Boston Consulting Group partners with leaders in business and society to tackle their most important challenges and capture their greatest opportunities. BCG was the pioneer in business strategy when it was founded in 1963. Today, we work closely with clients to embrace a transformational approach aimed at benefiting all stakeholders—empowering organizations to grow, build sustainable competitive advantage, and drive positive societal impact.

Our diverse, global teams bring deep industry and functional expertise and a range of perspectives that question the status quo and spark change. BCG delivers solutions through leading-edge management consulting, technology and design, and corporate and digital ventures. We work in a uniquely collaborative model across the firm and throughout all levels of the client organization, fueled by the goal of helping our clients thrive and enabling them to make the world a better place.

BCG X is the tech build & design unit of BCG.

Turbocharging BCG’s deep industry and functional expertise, BCG X brings together advanced tech knowledge and ambitious entrepreneurship to help organizations enable innovation at scale.

With nearly 3,000 technologists, scientists, programmers, engineers, and human-centered designers located across 80+ cities, BCG X builds and designs platforms and software to address the world’s most important challenges and opportunities.

Teaming across our practices, and in close collaboration with our clients, our end-to-end global team unlocks new possibilities. Together we’re creating the bold and disruptive products, services, and businesses of tomorrow.
The Future of Digital Health 2024

We have seen a big push into the digital health care and technology space over the past year as companies continue to evolve solutions and support for patients and physicians. And the digitization and automation of health care systems is offering tremendous potential for improvement in health outcomes.

In 2023, when we identified the trends that would define digital health in the year ahead, we predicted that the area of women’s health would attract significant attention, investment, and innovation. This has proved to be the case, and great progress continues to be made. We also project steady advancements in mental health in 2023, anticipating the way that digital tools are now helping to bridge care gaps, expand access, enable more personalized treatment, and eliminate geographic barriers—offering more options to those seeking care. We predicted a greater focus on costs as well, an emphasis that is ongoing, particularly with the growing ability of AI and other digital technologies to improve efficiency across every area of the industry.

Perhaps most important, our 2023 report foresaw great strides in the health care industry’s work with GenAI, which had already been tested in developing therapeutic ideas, analyzing medical data, and identifying patterns. In recent months, we have also seen GenAI adding a vast array of new sources to the data landscape available to health care companies due to its ability to process unstructured data. Several medtech players have announced their efforts in the field of AI infrastructure. And emerging GenAI use cases now exist in all health care segments.

Not surprisingly, then, our experts see GenAI playing an even bigger role in health care in 2024 and potentially having a profound transformational impact on the industry. It may play a part in aspects as diverse as health care R&D (advancing drug development); consumer billing (reducing medical costs at the click of a button); and other efficiency, productivity, and cost improvements—all leading one expert to call the next digital evolution “the AI era.”

As we look forward to 2024, these and other trends discussed a year ago have continued to gain traction, even as new developments have appeared on the horizon. In this latest edition of The Future of Digital Health, experts across BCG and BCG X—BCG’s tech build and design unit—offer the most exciting developments they foresee in the coming year.

Our experts expect new digital tools to enhance productivity in the health care arena, allowing companies to interact more directly with patients and clinicians, reducing software and marketing costs, and boosting efficiency by eliminating manual, time-consuming tasks. They also predict that leaders in women’s health—and in particular FemTech—over the coming year will be the data-driven health care companies that are able to offer an integrated, end-to-end care pathway for women.

In addition, our experts foresee ongoing momentum around alternative health care models that meet consumers where they are. Wearable and at-home smart medical devices will become increasingly prevalent, particularly for managing chronic conditions and postoperative care. Virtual hospital wards will facilitate the continuous monitoring of patients—primarily through wearable devices—reducing the necessity for in-person hospital visits. Telehealth will offer not only virtual consultations but also remote diagnostics, and may include the use of AI to analyze symptoms and enable at-home lab tests and the real-time monitoring of vital signs. Finally, these innovations will boost patient autonomy, empowering patients to more actively manage their own care and become dynamic participants in the conversation with providers, specialists, and care coordinators.

These and other predictions are detailed below in the projections of our global team of experts. The evolution of digital health has never been more thrilling.
The health care trend of virtual hospital wards is poised to revolutionize patient care through the use of remote monitoring, telemedicine, and data analytics.
There will be greater emphasis on outcomes. It has been nearly 14 years since the first FDA digital medicine solution (Welldoc) was approved, and it is one of the few that has survived the changing landscape for a decade or more. One of the main complexities continues to be generating the right outcomes for stakeholders: patients, physicians, and payers. These outcomes can be demonstrated through such means as real-world-evidence-generating studies, heads-up trials with traditional care pathways, and clinical studies. Outcomes that lead to reimbursement in treating patient conditions will be essential to the survival of digital companion and digital health solutions.

We expect a proliferation of GenAI, advanced analytics, and automation. Health care businesses are leading the charge (along with those in the financial services, insurance, consumer, and retail industries) in adopting AI- and GenAI-related applications to boost efficiencies and potential revenue gains. We believe that health care will achieve a more than 80% CAGR over the next five years, given the acceleration of such technologies and their overall value to the health care ecosystem.

We will see continued momentum around outpatient, home health, and care-anywhere models. In line with consumers’ increasing demand to receive care in different settings, health care companies will continue to drive alternative models that meet consumers where they are: we continue to see an uptick in outpatient and urgent care visits, the transformation of primary care (such as the One Medical acquisition by Amazon, and the Oak Street Health acquisition by CVS), and in-home diagnostic companies driving ease of testing. These new models, coupled with digital and analytics solutions, will advance our quest to deliver personalized care at a reasonable cost.

Ashkan Afkhami
Managing Director and Partner
At each step in the value chain, AI and digital have the potential to provide more equitable access to health care products and services for underserved populations.

Johanna Benesty
Managing Director and Partner
We will see a divergence in pharma’s publicly announced digital investments, with two archetypes. Some companies will embrace digital solutions within clinical workflows—investing in the clinical development of software-as-a-medical-device solutions and setting up organizational structures that allow for regulatory-compliant business operations. Others will focus on their core molecular portfolios, with digital investments being used more often as an enabler of commercial and development work within the core pharma value chain.

AI performance in clinical workflows will start to show pockets of superiority over humans, and regulators will be forced to respond in service of the best patient care. This will likely play out in selected diagnostics—starting in radiology—that can run independent of human intervention.

A second wave of conditions will start to be covered by employer-sponsored health plans. To date, we have seen a lot of penetration in the areas of weight loss, diabetes, musculoskeletal, mental health, and urgent care. The next wave will include maternity, cardiology, sleep, oncology, dermatology, and more, on a large scale. Where there is value, deals will be made—especially if payment structures are on a per-user, per-month basis and there is no downside for the employers beyond the time spent setting up the offering.

Where there is value, deals will be made.
AI architecture innovations will materially enhance care delivery. 2023 marked a significant leap in AI maturity, with four notable advancements. First, advanced AI models now handle increased text length, enhancing their ability to synthesize medical histories and create more accurate diagnoses. Second, the efficient processing of large health data sets has enhanced AI’s ability to monitor disease and intervene in a timely way. Third, the emergence of synthetic data is filling gaps created by scarce real-world data, especially benefiting how AI models can be trained. Finally, the integration of AI models into robotics will continue to improve decision making in surgical procedures, rehab, and assistive robotics in diverse clinical scenarios. These advancements promise more efficient care delivery, enabling better patient outcomes.

Quality data will become even more essential to risk sharing. Data is central to evolving risk-sharing agreements between payers and pharmaceutical firms. Outcome-based pricing, for instance, relies on data showing health outcomes, such as reduced hospital admissions, to negotiate drug pricing. Predictive modeling uses historical patient data to foresee the financial impacts of various pricing models, aiding informed contract negotiations. Pharmacovigilance employs data analysis to uncover early drug-safety issues, ensuring that agreements reflect true drug benefits and risks. And adherence monitoring uses data on medication usage to evaluate drug effectiveness in real-world settings, which is crucial for determining payments in risk-sharing agreements. This data-centric approach fosters mutually beneficial agreements, aligning financial transactions with actual patient outcomes and drug performance and paving the way for a more collaborative and transparent health care ecosystem.

Digital technologies will continue to change clinical development. Decentralized clinical trials (DCTs) are already part of the transition from site-based models to flexible remote or hybrid models, powered by digital technologies from end to end. We expect 90% of the industry to adopt DCTs in some form over the next year. In addition to shortening trials, we also expect digital technologies to scale patient recruitment via digital advertising, online patient communities, and tailored outreach to a broad range of participants. This will result in the continued streamlining of trial operations, and patients will come to expect hyper-personalized engagement via preferred channels.
The health care industry, with its various manual, knowledge-heavy, and text-focused tasks, is especially well suited to leveraging GenAI to improve efficiency and quality of care.
• Wearable and at-home medical devices will become increasingly affordable and consumer-friendly. Health insurance companies will subsidize the distribution of these devices as part of a continued drive to collect the member health data so critical to increasing preventative health adherence and optimizing their medical loss ratio. Once connected, these smart devices will also provide a real-time window into population health and significantly increase the capture of patient-outcome reported measures for different patient groups.

• The data lake created by new information flowing from smart medical devices will fuel the ongoing potency of large-language models (LLMs). This newfound robustness will allow these models to begin generating significant insights into best-practice treatments and disease prevention. The natural language interfaces into LLMs will also allow all patients to access highly qualified virtual doctors 24-7. As patients become more empowered to understand their own health, they will lean into being an active participant in the conversation with providers, specialists, and care coordinators.

• The rapid scaling of available data will allow GenAI startups to turn their focus toward solving the consumer billing problem, leveraging newly mandated pricing transparency and the expertise of medical-bill arbitrators to allow patients increased choice and control of how much they pay for care. Even with the data currently available, some of these startups may already be very close to developing an industry-disrupting platform that reduces medical bills at the click of a button.

Nick Cristea
Vice President,
Experience Designer
The number of “virtual wards” will go from the tens of thousands to the hundreds of thousands. The health care trend of virtual hospital wards is poised to revolutionize patient care through the use of remote monitoring, telemedicine, and data analytics. Enabled by these advanced technologies, virtual wards will facilitate the continuous monitoring of patients, primarily through wearable devices, reducing the necessity for in-person hospital visits. With the potential to detect early warning signs and prevent hospitalizations, they are set to enhance patient outcomes and increase patient autonomy and choice while contributing to cost efficiency. As a result, the integration of virtual wards into the hospital ecosystem will become increasingly prevalent in 2024; we are already seeing it in the UK’s National Health Service (NHS) this winter.

As challenges due to staff shortages continue, AI will help. In 2024, we will continue to see challenges caused by persistent and unprecedented staff shortages; for instance, there are over 100,000 current vacancies in the NHS alone. To address these deficits, health care organizations are implementing AI-powered workflow automation to optimize their operations and alleviate the administrative burden on staff. The latter effort is one of the biggest and most obvious shorter-term uses of generative AI and presents a huge opportunity for improving patient care by freeing up physicians’ time to focus on higher-value tasks—a win-win for both patients and physicians.

Patients will shape tomorrow’s health care. There will be a transformative shift in patients’ behavior over the coming years as they evolve from passive stakeholders to active co-creators of health care systems (HCSs). This evolution will amplify the patient’s voice, emphasize personalized care, and leverage valuable data to drive continuous improvement in the relevant HCS. Initiatives such as England’s Martha’s Rule, which would grant the legal right to a second opinion, may become law, further empowering individuals and helping them break away from their traditionally passive roles. At its core, the concept of patients as co-creators fosters collaboration with health care providers, underlining the indispensable role of patient input in shaping and enhancing health care systems.

Grace Davey
Vice President, Strategic Design
• Diagnostic testing companies will be able to provide more detailed, definitive answers to patients at the point of care. The consumerization of health care has meant that patients now expect near on-demand diagnosis and treatment. (My favorite recent quote is, “Patients are now less patient.”) And health care companies are catering to this need: the next great step for diagnostic companies will be providing lab test results in minutes rather than the days they often take now. This development will have a meaningful impact on both patient satisfaction and providers’ margins—since shifting testing to the point of care means that providers capture testing revenue.

• Digital platforms in women’s health will continue to be a strategic focus for private equity. We will start to see consolidation in the ecosystem concentrated on the growing opportunity to address women’s unique needs across the health journey—from the teen years to family planning, conception, motherhood, postpartum, perimenopause, menopause, and beyond. Digital consumer touchpoints will be the glue that binds one consumer life stage to the next. There will be growing M&A efforts by traditional players in medtech and biotech that are focused on digital companions. And the ecosystem will continue to get richer as more capital flows into the space.

• AI will transform revenue cycle management (RCM). Even the largest health care providers struggle with RCM, particularly in areas such as revenue capture, credentialing, care quality documentation, and payment reconciliations. Because each of these areas (and others) can be broken down into components, some software companies have tried to address these functions in a fragmented way. However, their technological solutions are now generally outdated and continue to require substantial human labor. Modern, AI-centric businesses will win over dissatisfied health providers who want better data transparency, faster payments, and the appropriate capture of charges and complexity. And the easily measurable ROI that results will inspire rapid adoption of the technology.

We will start to see consolidation in the ecosystem concentrated on the growing opportunity to address women’s unique health needs.

Alexandra Friedman
Managing Director and Partner
Health care professionals are increasingly acknowledging the significance of mental health and using digital tools to address it.

André Heeg
Managing Director and Partner

- **Telehealth and remote monitoring will be widely adopted.** The use of telehealth will continue to gain popularity. By 2024, telehealth services may become more advanced and offer not only virtual consultations but also remote diagnostics. This may include the use of AI to analyze symptoms and enable at-home lab tests and the real-time monitoring of vital signs. With the help of technologies such as 5G, telehealth services could become more reliable and accessible, offering faster connections and more effective health care services.

- **Personalized and predictive medicine will be transformed.** Health care personalization will soon be revolutionized by advances in genomics, proteomics, and metabolomics. By 2024, these technologies may be more widely used for predicting individual risks for specific diseases, leading to more personalized treatment plans. This could include medication and treatment regimens based on a person's genetic makeup, lifestyle, and environment, which could potentially improve outcomes and reduce side effects.

- **AI-driven innovations will support mental health.** Health care professionals are increasingly acknowledging the significance of mental health and using digital tools to address it. By 2024, AI-powered platforms may offer mental health support, including conversational agents capable of identifying signs of depression or distress. These tools could be integrated into daily devices such as smartphones or virtual assistants, providing on-the-go support—and connecting individuals with human therapists when required.
• **GenAI’s impact on health care R&D will intensify in 2024.** Firms such as Insilico Medicine are already leading the way, with AI-driven drug projects in Phase II. Exscientia, which has more than 20 partnerships with industry leaders such as Bristol Myers Squibb and Bayer, is advancing AI-driven drug development through its GenAI assistant, Centaur Chemist. Regulatory frameworks are evolving, along with GenAI advancements in diagnostics and patient care. Going forward, breakthroughs in AI-generated imaging and CAD design will support medtech product development. Collectively, these innovations are paving the way for personalized treatment modalities and expedited medical innovations.

• **Drug and device manufacturers are developing use cases that improve knowledge-intensive tasks in manufacturing,** from compliance to quality management. Knowledge management assistants make up a third of the use cases across more than 150 recent GenAI projects at BCG. One example of AI-assisted document generation is the creation of annual product quality reviews, which involve automating the integration of policy guidelines, site-level pipeline data, and relevant production data. In the pharma commercial space, this includes the generation of personalized copy for physicians, pharma representatives, and patients. In 2024, we expect to see more GenAI pilots put into production, with increased adoption and scale.
Health care GenAI solutions that focus on end-to-end process transformations will succeed, while those that do not evolve beyond narrow point solutions will fail.

Julius Neiser
Managing Director and Partner

- We will see an explosion of AI businesses and related consolidation in 2024, both within large health care players and in the broader health care market. The emergence of GenAI into the mainstream has already created a boom: today, almost every investor presentation already includes AI in some form, and GenAI experiments are bubbling up across numerous large health care companies. The good news is that health players are finally fully exploring the potential of AI, getting over the difficult first hurdles. The bad news is that a lot of small blooming shoots are being sold as trees. Only a few will live up to the market’s lofty expectations; however, the impact of those that make it will transform the way we think about health care—just look at the effectiveness of GenAI foundational models for medical decision making, for example.

- Health care GenAI solutions that focus on end-to-end process transformations will succeed, while those that do not evolve beyond narrow point solutions will fail. We have long observed that for AI solutions that succeed in value delivery, about 10% is due to their algorithms, 20% to data and their technological backbone, and 70% to people and processes. We will see those players get ahead that are able to pivot their GenAI point solutions and experiments into functional transformations that understand the importance of humans, GenAI, “traditional” AI, digital tools, and processes all working in unison to deliver value. The areas where we will see this play out particularly clearly will be in clinical development, such as in dossier writing; medical and commercial content generation, including content localization and personalization; and medical, legal, and regulatory review.

- The focus of digital-health investments will continue to fundamentally change from top-line growth to profitability, one of my predictions for 2023 that continues to hold true. In 2023, we saw many digital-health players struggle. In an environment of high interest rates and low deal flow, those that have not sufficiently demonstrated a path to profitability will continue to face difficulties in 2024. On the flip side, investors have been piling into digital-health solutions that unlock cash across health care delivery, including value-based care, at-home care, and health care workflow solutions. This trend will continue.
Hospital systems of all shapes and sizes will realize the value from digital technology to improve service to their patient populations.

Etugo Nwokah
Managing Director and Partner

- The digital front door, which is not a new industry concept, will find a resurgence across the broad landscape of health care delivery systems. Hospital systems of all shapes and sizes—from safety net, regional, and rural facilities to large, integrated delivery networks—will realize the value from digital technology to improve service for their patient populations as well as access and equity.

- Employers and health systems will continue to experiment with new models to manage drug pricing and pharmacy benefits, including partnering with new disruptive entrants such as Mark Cuban’s Cost Plus, which is emphasizing transparency and value in a historically opaque drug pricing landscape.

- Many hospitals will adopt autonomous voice agents powered by highly trained LLMs, boosting out-bound administrative-focused calls (such as for scheduling and pre-op) to patients and driving much-needed efficiencies for hospital systems.
We will see more tailored mental health and well-being propositions aimed at specific use cases and customer segments.
• Large pharma, payer, and provider customers will negotiate (or renegotiate) to lower SaaS pricing, with increasing cost pressure on SaaS vendors to pass on savings from GenAI. GenAI has certainly shown the potential to improve productivity and save costs for teams in software and marketing. In fact, new incumbents in the SaaS market are being built with these savings and thus can potentially offer similar or better services at reduced cost. Additionally, there is limited technical moat, or complexity, when it comes to traditional SaaS builds. And GenAI-powered co-pilots can accelerate integrations and data migrations, thus lowering the cost of switching to a new SaaS vendor.

• The rise of open-source software in digital health will shift the narrative from tech to value. Health care has experienced limited infiltration by open-source offerings because of either regulatory concerns or the opportunistic market. In 2023, however, we have seen growing traction for open-source projects within health care from startups that have challenged the “walled garden” that restricts access today. With more consumer tech companies entering the health care arena, we will see open-source software becoming even more accessible and available to consumers of digital health. These shifts will increase the competition for service providers and should thus reduce the costs of technology in serving patients.

With more consumer tech companies entering the health care arena, we will see open-source software becoming even more accessible.

Sawan Ruparel
Vice President, Engineering
The expansion of remote patient monitoring using wearables and IoT devices will require multifaceted solutions across hardware and software.

Remote patient monitoring using wearables and IoT devices will become more accepted, adopted, and relied on, particularly for managing chronic conditions and postoperative care. This expansion will require multifaceted solutions across hardware and software and, most importantly, strategic initiatives that leverage extensive data analytics capabilities.

GenAI will be adopted more widely to gain efficiency and productivity for tasks that may currently be manual and time-consuming but may not necessarily demand advanced analytical abilities. For example, GenAI may be quite useful for aggregating, drafting, and updating documentation for regulatory reporting and auditing purposes.

Digital therapeutics should expand to address a broader range of conditions—beyond just mental and behavioral health—with the reintroduction of the digital therapeutics bill (the Access to Prescription Digital Therapeutics Act).

Jessica Sanford
Vice President, Engineering
Having a responsible approach is essential for any health care company using AI and GenAI for anything beyond improving its internal functional efficiencies.

Dr. Gunnar Trommer
Managing Director and Partner

- Many health care companies across pharma, medtech, and payers and providers will go on a GenAI transformation journey. Similar to the way that digital technologies started to permeate every aspect of how companies do business and interact with their customers about ten to 15 years ago, GenAI will have a profound transformational impact on health care.

- All health care companies—including medtech and pharma—will continue to leverage technology to interact more directly with their end users (i.e., patients and clinicians) in their marketing, sales, and customer-service interactions. While the commercial function of health care companies will be fueled by digital, AI, and GenAI, it will clearly not be purely digital. There will still be important human-to-human interactions, enhanced by technology.

- As health care becomes more and more tech-enabled, data security and patient privacy will become even higher priority. Protecting sensitive patient information is an ongoing concern. Further, accelerated by the advent of GenAI in health care applications, a responsible approach is essential for any health care company using AI for anything beyond improving its internal functional efficiencies.
• We will see the increasing use of GenAI solutions in the health care context as the technology matures, the availability of solutions suitable for sensitive data settings increases, and regulations are established. Given the rapid development of both open-source and commercial LLMs as well as the integration of these models into existing tools, GenAI solutions will become more accessible for medical uses across health care subsectors over the coming year. The health care industry, with its various manual, knowledge-heavy, and text-focused tasks, is especially well suited to leveraging GenAI to improve efficiency and quality of care.

• The cloud hosting of health care software (including hospital information software for providers) in Europe will gain traction as players such as Fachklinikum Mainschleife and AWS pioneer new solutions. While cloud hosting is already more common in the US than in Europe, European health care providers have long been hesitant to move away from on-premises solutions. By now, however, most major providers in countries such as Germany seem ready to take the next step in modernizing their IT infrastructure. This transition will take years, but 2024 could become the tipping point.

• I expect a continued surge of both new and expanding hybrid health care clinic conglomerates. These conglomerates are combining their online presence, telehealth, and digital tools with optimized operations processes across multiple clinics through acquisitions (often private-equity backed). As health care costs increase and medical staff shortages persist, providers are actively seeking ways to optimize treatment paths through hybrid setups that tap into the post-COVID openness of patients to digital health care services. The increasing number of professional investors in the health care sector, whether private equity funds or corporations, is simply accelerating this trend.

David Wilhelm
Partner

Cloud hosting of health care software (including hospital information software for providers) in Europe will gain traction.
The winners in the FemTech space will be those that can position themselves as orchestrators of the emerging ecosystems.

Alice Wilson
Principal

• The FemTech leaders of 2024 will be data-driven health care companies that have built strategic partnerships to offer an integrated, end-to-end care pathway for women. As FemTechs race to become one-stop shops for women’s health, a big challenge, particularly outside of the US, is to scale quickly enough to provide comprehensive care pathways without compromising on the experience they offer. To succeed, FemTechs will need to join forces. The winners in this space will be those that can position themselves as orchestrators of the emerging ecosystems—using data effectively to personalize the patient experience and thoughtfully integrating with chosen partners.

• I expect to see a broader use of AI in reproductive health. In the past few years, we have already seen some great success stories for AI in reproductive health; numerous startups, such as Alife and Fairtility, that have begun to improve the IVF success rate; and companies such as Hertility Health, a data and AI health care company, that are leading the way in reducing diagnosis times for gynecological conditions from years to months. In 2024, I believe we will also see some much broader AI use cases being applied across reproductive health. For example, over 90% of women who are actively engaged with their fertility journey in the UK are using an app to track their menstrual cycle, but the leaders in this space (Clue and Flo) have yet to offer clinically meaningful insights to users—despite the wealth of available data. In 2024, I predict we will see glimpses of AI being used to deliver clinical insights across broader reproductive health use cases to help women manage symptoms, predict longer-term trends, optimize fertility, and diagnose conditions even earlier.

• We will see more specialized digital mental health and well-being solutions emerge. Despite the huge investment in this space, there are still many extremely underserved areas that require more tailored approaches. In 2023, we saw mental health and well-being propositions appear across chronic disease management, reproductive and fertility journeys for all genders, and bereavement and loss. In 2024, I predict that we will see more tailored mental health and well-being propositions aimed at specific use cases and customer segments.

1. Based on a BCGX x Hertility study of 500+ women who were trying to conceive or actively planning for their reproductive future.