KPMG

MedTech at the crossroads: Challenges and opportunities

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Introduction

Some of healthcare's biggest challenges represent significant opportunities for the MedTech industry. MedTech is uniquely positioned to help transform care delivery through innovative solutions that elevate both the provider and the patient experience. Rapid innovation in diabetic care, cardiology, robotic surgery, internet-connected wearables, and a whole host of AI-enabled devices is causing a great deal of excitement among not only providers and patients, but also investors. Ultimately, close attention to user experience and thoughtful use of AI will be fundamental drivers of innovation.

The global market size of the medical device and in-vitro diagnostics (IVD) industry was estimated to be $518.46 billion in 2023 and is expected to grow to $886.80 billion by 2032.[2] Further, the market for digital devices was estimated to be $269 billion in 2023 and is expected to grow at a CAGR of 18.2 percent from 2023 to 2030, reaching $867.6 billion.

Meanwhile, healthcare systems worldwide are being strained by the demographic shifts of an aging population, as well as increasing healthcare provider (HCP) burnout. Greater demands on fewer providers, including pressure from payors, create a compelling need to do more with less human capacity. There is an opportunity for MedTech to fill the gap by enabling HCPs to be more effective and efficient and by empowering patients and their caregivers to be more self-reliant.

For physicians, there is tremendous potential for MedTech devices to streamline workflows and help improve patient outcomes. However, if devices create undue administrative responsibilities or have steep learning curves, providers are unlikely to adopt their use on a regular basis. In the aftermath of the worst days of the pandemic, many providers have experienced significant stress and burnout, with more than 71,000 physicians leaving the industry between 2021 and 2022.[1] MedTech has a role to play in stemming this tide of attrition by offering devices and capabilities that simplify and improve providers' daily experiences.

For patients, MedTech can help individuals with chronic illnesses better manage their conditions and communicate regularly with their physicians. However, such use cases are too frequently a luxury of the privileged. For those who cannot afford proper medical care, certain forms of MedTech have only limited currency. That said, MedTech has a significant opportunity to address health inequities with devices that can serve as conduits to basic healthcare access for individuals in rural and underserved communities—both in the U.S. and across the globe. Since the potential for MedTech to help close the health equity divide depends on a foundation of digital equity, the issues of digital equity and health equity need to be addressed concurrently.

Although MedTech has contributed to significant advances in care delivery over the years, certain healthcare challenges persist. AI-enabled MedTech in particular—as well as advances in other technologies, bandwidth, and computing power—has an unprecedented opportunity to help improve access and quality of care. Still, given the range of challenges when it comes to balancing efficiencies and stress, MedTech companies would be wise to pick their opportunities strategically. The most successful companies will focus on the overall experience and not just the white space in the physicians' workflow, as well as truly differentiated care paradigms and ways to bring care to all patients, from the most privileged to the most vulnerable. The end state will be an evolved relationship between MedTechs and providers, where MedTech functions more as a strategic partner versus merely a supplier.

[1] All economic figures are in US dollars, unless otherwise stated.

[2] https://www.fortunebusinessinsights.com/industry-reports/medical-devices-market-100085

Signals of change

AI enablement continues to proliferate across industries, and it is clear that MedTech is no exception. Patients will increasingly expect real-time tracking of symptomology, access to their care teams, and the ability to course correct their treatment protocols based on AI-enabled collection and analysis of their data. At the same time, physicians will be under pressure to recommend medical devices based on advanced technologies to their patients. However, if these devices cause undue stress or more administrative management than already-stressed providers can absorb, uptake is likely to be hindered. These dynamics are reflected in the following signals of change, which represent the driving forces shaping the MedTech industry:

- Increasing demand and declining supply is driving stress in the healthcare system
- The need to address health and digital equity
- Changing consumer expectations, as cost burden shifts to each of us
- Breakthrough medical, material, and technological innovations
- The opportunities presented by Big Data

01

Increasing demand and declining supply is driving stress in the healthcare system

Ironically, the shift to an aging population is in part the outcome of successful healthcare breakthroughs. Reduced infant mortality, prevention and containment of infectious diseases, and effective management of chronic conditions allow people to live longer, more productive lives. The growing percentage of elderly individuals is also driven by a general trend of declining birth rates and smaller family sizes.

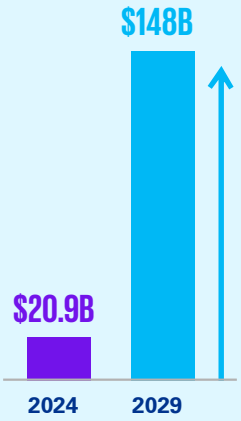
The downside of this success story is a higher burden on healthcare systems. The reality is that elderly people consume more healthcare services than the rest of the population. In the US, data from the Centers for Medicare & Medicaid Services (CMS) indicate that individuals 65 and over account for about 36 percent of total healthcare spending, while they represent only 16 percent of the population. In Japan, the contrast is even more pronounced: As of 2021, approximately 28.9 percent of the population of Japan was 65 or older. With one of the highest life expectancies globally and a universal healthcare system, the burden of care for the "latter-stage elderly" (those 75 and over) represented 37.8 percent of the nation's total national healthcare spend in 2018. In the EU, 16 percent of the current workforce consists of workers aged 55+. And, by 2050, numerous countries in the Asia-Pacific (APAC) region, such as Korea, Japan, and Singapore, are projected to have over 40 percent of their population aged 60 and above.[ii]

Even before the COVID-19 spike, the rising demand for healthcare made physician burnout a significant issue. HCP attrition rates rose 43 percent between 2010 and 2018.[iii] A 2023 survey showed that 53 percent of surveyed clinicians experienced symptoms of burnout, with the breadth of new technologies on which they must be trained cited as a primary factor.[iv] And, as data is considered an invaluable asset, the volume of patient records to be managed and recorded by physicians is expected to increase.

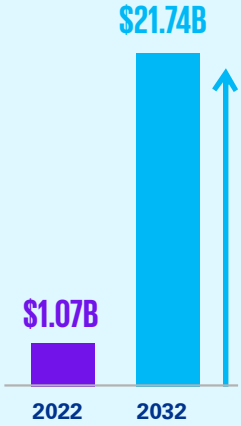
Global market

AI in healthcare

Which represents a CAGR of 48.1 percent; the Asia-Pacific region is expected to lead the way, growing at 50.8 percent CAGR, due to increasing government investment.



Generative AI in healthcare



Growing at a CAGR of 35.14 percent between 2023 and 2032. The global digital health ecosystem in Asia Pacific is currently growing at a five-year CAGR of 4 percent, with 25 percent of global Digital Health Ventures headquartered in APAC (the 2nd largest ecosystem in the world).

The healthcare worker shortfall is growing

Global

Shortfall of

10 million

health workers by

2030, mostly in low- and lower-middle income countries.

US

Shortfall of

124,000

physicians by

2031, according to Association of American Medical Colleges.

That includes a shortage of between **17,800** and **48,000** primary care physicians.

02

The need to address health and digital equity

In the U.S., health disparities disproportionately affect people of color, members of the LGBTQ community, immigrant families, lower-income individuals, and rural and inner-city citizens, according to the World Economic Forum.[v] For example, Black adults are significantly less likely to use continuous glucose monitoring devices than non-Black adults (8% versus 30%), according to a recent study.[vi] MedTech has the power to provide access to care for our most vulnerable citizens, provided they have smart phones and broadband and are educated on their use. Digital access is considered a "super social determinant of health," as a lack of digital literacy or access can dramatically exacerbate health disparities.

While health inequities are particularly acute in the U.S. given the multi-payer system and higher cost of care, other developed nations are not immune. In Europe, there is a digital divide, with western European nations showing greater adoption of MedTech than central and eastern European nations. For example, countries with the highest rate of digital skills are Finland and the Netherlands (both 79 percent), followed by Ireland at 70 percent. The lowest uptake was seen in Romania (28%), Bulgaria (31%), and Poland (43%),[vii] thus increasing the need for digital MedTech tools to promote healthcare access. Asia has surpassed Europe as the second-largest medical technology market in the world, with 20 percent of the opportunity coming from China. And yet, in Southeast Asia, uptake is relatively low, despite the fact MedTech could help address dramatic disparities in health equity.[viii] In India, most healthcare facilities are in urban areas, even though more than 68 percent of the national population lives in rural regions,[ix] which, since the pandemic, has spurred demand for telemedicine and remote monitoring tools.

03

Changing consumer expectations, as the cost burden shifts to each of us

Relationships between patients and providers are evolving. In developed markets, consumers have come to expect the same recognition of their preferences, as well as the multiple touchpoints, to which they have become accustomed through their interactions with retail, travel and hospitality, and banking. A 2021 MHH survey concluded that 66 percent of healthcare consumers say that selecting a provider is dependent on the physician's ability to communicate with them in a timely and consistent manner,[x] which increasingly requires MedTech tools. Patients prefer tools that offer seamless user experiences through intuitive interfaces, as well as real-time access to health information, medical records, and test results. And, among digital natives in the millennial and GenZ demographics, consumers are more willing to share their personal health information than previous generations were. As we look forward, the global patient-centric healthcare app market is expected to grow from $8 billion in 2024 to $367 billion by 2028, which amounts to a 35.2 percent CAGR, according to Market Data Forecast research.[xi]

04

Breakthrough medical, material, and technological innovations

The pace of innovation in MedTech is unprecedented, although the degree to which providers and patients are adopting new devices is not necessarily keeping pace. This means that MedTech companies need to do three primary things: ensure that the innovative technologies they introduce actually make life easier for their constituents; provide guidance related to continually evolving technology capabilities, such as AI; and offer price points that make their innovations both accessible and more attractive than the alternatives. Some key areas of innovation on which MedTechs should focus follow:

Telemedicine:

In the United States, a survey by MHH in 2021 indicated that 70 percent of Americans are comfortable with care in the home,[xii] which can be provided via telemedicine. Telemedicine is expected to realize a CAGR of 5.25 percent between 2022 and 2030.[xiii]

Wearables:

One of the trends that has currency with both patients and providers are wearables that allow for remote patient monitoring. All in all, the wearable technology market is expected to increase from $27 billion in 2019 to $156 billion in 2024.[xiv]

Robotics:

The MedTech and healthcare sectors are leveraging robotic technology for a wide range of applications, from robot-assisted surgeries to hospital room disinfection and drug delivery via microneedle patches. The global medical robotics market is projected to reach $12.7 billion by 2025.[xv] Still, the most sophisticated capabilities are frequently unavailable in low-income areas, where healthcare infrastructures are stretched to meet the most basic needs.

AI-enabled devices:

The MedTech sector is increasingly integrating artificial intelligence (AI) and machine learning (ML) into devices to allow for data analysis and interpretation of health trends on both the individual and population level. In 2022, the US FDA authorized 91 AI- or ML-enabled medical devices.[xvi] The pace of change for these devices is breathtaking as new versions of Chat GPT and other GenAI tools are released. The global market for AI in healthcare is projected to grow from $20.9 billion in 2024 to $148 billion by 2029, which represents a CAGR of 48.1 percent; the Asia-Pacific region is expected to lead the way, growing at 50.8 percent CAGR, due to increasing government investment.[xvii] When it comes to generative AI, the global market in healthcare reached $1.07 billion in 2022 and is projected to surpass $21.74 billion by 2032, growing at a CAGR of 35.14 percent between 2023 and 2032.[xviii] The global digital health ecosystem in Asia Pacific is currently growing at a five-year CAGR of 4 percent, with 25 percent of global Digital Health Ventures headquartered in APAC (the 2nd largest ecosystem in the world).

MedTech Epicenters

Numerous governments worldwide are trying to establish their countries as burgeoning "MedTech epicenters" with the support of grants and policy initiatives designed to attract innovative startups, research institutions, and established companies to invest in cutting-edge medical technologies. These initiatives often involve financial incentives, tax breaks, research funding, and regulatory support. For example, in the UK the NHS is slated to receive an injection of £30 million in government funding for novel MedTech modalities. In a similar vein, the Indian government has unveiled a series of policy initiatives geared toward fostering research and development and innovation across various sectors, including MedTech.

05

The opportunities presented by Big Data

The healthcare industry encounters a higher frequency of data breaches than any other sector—over 15 million health records have been compromised by data breaches.[xx] Addressing the privacy of patient data is critical for MedTech uptake, as 63 percent of individuals report concerns about the security of their personal health information given the rise of AI-enabled medical devices.

A KPMG 2023 global study concluded that 71 percent of individuals believe AI regulation is required, underpinning the public desire for safeguards.[xxii] To help mitigate such breaches regulators around the world are tightening regulations. The US Federal HIPAA Security Rule has mandated several protective measures, including data encryption, multi-factor authentication, and routine network security maintenance. When the EU AI Act goes into full effect, AI applications will be ranked according to risk level with the goal of ensuring that all AI systems used in the EU are safe, transparent, traceable, and unbiased.[xxiii] The APAC Medical Technology Association (APACMed) is working on a regulatory framework for digital health across the APAC region, which is expected to include provisions related to the use of AI and ML in MedTech devices.[xxiv] MedTech companies will need to stay abreast of evolving regulations as they use and transmit patient data to improve care in new and innovative ways.

Regulatory developments

Just as regulators across different countries have taken positions on data privacy, it is likely we will see a range of responses on the use of AI in MedTech as well. MedTech companies will need to be able to consider and work within the complexity and uncertainty that engenders. Currently, regulatory bodies, such as the FDA in the US, the MDR in Europe, and the Therapeutic Goods Administration (TGA) in Australia, have released guidance documents to accommodate real-time enhancements of these technologies.

Critical actions for MedTech companies

As MedTech companies seek to incorporate AI and other advanced technologies into their devices, they will need to balance meeting the evolving needs of increasingly demanding patients with minimizing stress to the physicians they serve. The following section outlines critical actions MedTech companies can take to mitigate the challenges and take advantage of the opportunities detailed in the first half of this paper.

- Lean into the opportunity to transform healthcare delivery and the patient/provider experience
- Leverage digital solutions to improve health equity and access
- Facilitate next-generation, patient-centric healthcare
- Lead the way on innovation
- Harness the power of Big Data through robust security and privacy measures

01

Lean into the opportunity to transform healthcare delivery and the patient/provider experience

Innovative MedTech solutions should focus on creating a satisfying user experience, which reflects the evolving focus in life sciences from product-centric, to brand centric, to customer centric, to experience centric. How will patients, caregivers, or clinicians use the solutions? Are existing training and support services adequate to ensure that new solutions achieve their transformational potential? Ultimately, usability, reliability, and security are critical to trust and adoption. Therefore, MedTech companies should focus on creating products that are intuitive for providers to use, easily integrated into the clinical workflow, compatible within existing system architectures, and interoperable with companion devices.

Begin with physician input: As digital MedTech devices become more integrated into the clinical workflow, providers are keen to participate in their design and functionality. Companies that provide solutions for HCPs should consider their value in the context of care. Is the solution improving quality of care and reducing effort for the healthcare system? Some innovations will, by their nature, create new care pathways that may actually create more work for HCPs in the short term. For instance, devices that yield early diagnoses may get patients into treatment sooner but could yield better outcomes. MedTech companies will find it valuable to incorporate insights from physicians that reflect their practical needs and those of their patients. By participating in the design process, clinicians can help ensure devices are technologically advanced, tailored to various medical specialties and patient needs, and designed with ergonomics and usability in mind. As it is likely that competitors are creating comparable devices that address similar health issues, the company that delivers a better user experience will have an advantage.

Offer "around-the-device" services: With the shift toward digital therapeutics (DtX), i.e., health software solutions that provide evidence-based treatments, there is more of a need for "around-the-device" offerings. More and more, medical devices are providing a platform for behavioral therapy, biofeedback, cognitive training, medication adjustments, disease management, and clinical rehabilitation—all complex therapeutic areas for which providers and patients need training and support from MedTech companies. Further, designing devices as part of an end-to-end healthcare solution—whereby patients capture data through wearables and share the data with their physicians—can transform care delivery. In fact, as healthcare systems and technologies become more interconnected, the ability to seamlessly exchange, analyze, and leverage data across various platforms and institutions allows for a comprehensive view of a patient's medical history, facilitating more informed and timely clinical decisions. Further, as devices evolve and offer new applications, more comprehensive data sets and clinical evidence, such as clinical trial data, will be needed to inform their functionality. And finally, it is critical to bear in mind that sharing data in this way requires a robust approach to cybersecurity and data privacy.

Still, just because new innovations are offered, adoption is not always rapid and assured. By way of comparison, when the first iPhone was released, how many people wondered why a phone should include a camera—and now, how many people consider the quality of the camera a critical selection criterion for a cell phone? Similarly, to ensure adoption, MedTech companies should seek to accelerate care transformation through supporting services that ensure devices are used to their fullest and enable new paradigms of care.

02

Leverage digital solutions to improve health equity and access

MedTech companies have a major role to play in health equity, making healthcare solutions accessible to diverse populations by designing products with end users in mind and providing comprehensive user education and training programs that can help bridge the digital divide. [See sidebar] Telemedicine, for example, can help reach underserved individuals, who either have limited trust in the healthcare system or restrictions that make it difficult to see physicians at traditional points of care. MedTech is well-positioned to help address both health and digital inequities in the following ways:

Calibrate efforts to provide access based on a region's digital maturity: When it comes to developing nations, MedTech has a specific role to play since many people don't even have access to basic healthcare services. For example, only 0.4 percent of the 3.2 billion COVID-19 tests administered worldwide were given in low- and middle-income countries, even though 75 percent of the global population lives in those regions. Even in areas with surprisingly high levels of smart phone adoption, the lack of financial resources for healthcare means that MedTech is more likely to be used primarily for basic medical care, i.e., managing viruses or providing guidance to expectant mothers, as opposed to more sophisticated management of chronic illnesses. Dynamics are changing, however. Smart phone adoption is surprising high in sub-Saharan Africa, and, in Southeast Asia, 60 million new consumers joined the digital economy during the pandemic with the highest proportion of new users in the Philippines and Thailand.[xxv] As bandwidth, electric grid, and cell service inequities are addressed, MedTech will have a role to play in helping economically disadvantaged patients gain access to more sophisticated healthcare, including remote monitoring of chronic conditions.

MedTech's role in bridging the digital divide

Forward-reaching MedTech companies recognize that existing health disparities can be exacerbated by a lack of digital equity. If individuals—both in underserved US communities and in developing nations across the globe—lack device connectivity, digital and technical literacy, or a comfort level with privacy issues, they are unlikely to utilize the MedTech devices that could help them gain access to better clinical care. MedTech companies can help bridge the digital divide and support digital adoption across healthcare systems through physician and patient education and by helping establish the technical infrastructure that would help increase both health and digital equity. It is important to bear in mind, however, that if MedTech companies wait until they can solve what can seem like intractable problems in their entirety, the health and digital divides will never narrow. Instead MedTech should strike a balance between elevating the level of basic healthcare for populations with the most limited access and driving sophisticated breakthrough solutions.

Mitigate bias: MedTech companies need to take steps to mitigate bias and improve equity and access to quality healthcare services, while taking care not to exacerbate these issues. It is important to consider the three main types of biases—physical bias, computational bias, and interpretation bias.[xxvi] Physical bias is inherent in the mechanics of the device, computational bias lies in the software or in the data sets used in development, and interpretation bias occurs when clinicians apply unequal, race-based standards to medical device readouts.[xxvvii]

Bias can be introduced when the sampling pool in clinical databases fails to represent the broader population; a lack diversity in data used to train AI algorithms can perpetuate racial, gender, and sexual orientation-based biases. For instance, research has shown that, when physicians use pulse oximeters to test for toxemia in Black patients, they can get false negative readings given that that the technology is designed for lighter skin tones.[xxviii] Therefore, MedTech companies should prioritize developing algorithms that consider diverse demographics.

When it comes to AI-enabled products, there is an even greater risk of introducing biases related to underrepresented groups due to a lack of diversity in training datasets. For example, detection algorithms have shown lower accuracy in identifying skin cancer in individuals with darker skin.[xxix] Most AI algorithms are trained on databases from North American and European populations, limiting cross-cultural genetic and morphological diversity, just as more than 80 percent of historical clinical trials have done by depending on Caucasian populations in patient recruitment.[xxx] That said, using remote monitoring devices for data collection can result in more objective findings than patient self-reporting as it eliminates the tendency for patients to misreport based on social desirability factors or selective recall. Accurate data from MedTech devices can be instrumental both in devising appropriate clinical interventions for individual patients and in analyzing population health trends. Availability of representative data sets is a challenge, but MedTech companies can help work with clinical researchers and healthcare professionals to improve the reach and inclusivity of data sets.

Addressing the "E" in ESG

The healthcare sector, including MedTech, is responsible for roughly five percent of global emissions, but to date has been behind other major industries in planning for a decarbonization. The production process for MedTech is often energy-intensive and produces a great deal of waste, not to mention the waste generated by single-use disposable products and packaging. A recent study revealed that cutting emissions by just 20 to 30 percent could generate a net cost savings and cutting them by 80 percent would be cost-neutral.[xxxi] Further, 60 to 80 percent of avoidable MedTech emissions could be reduced at no cost.[xxxii] This calls for the MedTech industry to give more serious consideration to using energy-efficient equipment, waste recycling, sustainable materials, and responsible sourcing in the production process. Further, digital advancements like digital health platforms, telemedicine, and AI-powered diagnostics are expected to curtail the carbon footprint associated with clinical medicine by diminishing the reliance on physical infrastructure and transportation.

03

Facilitate next-generation, patient-centric healthcare

Patients expect to receive healthcare when and how they want it, whether that means scheduling appointments at their convenience, accessing their medical records online, or receiving tailored health information through digital platforms. Just as consumers rely on content in their daily lives, patients want to be able to access medical information, consultations, and appointments through various digital means, such as telehealth and mobile apps. Whether a patient simply prefers virtual care options to manage chronic conditions or to maintain wellness, or requires the use of telemedicine and wearables in order to access care, advanced MedTech options are critical facilitators.

MedTech companies that provide solutions used directly by patients need to consider both the user experience for the patient, but also the potential impact on the healthcare provider. Traditional MedTech companies in this domain should adopt a consumer-product mindset when it comes to user experience and customer support. As more consumer product companies expand into this space, consumer expectations of product design and support services are likely to continue to grow. By contrast, consumer products companies that are new to the MedTech realm need to be mindful of the impact of their solutions on the care continuum. Quality and trust are essential, and education and support services for both patient and HCP should complement traditional marketing and support plans.

Finally, to ensure desirable health outcomes and positive patient experiences, MedTech is in a position to help foster greater coordination and collaboration with the healthcare ecosystem.

04

Lead the way on innovation

After becoming comfortable with telemedicine and wearables during the pandemic, many patients continue to prefer the convenience and accessibility of receiving medical advice, monitoring, and even treatment from the comfort of their own homes. MedTech companies should focus on transitioning from traditional medical equipment to smart, interconnected devices that collect and transmit real-time patient data, thus enhancing diagnostic and treatment outcomes for patients and their clinicians.

Advanced wearables: The number of physicians who believe digital health tools are advantageous for patient care rose from 85 percent in 2016 to 92 percent in 2022, according to AMA Digital Health Research. And, at present, the average number of tools used per physician has increased from 2.2 in 2016 to 3.8 in 2022, with telehealth tools leading the way, followed by remote monitoring devices and a growing interest in AI-enabled technologies. For patients, knowing that physicians are monitoring their self-care can lead to healthier lifestyle choices and greater adherence to prescribed clinical protocols. Remote monitoring tools—including both wearable devices and mobile apps—empower patients to manage their health proactively, offering early health issue identification, timely intervention, and the opportunity to stem the tide of complications before they progress.

For example, in the type 1 and 2 diabetes arena, there have been major advances in insulin pumps and continuous glucose monitors, with much work being done toward the development of an artificial pancreas, leading to predictions of a double-digit annual growth rate. Other primary areas of development include interventional cardiology devices, pulse oximeters, and implantable blood pressure monitors.

At the same time, these tools contribute to health equity by facilitating access to care for those who may face transportation or financial restrictions (e.g., due to remote geographies, difficulty with mobility, caretaking responsibilities, etc.). With wearables, being able to track patient symptomology in real time aligns with the trend toward value-based medicine, allowing physicians to take a more active day-to-day role in their patients' clinical outcomes.

Finally, interconnected devices come with increased cyber risk, so cybersecurity capabilities should be built into devices from as early as the ideation stage. (See sidebar.)

Ensuring safety and trust

To ensure that AI-enabled devices and other advanced technologies are used to improve the quality of care and trust in the healthcare system, products need to consider cybersecurity and data privacy issues throughout the development of new products. Further, steps need to be taken to ensure design algorithms and data strategies deliver fair and unbiased output.

AI hype to business as usual: AI and ML are, of course, used in MedTech well beyond wearables. For example, AI and ML in imaging is a relatively mature application, allowing for pattern recognition that can lead to life-saving diagnoses and improved provider workflow. And AI in robotic surgery is a trend to watch.

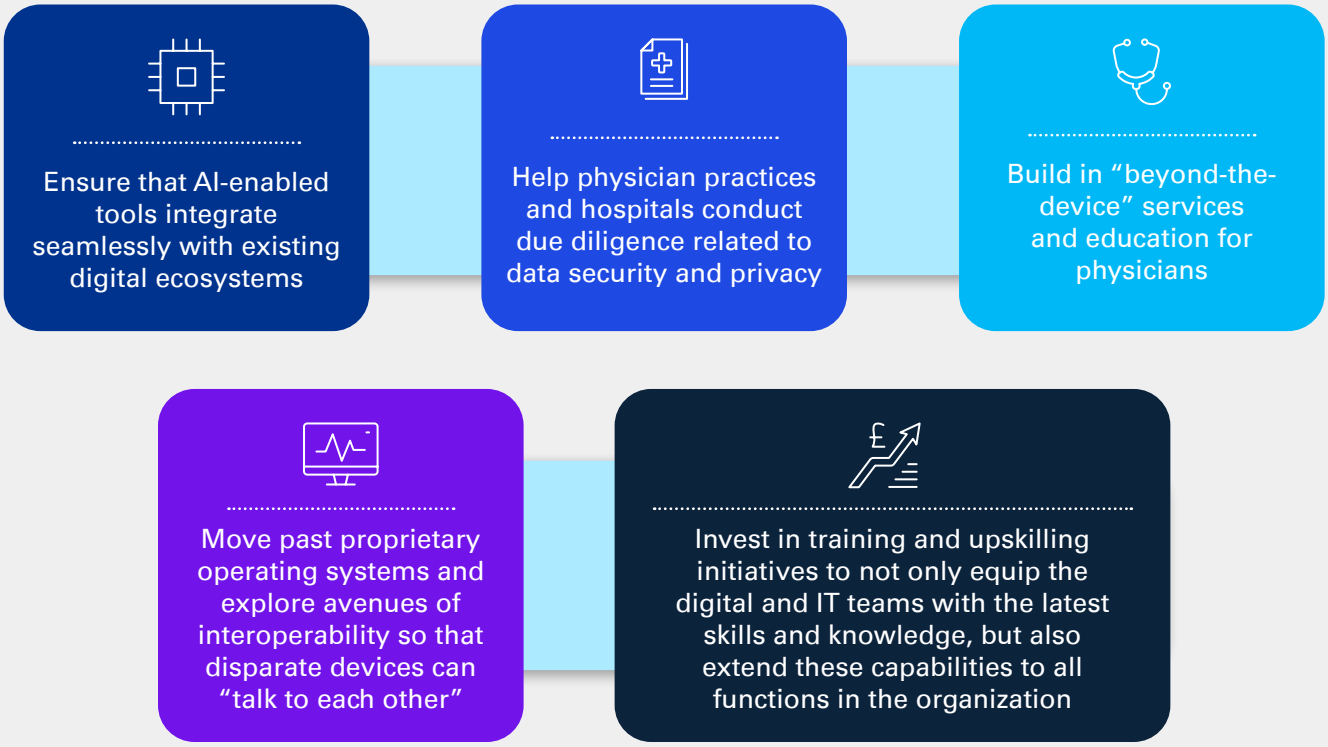
As the patient population continues to age, continuous monitoring via AI-enabled devices will allow early detection of emerging health issues, monitoring for medication adherence, and even fall detection.[xxxiii] These devices ease the burden on caregivers and providers and allow people to be maintain their independence as they age.

When it comes to personalized medicine and the possibility of cures to previously intractable diseases, MedTech plays a critical role in monitoring and capturing critical diagnostic data. Further AI will be instrumental in culling through exhaustive amounts of data on treatments from researchers and physicians worldwide combined with individual analyses of a particular patient's genealogy and individual medical history, as well as the health histories of their close relatives.

Generative AI chatbots can improve patient care by reducing workload for HCPs and their staff while also providing faster responses to patient inquiries. Automating appointment scheduling for low-criticality cases, optimizing resource allocation, and helping manage the supply chain represent a win-win for providers and patients. One example is DiagnaMed's Dr. GenAI, a medical chatbot powered by ChatGPT, which allows users to better understand their health status and symptoms without needing a consultation.[xxxiv]

Forward-thinking MedTech companies have already made notable progress in the area of radiology, using AI-enabled devices to detect anomalies in medical images from chest CTs, mammograms, brain MRIs, and various other diagnostic modalities. For example, at Massachusetts General Hospital, AI is used to analyze thousands of brain MRI scans to identify individuals at risk of developing Alzheimer's disease with 90.2 percent accuracy.[xxxv]

In order to ensure that AI-enabled tools become "business as usual" in the healthcare ecosystem, there are a variety of steps MedTech companies should take:



Robotic surgery: The MedTech industry is introducing a spectrum of robotic solutions that improve clinical accessibility, enhance global access to specialized care, decrease travel and wait times for patients in need, minimize health risks to medical personnel during emergencies/pandemics, and allow for collaboration between providers across the globe for nuanced cases. The most complex of these solutions are those used in robotic surgery.

A variety of technologies play into robotic surgery equipment including AI, ML, virtual reality (VR), augmented reality (AR), and the Internet of Things (IoT). These technologies introduce innovative capabilities that can improve surgical precision, enhance patient safety, and streamline complex procedures. AI, for instance, can aid in real-time decision support during surgery and make possible more autonomous and precise procedures. AR provides surgeons with immersive, data-rich visualizations both during training and surgery. IoT facilitates connectivity and data sharing, enabling remote monitoring and control of surgical systems. Over time, with miniaturization of surgical tools, physicians will be able to perform surgeries on delicate areas of the body with increased accuracy. Achieving miniaturization down to the microscale, e.g., with microrobots, will allow surgeons to use these devices for intricate procedures like removing build up in critical blood vessels, extracting kidney stones, treating aortic dissection, and performing less-invasive endoscopy. Finally, haptic feedback technology will provide surgeons real-time tactile sensations and offer kinesthetic and tactile cutaneous feedback, enabling assessment of tissue tension, pressure, and viscosity. Incorporating AI and ML into any of these tools can allow for not only more personalized and efficient procedures, but also the ability to capture and analyze vast amounts of data that can be used to identify the best techniques for future patients.

Case study

Collaboration on first-of-its-kind robotic telesurgery trial

In October 2023, NUS Yong Loo Lin School of Medicine (NUS) and National University Hospital (NUH) partnered with Fujita Health University (FHU) to conduct the first telesurgery trial between Singapore and Japan. Using a surgical robot based in Japan, physician-scientists from NUS and NUH performed a gastrectomy from a remote surgical cockpit at the NUS teaching hospital.[xxxvi] The Singaporean surgeons' motions were transmitted and replicated by a robotic operation unit in Japan via a dedicated international fiber-optic network. This collaboration spanned over 5,000 kilometers and represented pioneering efforts in navigating the evolving regulatory landscape.[xxxvii] Of course there are some cost limitations associated with this form of remote surgery: a single robotic surgical system can cost around $1.3 million while the average cost of an in-person gastrectomy ranges from $3,000 to $5,000.

Finally, the innovation of MedTech products also means that companies need to consider how their business models need to evolve. Companies should adopt comprehensive strategies that engage their customers—both patients and providers—across various channels. This engagement should be seamless, unified, and encompass options like mobile apps, online training, and remote support—over and above historical ordering and supply chain support.

05

Harness the power of Big Data through robust security and privacy measures

In an era where health information is stored in disparate systems and formats, achieving seamless data exchange between MedTech devices is imperative. Data interoperability will contribute to improved patient care, more accurate diagnoses, more rapid treatment decisions, and streamlined processes. Clinicians will be empowered with a comprehensive view of a patient's medical history as seamless exchange of patient heath records and information will be possible. Moreover, MedTech devices that can talk to each other will facilitate care coordination among healthcare providers for collaborative care delivery, thus reducing redundant tests and procedures. Patients will also be empowered as they gain greater access and control over their own health data, enabling them to actively participate in their own care and seek healthcare services from the most appropriate providers, even if they are located in a different geography. Interoperability also enables timely access to new diagnostics and treatments, streamlining the process for device entry into various markets and a reduced go-to-market cost.

Of course, all this progress depends on overcoming regulatory barriers surrounding data sharing, data ownership, and cross-border collaboration. Due to the evolving regulatory landscape, it is crucial for MedTech companies to invest in cybersecurity solutions, privacy frameworks, data encryption, multifactor authentication, and regular network security maintenance to ensure the confidentiality and integrity of patient information. It is also critical that the issue of data privacy in AI-enabled tools is addressed during the product development stage so that patients can get full benefit from breakthrough tools.

The focus on cybersecurity and data loss prevention is critical as cyber-criminals continue to look for new ways to circumvent defensive measures. Beyond data protection there needs to be an increased focus on data quality, especially as it supports AI-enabled solutions. To drive quality and equity in AI, the data sets used should not only be accurate, but should also be as complete and representative of the patient population as possible.

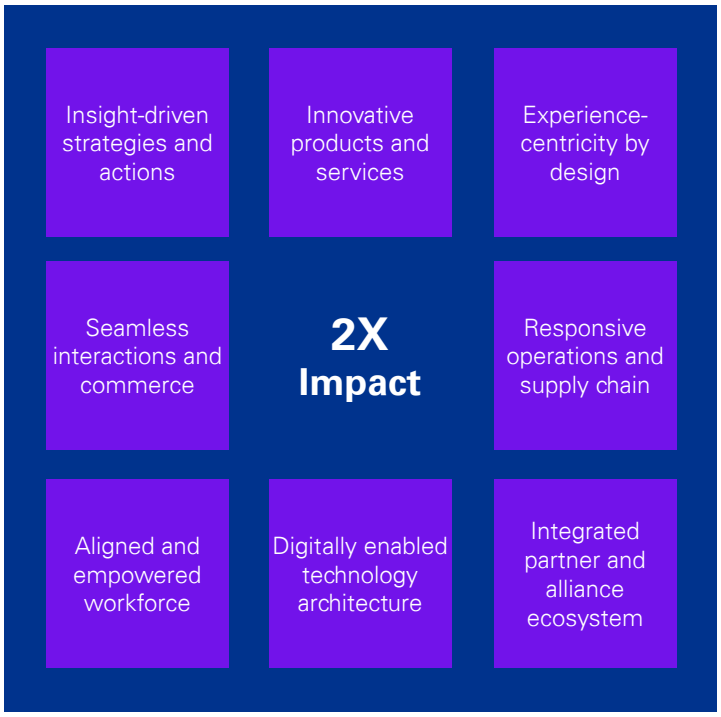
Conclusion

Digital transformation is fueling breakthrough change in MedTech. Enabled by sensor technology, computing power, increased bandwidth, and AI, devices are changing care delivery for wellness, chronic condition management, diagnostics, and surgical procedures. For MedTech companies to continue to succeed, they need to develop and promote digital capabilities that improve physicians' work lives and provide health access to all strata of society. This calls for strategic incorporation of digital acumen into the workforce and an exploration of new business models that align with patient and clinician expectations and remain flexible to meet evolving regulatory requirements. In these ways, MedTech companies can ensure they not only deliver cutting-edge solutions, but that these solutions will be embraced at scale.

How KPMG can help

KPMG's life sciences practice helps MedTech clients seize opportunities and minimize risks in this rapidly changing world. We help clients design and drive digital transformation initiatives using our Connected Enterprise approach. Our Connected Enterprise methodology is grounded in research and helps clients prioritize innovation opportunities based on the value to the business. Defined around eight core capabilities (see chart to the right), the methodology considers the experiential, operational, and workforce factors needed to develop a digital transformation roadmap. With the proliferation of digital solutions and AI capabilities, the Connected approach provides a framework to prioritize investment with impact.

In addition to our global digital transformation capabilities, KPMG has a global team of life sciences and MedTech industry professionals who specialize in Deal Advisory & Strategy, Management Consulting, and Risk & Regulatory Compliance. Our broad and diverse team of professionals work together to help life sciences clients innovate, optimize, and de-risk their businesses.



Appendix

Medical device and IVD market

Region	Proportion	2023 (USD)	Future – 2030 (USD)	CAGR
Global	100%	$531.7 billion	$758.9 billion	5.2%
North America	35%	$191 billion	$256 billion	4.3%
Europe	28%	$153.2 billion	$201.4 billion	4.0%
APAC	25%	$131.3 billion	$196.3 billion	5.9%
Others	12%			

Digital health market

Region	Proportion	2023 (USD)	Future – 2030 (USD)	CAGR
Global	100%	$269 billion	$867.6 billion	18.2%
North America	34%	$85 billion	$317.2 billion	20.7%
Europe	18%	$50.1 billion	$140.6 billion	15.9%
APAC	19%	$51.3 billion	$169.8 billion	18.6%
Others	29%			

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