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A 2030 Vision for the Mayo Clinic Department of Medicine

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) challenged academic medical centers to adapt to a public health crisis while continuing to advance transformations designed to address challenges in health care predating the epidemic. The Department of Medicine at Mayo Clinic in Rochester, Minnesota, developed a 2030 strategic plan guided by Mayo Clinic core values aligned with our multidisciplinary approach to care. Teams reimagined virtual medicine, intelligent and assistive technologies, and care processes to transform global health care delivery into inclusive patient-centered[1] models. The leadership team developed the 4 pillars framework around which multidisciplinary "learning teams"[2] crafted the vision of future health care delivery with enhanced digital capabilities. Each encompassing a vision and key milestones, the 4 pillars represent the key domains in which to strategically invest resources along the way to achieve the 2030 Mayo Clinic vision (Figure).

THE 4 PILLARS

Practice Innovation

We believe that the traditional model of health care delivery with patients in examining rooms has experienced slow or no innovation relative to that witnessed in other industries. Models of health care delivery require advancement to meet contemporary and future patient needs. The vision of the practice innovation pillar is to advance health care solutions to meet the needs of people where they are. *People* refers to patients, health care professionals, and healthy individuals, including those across the globe who may not physically visit a Mayo Clinic site. Health consumerism is driving medical institutions to advance current care models toward solutions building on paradigms such as "the patient will see you now." We will innovate approaches to deliver care in physical locations optimally suited for the health care consumer.[3] Health care will move beyond the traditional patient-health care professional interaction and offer flexible, responsive, and intelligent-by-design care solutions.

Medical institutions of the future will accompany individuals along their journeys through both illness and health. Achieving this vision necessitates simultaneous advancement and integration of models of both care delivery and medical education, in-person and virtual and synchronous and asynchronous. We will advance the practice of medicine by building on the full integration of virtual visits, digital health solutions, and data collection (Table). We are reimagining care processes and teams to handle increasing amounts of clinical data and optimizing the use of health care professional skill sets while decreasing cognitive and clerical burden. Creating new roles to meet the needs of virtual, digital, and face-to-face care delivery models is critical to team optimization. Mayo Clinic will provide care digitally and face-to-face while seeking to provide a cohesive and consistent patient experience across all channels of interaction.

By 2026, we seek to incorporate intelligent technologies such as cognitive computing solutions in our electronic health record to predict patient needs and to present clinical orders to health care professionals based on patient diagnoses and health care professional ordering

FIGURE. Mayo Clinic Department of Medicine 2030 vision 4 pillars.
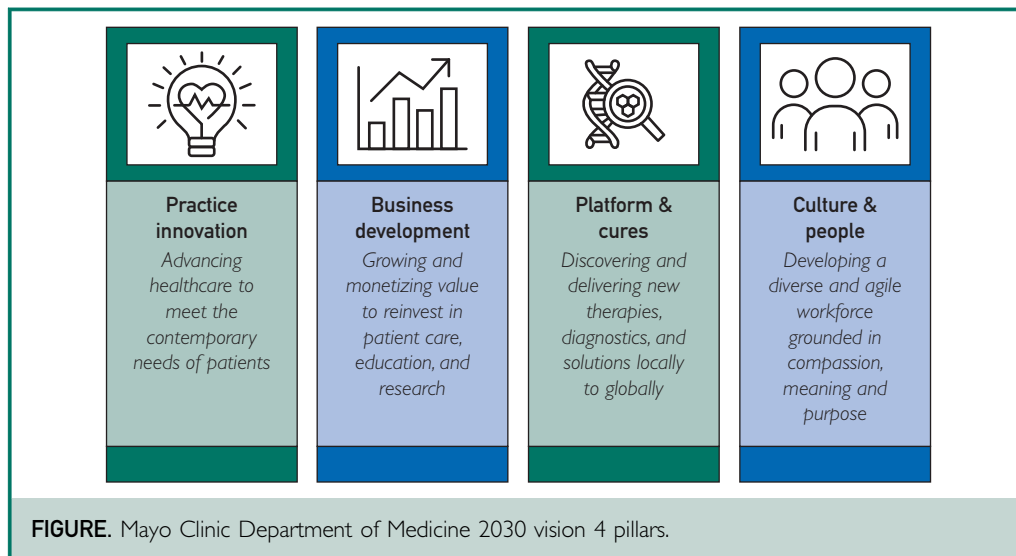
behavior. One example is a project currently underway we call ASSIST, using data present in the electronic health record to present order panels to health care professionals who will deploy self-directed, patient-empowering educational modules for the management of conditions typically associated with low patient satisfaction, such as fibromyalgia, chronic abdominal pain, chronic migraine, and chronic fatigue syndrome. Artificial intelligence (AI) solutions will be leveraged to reduce cognitive burden for clinicians; AI can be leveraged across health care for disease and genetic mapping, identification and population health management, modification of treatments, and remote monitoring.[4]

By 2030, we anticipate the creation of a patient "digital phenotype" aggregating electronic health record and patient survey data. This digital phenotype will leverage predictive analytics tools driven by existing health risk scores (such as osteoporosis or breast cancer risk scores) to proactively establish care plans that can be shared virtually with patients. Successes and challenges will be assessed and iteratively improved through mixed methodologies as in our previous work.[5]

Business Development
Our vision for business development is to advance novel solutions improving the health and well-being of patients with serious and complex disease. We seek to leverage Mayo Clinic knowledge and data to envision Mayo Clinic solutions to patients worldwide, providing hope and healing to patients who might not otherwise reach a Mayo Clinic facility. For the Department of Medicine to accomplish this goal, we realigned our team focus on business development in portfolios organized around "drugs, devices, and digital services." We will use a *Build, Buy, Partner* paradigm including joint ventures with external companies for the benefit of patients, health care professionals, and consumers, allowing acceleration along our intellectual property and commercialization path and fast-tracking solutions to reach more patients with our discoveries.

The Department of Medicine, as part of an academic medical center, serves patients across outpatient, procedural, and hospital settings as well as in our communities and our destination medical centers. The business development space provides a diverse portfolio of digital products including app-based care, virtual care, remote monitoring, employer services, AI, and advanced diagnostics.

We developed a service line entitled Remote Monitoring to Enhance Timely Hospital Dismissal (REMODi) to provide remote care for patients who need monitoring but do not need to be hospitalized, synthesizing biomedical monitoring data and using expert

TABLE. Present and Envisioned Future Clinical Encounters

	Today	Tomorrow
Visits	Office	Anywhere, kiosks
Vital sign assessment	Clinical devices	Home devices, smartphones, wearable technologies
History taking	Clinician questioning	Artificial intelligence—driven chat-bots
Physical examination	Office equipment	Remote diagnostic tools
Timing	Synchronous	Asynchronous
Diagnostics	Clinical laboratory	Mail-out/home testing
Charting and recording clinical information	Dictation	Ambient voice technology
Clinical decisions	Manual	Artificial intelligence assisted
Treatment tailoring	Health care professional adjusted	"Closed loop" personalized intelligent diagnostic and treatment devices

AI algorithms to proactively alert care teams to patient needs. For example, our liver platform will detect liver disease and connect patients to appropriate health care professionals at the ideal time, providing remote monitoring in their home environments and delivering novel therapeutics. Our digital transformation has allowed us to rapidly accelerate serving our patients through high-quality virtual interactions and to meet the needs of the public, referring health care professionals and employers in new and exciting ways. Our integrated practice, engaged staff, and culture of excellence puts us in a strong position to generate pioneering solutions that could serve as a shared vision with other academic medical centers.

Platform and Cures

The Department of Medicine research signature, "Novel solutions, for our patients, from our patients, both here and afar," drives the 2030 vision for research, platform and cures. Integrative, patient-centric research and development are at the center of this vision, building on the primary value that the *needs of the patient come first*. The Department of Medicine research, platform and cures, is person-centered and guided by the moral obligation to learn from every patient.

We have chosen to focus on 3 domains: device and drug innovation and commercialization, clinical trials innovation, and foundational competencies. We have developed integrated, multifunctional processes for device and drug discovery, employing nimble think tanks and multidisciplinary teams to innovate and streamline implementation. Mayo Clinic's Business Development and Mayo Clinic Platform, an institutional structure that connects health care professionals and consumers through network effects, are essential in this evolution, particularly as remote diagnostic needs are realized. Through new solutions and partnerships, we are expanding our reach to bring solutions to patients and to support a virtuous innovation cycle.

Clinical trials innovation will grow early-phase, investigator-initiated trials, offering early insights into drug efficacy and laying the groundwork for future commercialization. The Department of Medicine clinical trials incubator is both a structure and methodology, focusing on biomanufacturing-compatible products developed in laboratories at Mayo Clinic as well as AI algorithms developed to detect yet-unmatched opportunities between drug candidates and targets. This incubator is specifically designed and resourced to work in a small-team environment with Mayo Clinic physicians and scientists as well as with industry partners. This incubator plans to build on our experience with clinical trials in a small team environment to deliver new discoveries to patients with low barriers to innovation and translation.

Underpinning the domains is the foundational competencies domain, a deliberate focus on excellence and optimizing resources for the investigator talent pipeline in coordination with federal funding agencies, pharmaceutical companies, and internal and external venture capital. Central to this domain is a deliberate focus on increasing the diversity of research talent in the Department of Medicine, programmatic investment in training grants and early investigator opportunities, and enhanced support of midcareer investigators.

Culture and People

Our ideal future state is an agile, diverse, and inclusive workforce grounded in compassion, meaning, and purpose. The Department of Medicine will remain rooted in our values that are central to our mission. The culture and people pillar will support these values for the members in the Department of Medicine, promoting purpose, sense of community, a culture of inclusion, equity and diversity, innovation and agility, and joy and well-being.

The Department of Medicine will ensure an engaged workforce by promoting meaningful work that supports the department's 2030 plan. We seek to further enhance our sense of community and belonging, recognizing the power of relationships with colleagues and learners as well as with our patients. Equity, inclusiveness, and diversity are paramount to a successful work community and learning environment and are among the highest priorities of the Department of Medicine and Mayo Clinic. Our efforts will focus on creating inclusive patient experiences that are free of bias and discrimination along with incorporating equity into the structure, processes, and everyday experiences across our 3 shields of clinical practice, research, and education.

Recognizing that the Department of Medicine 2030 roadmap requires strong commitment to innovation, we plan to evolve the department's culture to embrace smart calculated risks and a more agile mindset. Leadership development leveraging Kotter's change management model[6] to drive change and innovative thinking is an important component to support our transformation. Finally, the culture and people pillar will partner with leaders across our institution who are advancing joy and well-being at work. Using a systematic approach and incorporating measurement tools to gauge success of interventions, we will employ tactics to increase staff engagement through a focus on inclusive management, camaraderie, connection to purpose, daily improvement, and optimization in work-life harmony. These efforts are intended to elevate meaning in work and to realize a sense of belonging and community with joy in everyday moments.

CONCLUSION

The Mayo Clinic Department of Medicine 2030 vision creates the 4 pillars framework of practice innovation, business development, platform and cures, and people and culture. Engaging curious teams in a learning culture will allow us to operationalize plans, iterate improvements, and rise to the unprecedented challenges in health and health care while remaining true to our core values.

POTENTIAL COMPETING INTERESTS

The authors report no competing interests.

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