lacks human reasoning, context, and compassion. Limitations include hallucinations, data bias, unclear processes, over-reliance, and risks to privacy. AI wants to please the user and responses on the same topic degrade when the user tries to dig deeper. AI also isn't as strong when questions need really specific, up-to-date, or highly specialized information. It can make mistakes especially with images or data that aren't text-based.

For students, AI cannot replace failure, risk, and emotional feedback which are key elements of learning.

What is the wrong way to utilize AI? (if there is)

- As the "easy button"
- Blindly trusting outputs.
- Using it to write assignments or replace reasoning.
- Generating assessments without review.
- Ignoring ethics, privacy, or bias.

In sum, using AI as a substitute for your own thinking instead of using AI as a support tool.

What skills should students have before approaching AI? How can you encourage critical thinking with a tool that quickly formulates an answer?

Students need basic AI literacy, critical analysis, information literacy, and awareness of ethics and bias. We can promote:

- Self-directed learning skills: setting goals, monitoring progress, and evaluating when AI is helping versus hindering.
- Metacognition: reflecting on how they're learning and how reliable the AI outputs are.
- Critical analysis: questioning accuracy and identifying bias.
- Ethical awareness: recognizing privacy and professionalism concerns.

Educators can help by asking students to critique AI answers, develop assignments and exams that promote integration over recall, and model their own reflective process (ex. "Here's how I check if this answer makes sense").

What are your recommended sources of AI that students can use? What are the best ways to utilize these tools?

ChatGPT, Gemini, AMBOSS GPT, NotebookLM: for summaries, practice questions, multimodal study aids.

OpenEvidence: for evidence-based clinical decision support.

Brook A. Hubner, Psy.D.

Dr. Brook A. Hubner is an Assistant Professor in the UAB Heersink School of Medicine Department of Medical Education and Director of the Academic Success Program. An educational psychologist, she combines practitioner expertise in curriculum development with research on learning science and educational technology. She develops programs that strengthen medical students' self-regulated learning and resilience and that support their professional identity development.

NexBioHealth values open dialogue and the exchange of diverse perspectives within the medical community. In our 4th edition, medical student Sanjana Sharma contributed an op-ed titled "Inclusive Education is Life-Saving." In response, Dr. Michelle Cretella and Dr. Andre Van Mol offer a thoughtful counterpoint, encouraging readers to examine both sides of the discussion through available data and research.

Sharma's Claims for Inclusive Comprehensive Sex Education Are Contestable

Sharma's op-ed "Inclusive Education is Life-Saving," which argues comprehensive sex education (CSE) add LGBTQ material, assumes these five falsehoods:

- LGBTQ identified youth are unacknowledged in curricula.
- Adolescent sexual activity is unavoidable and healthful.
- LGBTQ sexual behavior is innate and healthful.
- Health disparities between heterosexually and LGBTQ identified youth are due solely to minority stress
- And finally, that CSE is effective.

LGBTQ-identified students are anything but unacknowledged. The National Education Association and the American Federation of Teachers have partnered with Planned Parenthood, the Human Rights Campaign and the Gay Lesbian Straight Education Network for decades. Consequently, LGBTQ themes are ubiquitous across curricula .[24]

The CDC reports a significant decrease in adolescent sexual debut from 2003-2023. Nearly 70% of high school students are virgins, proving youth are capable of abstinence.[25] In addition to making healthier life choices than their sexually active peers, sexually abstinent youth also avoid the adverse consequences of premature sexual activity: teen pregnancy, childbirth and abortion; sexually transmitted diseases and infertility; sexual violence; depression and suicide.[26]

A 2019 study revealed same-sex sexual behavior is not genetically predetermined.[27] This is important since LGBTQ-identified youth are at greater risk of experiencing all negative consequences of sexual activity. These health disparities also exist in LGBTQ-affirming countries where minority stress is minimal; even higher rates of attempted suicide are not explained by discrimination.[28],[29] Adverse childhood events and high-risk behaviors may be larger contributors to these health disparities than minority stress.

Anal intercourse is high-risk for trauma and infection. The large intestine, in contrast to the vagina, is not a receptive organ; it is structured to excrete feces. Semen has immune-suppressant activity which promotes fertilization during vaginal intercourse, but increases infection and cancer risk during anal intercourse. Consequently, the risk of contracting HIV from a single act of receptive anal intercourse is 20 times greater than for receptive vaginal intercourse.[30] Anal sex is also more likely to facilitate HPV infection resulting in anal and rectal cancer.[31],[32] Women who have sex with women are also at higher risk for STDs and other health problems than are heterosexual women.[33] As lesbian-identified scholar Camille Paglia states, "[I]n nature, procreation is the single relentless rule. That is the norm... Our sexual bodies were designed for reproduction."[34]

Due to how humans are innately structured for reproduction, human sex is binary and immutable. According to the DSM-5, sex is the "Biological indication of male and female (understood in the context of reproductive capacity), such as sex chromosomes, gonads, sex hormones, and nonambiguous internal and external genitalia."[35] Two sexes exist because only two gametes exist: sperm and ova. The colloquialism "intersex" refers to rare disorders of sex development (DSD) in male or female patients. DSD are deficiencies and malformations of the reproductive system associated with impaired fertility. Sex is determined at fertilization and registered in every nucleated cell of the body.[36]

CSE programs, created by the Sexuality Education Information Council of the United States (SEICUS) and Planned Parenthood have proliferated in schools for over three decades. Based on the secondary public health principle of risk reduction, they are touted as "effective" at reducing teen risk behavior, pregnancy and STDs.[37] Yet, U.S. teen pregnancy and STD rates are still among the highest of industrialized countries. Why?[38],[39]

In 2024, the Institute for Research and Evaluation

24) National Education Association "Defending the Freedom of Our LGBTQ+ Students to be Themselves." NEA website accessed September 17, 2025; American Federation of Teachers "Our Bullying Prevention Partners." AFT website accessed September 17, 2025; Planned Parenthood "Info and Resources for LGBTQ+ Teens and Allies." PP website accessed September 17, 2025; Human Rights Campaign Foundation "Welcoming Schools Trainings and Resources Benefitted a Record 600,000 Students During Year of Unprecedented Attacks on LGBTQ+ Inclusion." HRC website accessed September 17, 2025; Gay Lesbian Straight Education Network "Our Work." GLSEN website accessed September 17, 2025; GLSEN LGBTQ Inclusive Curriculum Resource accessed September 17, 2025 from https://www.glsen.org/activity/inclusive-curriculum-guide.

25) Lifetime sexual intercourse | YRBS-Graph | CDC (2023)

26) Ihongbe TO, Cha S, Masho SW. Age of Sexual Debut and Physical Dating Violence Victimization: Sex Differences Among US High School Students. Journal of School Health. 2017 Vol. 87(3):200-208; Hallfors DD, Waller MW, Ford CA, Halpern CT, and Brodish PH, Iritani B. "Adolescent Depression and Suicide Risk: Association with Sex and Drug Behavior. American Journal of Preventative Medicine. 27 (2004): 224-230; McIlhaney, J and McKissic Bush, F. Hooked: New Science on How Casual Sex is Affecting Our Children. Northfield Publishing, Chicago. 2008, pp.77-78.

27) Gana A et al. "Large-scale GWAS reveals insights into the genetic architecture of same-sex sexual behavior." Sciene. Available here Large-scale GWAS reveals insights into the genetic architecture of same-sex sexual behavior | Science; Also see "Born That Way" No More: The New Science of Sexual Orientation - Public Discourse Accessed September 17, 2025.

28) Bailey JM. It is Time to Stress Test the Minority Stress Model. Arch Sex Behav. 2021 Apr;50(3):739-740. doi: 10.1007/s10508-021-01912-1. Epub 2021 Feb 3. PMID: 33534042; Bailey JM. The Minority Stress Model Deserves Reconsideration, Not Just Extension. Arch Sex Behav. 2020 Oct;49(7):2265-2268. doi: 10.1007/s10508-019-01606-9. Epub 2019 Dec 18. PMID: 31853696.

29) Wang, J., Ploderl, M., Hausermann, M., & Weiss, M. G. (2015). Understanding suicide attempts among gay men from their self-perceived causes. Journal of Nervous and Mental Disease, 7, 499-506. http://dx.doi.org/10.1097/NMD.0000000000000319

30) Pinkerton SD, Martin JN, Roland ME, Katz MH, Coates TJ, Kahn JO. Cost-effectiveness of postexposure prophylaxis after sexual or injection-drug exposure to human immunodeficiency virus. Arch Intern Med. 2004 Jan 12;164(1):Table 4, p.50. doi: 10.1001/archinte.164.1.46. PMID: 14718321.

31) Potterat JJ, Brewer DD, Brody S. Receptive anal intercourse as a potential risk factor for rectal cancer. Cancer. 2011 Jul 15;117(14):3284; author reply 3284-5. doi: 10.1002/cncr.25909. Epub 2011 Jan 18. Erratum in: Cancer. 2012 Mar 1;118(5):1470. PMID: 21246539. Available here Receptive anal intercourse as a potential risk factor for rectal cancer - Potterat - 2011 - Cancer - Wiley Online Library Accessed September 17, 2025.

32) The Federal Health Group website Understanding the Link Between HPV and Anal Cancer: Answers to Your Most Pressing Questions December 19, 2024. Accesssed September 17, 2025.

33) CDC website Women Who Have Sex with Women (WSW) and Women Who Have Sex with Women and Men (WSWM) accessed September 17, 2025.

34) Paglia C. Vamps & Tramps: New Essays. Vintage Books, NY; 1994.

35) American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed;p. 829; 2013.

36) Sax L. website https://www.leonardsax.com/how-common-is-intersex-a-response-to-anne-fausto-sterling/; American College of Pediatricians. General FAQs - Biological Integrity (2025). Accessed September 17, 2025.

37) Goldfarb ES, Lieberman LD. Three Decades of Research: The Case for Comprehensive Sex Education. J Adolesc Health. 2021 Jan;68(1):13-27. doi: 10.1016/j.jadohealth.2020.07.036. Epub 2020 Oct 12. PMID: 33059958.

38) OPA/HHS website Data and Statistics on Adolescent Sexual and Reproductive Health | HHS Office of Population Affairs accessed September 17, 2025.

39) World Population Review website STD Rates by Country 2025 accessed September 17, 2025.

(IRE) analyzed seven systematic literature reviews of school-based CSE applying public health standards of effectiveness. IRE found no long-term evidence of improvements in abstinence, consistent condom use, or reduced rates of pregnancies and STDs in the same program.[40] One of the systematic reviews identified 6 CSE programs with significant negative effects: increases in sexual initiation, higher rates of oral sex without condoms, lower levels of contraceptive use, and increases in teen pregnancy.[41] Given Planned Parenthood's financial conflict of interest, these findings are not surprising.

A promising alternative exists: sexual risk avoidance education (SRAE). When the IRE analyzed SRAE in schools the evidence-though limited-was more positive:

> [E]vidence of effectiveness ... appeared somewhat greater than for CSE in U.S. schools (seven AE studies vs. three CSE studies) and the overall success rate ... at 47%, [was] higher than that of school-based CSE in the U.S., at 15%. Moreover, the prevalence of negative effects appeared somewhat lower for AE (6%) than for CSE in U.S. schools (12%).[42]

SRAE is based on the primary public health principle of risk avoidance which the CDC has long acknowledged:

> Abstinence from vaginal, anal, and oral intercourse is the only 100% effective way to prevent HIV, other STDs, and pregnancy. The correct and consistent use of male latex condoms can reduce the risk of STD transmission, including HIV infection. However, no protective method is 100% effective. And condom use cannot guarantee absolute protection against any STD or pregnancy.[43]

SRAE teaches six universally transferrable principles:

1) Sexual delay is a protective factor for sexual health.
2) The fewer lifetime partners a person has, the healthier the sexual outcomes.
3) Teen sex is high-risk but certain behaviors are especially risky, even with a condom.
4) Healthy relationships have a greater opportunity to develop when they are not complicated with sexual activity.
5) Setting boundaries, learning refusal skills, and acquiring date-rape prevention strategies help to prevent victimization.
6) Reserving sex for a lifetime, sexually faithful, monogamous relationship with an uninfected partner is the best protection against contracting STDs or sexually transmitted HIV.[44]

40) Institute for Research and Evaluation website. Seven-research-reviews-show-lack-of-CSE-effectiveness-in-schools-July-24-2024.pdf accessed September 17, 2025.

41) Institute for Research and Evaluation website. Re-Examining the Evidence for Comprehensive Sex Education in Schools in the United States. December 17, 2019. Accessed September 17, 2025.

42) Institute for Research and Evaluation website Global_CSE_Report_12-17-19.pdf accessed September 17, 2025.

43) CDC website Sexual Risk Behaviors | Reducing Health Risks Among Youth | CDC

44) Ascend Website SRA & Gay Teens (2022) accessed September 17, 2025.

Contrary to critics' claims, effective SRAE is medically accurate, discusses condoms and contraceptives, and has helped students commit to abstinence without decreasing condom or contraceptive use.[45]

Sharma writes through the narrow lens of minority stress theory, which overlooks important realities. Sharma advises "those in places of influence" to "mobilize ... public health education towards positive sexual health outcomes for LGBTQ individuals." However, inclusive CSE already fails to provide positive outcomes for LGBTQ-identified students, let alone all students. More of the same is not the answer. Adolescent sexual activity is harmful. Long-standing evidence indicates failure of CSE programs. But promising early evidence for SRAE, alongside CDC data, indicate adolescents are capable of sexual abstinence. This is good news upon which to collaborate.

"NexBioHealth encourages readers and others to submit articles for consideration for publication. We strive to provide a neutral forum where writers can express their views and engage in robust debate. That principle extends to controversial topics, such as those discussed in the two articles presented here. Subjects such as this tend to engender strong opinions, often passionately expressed. So long as authors are respectful of their opponents, NexBioHealth is open to forceful advocacy and muscular rebuttals. While we ourselves take no position on issues such as this, we encourage readers to come to the question with open minds, to give a fair reading to both articles, to weigh them impartially, and to form their own opinions."

45) Institute for Research and Evaluation website. An Evidence-Based Rebuttal to a Critique of Abstinence Education. May 2020. Accessed September 17, 2025.

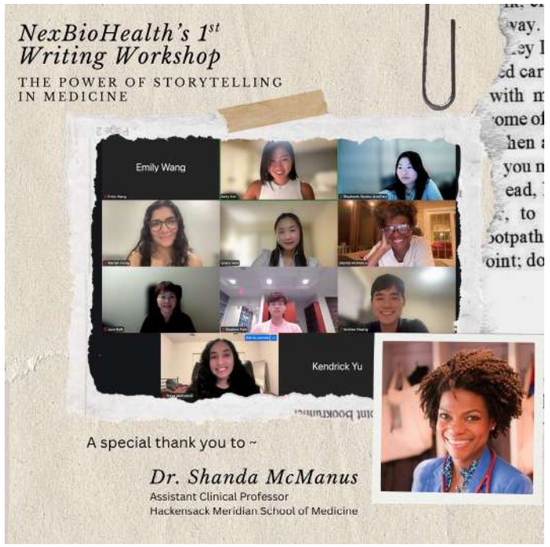
Michelle Cretella, MD

Michelle Cretella, MD is a pediatrician, writer and speaker. She is the past executive director of the American College of Pediatricians and is the current Chair of its Adolescent Committee. She received her medical degree in 1994 from the University Of Connecticut School Of Medicine. She completed her internship and residency in pediatrics in 1997 at the Connecticut Children's Medical Center in Hartford, Connecticut. She completed a fellowship in College Health through the University of Virginia in 1999 and has practiced in general pediatrics with a special focus in behavioral health. She serves as a peer reviewer for the Journal of American Physicians and Surgeons, Issues in Law and Medicine, and the International Journal of Behavioural and Healthcare Research.

André Van Mol, MD

André Van Mol, MD is a board-certified family physician in full-time practice in California. He co-chairs the Christian Medical & Dental Associations Sexual & Gender Identity Task Force and is the transgenderism scholar for both the CMDA and the American Academy of Medical Ethics. He works with Alliance Defending Freedom in a coalition of professionals advising on policy matters addressing sexual orientation and gender identity. His education included the University of Southern California, the Medical College of Wisconsin, Charleston Naval Hospital, and the Naval Aerospace Medical Institute.

The Power of Story in Medicine: Reflections from the NexBioHealth's 1st Writing Workshop



On September 18, 2025, the Student Advisory Committee held their first writing workshop on narrative medicine with a special guest, Dr. Shanda McManus. Dr. McManus is a family medicine physician who writes about the intersection of life, race, and medicine. She is an Assistant Professor of Clinical Medicine at Hackensack Meridian School of Medicine, where she champions Narrative Medicine.

During the writing workshop, students read and reflected on "GIRL" by Jamaica Kincaid, sharing their personal stories for pursuing medicine and how they have a responsibility to communicate with compassion to patients. The writing workshop focused on how medical students and physicians can use stories in medicine and how stories can shape their identity as healthcare providers. Students engaged in thoughtful conversations of how patients may go through overwhelming moments when met with difficult health challenges and rigorous care routines, and they spoke about how they can show sensitivity and sympathy while promising quality care. Towards the end, students wrote their own piece after reflecting on the emotions "GIRL" evoked and spoke about their experience being patients themselves or studying as medical students.

The workshop offered students a unique opportunity to explore how narrative can not only enrich their practice of medicine but also ground them in empathy and human connection.

By Grace Ham, SAC Coordinator

NexBioHealth is more than just a magazine it's a global community for the next generation of medical professionals.

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UPCOMING CONFERENCE ALERT

APHA 2025 Annual Meeting & Expo

Dates: November 2–5, 2025
Location: Washington, D.C.

Focus: Gathering public health leaders to discuss health equity, policy, and innovations in public health practice.

https://www.apha.org/events-and-meetings/annual

National Alliance for Care at Home Annual Meeting & Exposition

Dates: November 2–4, 2025
Location: New Orleans, LA

Focus: Exploring trends and challenges in home health, hospice, and community-based care.

https://allianceforcareathome.org/event/the-national-alliance-for-care-at-home-fall-conference

Global Missions Health Conference (GMHC 2025)

Dates: November 6–8, 2025
Location: Louisville, KY

Focus: Bringing together healthcare professionals, students, and organizations passionate about global health and medical missions.

https://www.medicalmissions.com/events/gmhc-2025

AASLD The Liver Meeting 2025

Dates: November 7–11, 2025
Location: Washington, D.C.

Focus: Hosted by the American Association for the Study of Liver Diseases (AASLD), this premier hepatology conference highlights advances in liver research, clinical care, and global health collaboration.

https://www.aasld.org/the-liver-meeting

Ambulatory Care Conference (In-Person)

Dates: November 5, 2025
Location: Chicago, IL

Focus: Covering standards, regulations, and best practices for outpatient and ambulatory care settings.

https://store.jcrinc.com/ambulatory-care-conference-in-person-november-5-2025

Innovations in Medical Education (IME) Conference 2026

Dates: February 11–12, 2026
Location: Los Angeles, CA & Online

Focus: Exploring cutting-edge methods and innovations in medical education for students and faculty.

https://sites.usc.edu/ime-conference

WHX Dubai (formerly Arab Health)

Dates: February 9–12, 2026
Location: Dubai, UAE

Focus: One of the world's largest medical exhibitions, showcasing global healthcare innovations and industry networking.

https://www.worldhealthexpo.com/events/healthcare/dubai/en/home.html

Primary Care Conference Hawaii 2026

Dates: February 23–26, 2026
Location: Honolulu, HI

Focus: Comprehensive updates in primary care, family medicine, and internal medicine for practicing clinicians.

https://www.cmemeeting.org/cme-conferences/maui-hawaii-winter-cme-2026

UPCOMING ISSUE

Medical Education: Reimagining How We Learn, Teach, and Connect

If our November issue asked how artificial intelligence is reshaping medical education, the February 2026 issue will widen the lens to a broader question: What should the future of medical training look like?

This upcoming issue will continue the dialogue about technology, empathy, and the evolving identity of the physician-educator-while opening space for new questions that medicine has yet to answer.

We could potentially explore how telehealth and virtual care might find their place in the medical curriculum, and whether skills such as digital literacy, AI interpretation, and communication through screens should become core competencies for every trainee.

We may also look at how to preserve humanism in an increasingly digital age, integrate ethics and social context into training, and redefine mentorship and collaboration in a global, interconnected world. Finally, we hope to reflect on student well-being and resilience-how to build learning environments that nurture rather than exhaust.

Together, these explorations will return to a simple but essential question: not only what we teach, but how we teach-and how medicine can educate for wisdom as well as knowledge.

The NexBioHealth Editorial Team

Stay tuned for this engaging and thought-provoking issue, coming February 2026!

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With world-class research and technology
we are opening a new future in medicine