Generative AI in health and opportunities for public sector organizations

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BCG

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Key takeaways:

- Generative AI has the potential to transform industries.
- The healthcare industry is expected to experience some of the most significant benefits from and growth in GenAI investments in the coming years.
- As practitioners, public sector organizations can leverage GenAI, and AI more broadly, to improve their operations, and accelerate delivery against their missions.
- As enablers, public sector organizations can play a key role in accelerating the adoption of AI within the health ecosystem, including by establishing policy and regulations that promote the responsible use of AI and reducing barriers related to data and technology, workforce, and infrastructure.
- To get started, public sector organizations should establish rules of responsible engagement, define and communicate their AI strategies, serve as a central coordinator to improve transparency and facilitate partnerships, improve their internal readiness to adopt and scale AI, advance workforce capabilities, build a culture of AI use, and provide thought leadership to establish trust in AI among users and the public.

What is Generative AI?

Generative artificial intelligence (GenAI) has emerged as the biggest buzz word across nearly all industries given the potential for its broad and deep applications and the speed at which the technology is maturing. Evolving from prior advances in deep learning and machine learning, the most powerful GenAI algorithms are trained on vast quantities of unlabeled data in a self-supervised way. They learn underlying patterns from training data, which enables them to complete a wide range of tasks, including creating fully original text, images, audio and more in a matter of seconds. With thousands of new GenAI tools being developed each week, there is tremendous anticipation and excitement about its potential.

GenAI opportunity landscape across the health ecosystem

GenAI is projected to grow faster in healthcare than any other industry. With an estimated compound annual growth rate of 85%, by 2027 the market value is expected to reach $22B[1]. This appetite for investment is driven by the potential for GenAI to significantly enhance efficiency, reduce costs, and improve health outcomes.

The power of AI promises value for all stakeholders across the health ecosystem. For example, for providers, GenAI is expected to create $80B+ in savings via automated operations, reduced burden, and improved revenue cycle management. AI, and GenAI in particular, has the potential to provide **patients** with improved quality, access, affordability, personalization, and equity of healthcare services toward better patient outcomes. Through GenAI, **providers/ hospital systems** are offered the potential for quicker, more effective methods to prevent, diagnose, and treat patients. **Payers** may benefit from improved data sharing and analysis, communication, and payments, including preventative healthcare through predictive models and automation of claims processing. **Research & development institutions** including pharma, biopharma, and biotech can accelerate the product pipeline by applying GenAI to drug discovery and design, clinical trial planning and execution, precision medicine therapies, diagnostic image enhancement & analysis, supply chain risk identification and process augmentation, and more.

Public sector organizations have an important role to play in both using and advancing the technology:

- As **practitioners**, they can use GenAI to *improve internal operations and better deliver against their own mission*, by deploying the latest technology to modernize processes, products, and services to more cost-effectively and efficiently serve individuals, agencies, and businesses.
- As **enablers**, they can *advance the healthcare AI ecosystem* by fostering research, innovation, investment, workforce development, and collaboration. Enablement also includes limiting unintended consequences by codifying best practice standards, policies, and regulations in ethics and safety, data privacy, and security.

1. AI TAM research, Expert interviews, BCG analysis.

Practitioners: Improving internal operations and mission delivery

Public sector organizations have started to experiment with AI to improve their internal operations, deploying the technology to improve ways of working and to optimize business processes. The addition of GenAI will further enhance these capabilities. For example, the Department of Veterans Affairs (VA) has used AI to sort incoming claims from multiple sources (e.g., mail, fax, and electronic), reducing processing times from 10+ days to less than 1 day. The Centers for Medicare and Medicaid Services (CMS) built an AI pipeline to drastically reduce time spent on the Authority to Operate (ATO) security planning process, a process which currently requires 540+ hours logged for every document submitted. CMS and other federal health organizations, including the Agency for Healthcare Research and Quality (AHRQ) and Health Resources and Services Administration (HRSA), are using chatbots to improve customer service by providing knowledge- and action-based responses with 24/7 availability. There are opportunities to expand existing AI use cases to be generative in nature as the depth and breadth of data sets grow, more sophisticated models are trained, policies and regulations are established, and new applications are tested.

To realize the potential for GenAI internally, selecting priority use cases that drive step-change improvements in productivity and effectiveness is the most critical first step. Beyond those described above, Exhibit 1 outlines several additional use cases that can address common challenges related to internal operations, ranging from use cases that are conceptual to those that have been implemented, tested, and validated.

Importantly, public sector organizations should also define and prioritize AI use cases that directly enable mission delivery. For example, these may include:

- Using AI to improve the speed and consistency of medical product safety reviews for the U.S. Food and Drug Administration (FDA) by summarizing drug adverse event reports, prioritizing reports for further evaluation, and referencing historical data to track emerging issues.

- AI could be used by the National Institutes of Health (NIH) to boost productivity of clinical trial development teams by gathering intelligence from numerous sources (e.g., ClinicalTrials.gov, FDA guidance documents, PubMed, and other publicly available sources of scientific publications) to provide protocol writing support, elevate areas of over- or under-investment in research by reviewing grant submissions against previous awards, or improving health equity through pre-assessment of clinical study plans.

- The U.S. Centers for Disease Control and Prevention (CDC) could reduce vaccine misinformation and advance health equity through AI-driven multi-language chatbots to answer questions related to disease control and prevention, quickly generate communication materials during an emergency response, and monitor public health data.

- The Administration for Strategic Preparedness and Response (ASPR) may use AI to predict outbreaks, optimize mobilization of resources during an emergency response, and assess the strength of health systems to predict areas most likely to be impacted.

- Lastly, Centers for Medicare and Medicaid Services (CMS) could use AI to forecast needs based on health data, improve management of allocations, and detect instances of fraud, waste, and abuse.

While these use cases may be built within the limitations of currently available data and technology, there are opportunities to evolve them to be generative in nature as the landscape matures and evolves.

Enablers: Advancing the health ecosystem through AI

Public sector organizations are also uniquely positioned to support the broader health ecosystem - including patients, providers, payers, biopharma, MedTech, other federal agencies - in harnessing the full power of GenAI through the products and services that they deliver. When enabled by the public sector, the opportunities for GenAI applications across the health ecosystem are extensive.

The health ecosystem generates massive data stores that can be used to train generative AI models from sources including electronic health records, imaging, testing & diagnostics, -omics, biosensors and more. Additionally, GenAI foundational models trained on these data sets will have a myriad healthcare applications, including virtual health coaches, precision health monitoring, 'hospital at home' services, disease surveillance, digital twins, digital clinical trials, and more. These applications have the potential to impact quality improvement, patient safety, clinician/patient experience, and access to care, issues that are often core to agency missions (Exhibit 2).

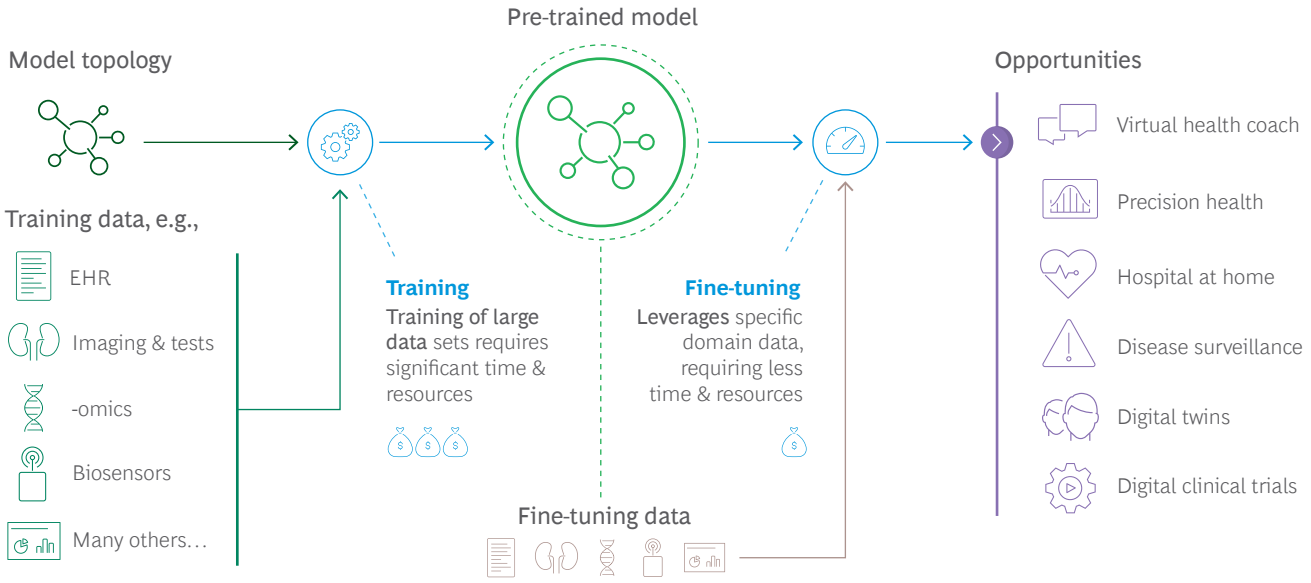
Exhibit 1 - Applications of generative AI to improve public sector internal operations

Non-exhaustive

	Functions		Potential GenAI applications
Front Office	**Service Delivery**	Siloed **service delivery and data;** reliance on higher cost **human responses**	✓ Natural and multi-language processing of agency documentation and public guidance – ability to personalize interaction in a more natural way without or assisting the human in the loop, and with a robust understanding of content, context, and ability to quickly search for the right data
	Public Relations & Communications	Time-consuming and menial approach to **composition of correspondence**	✓ **Automated email generation;** personalization of mailings and correspondence to residents and organizational stakeholders – **Streamlined public consultations** from constituents to collect input and prioritize relevant issues
Middle Office	**Risk Management & Compliance**	**Missing/incorrect data, manual processes, high prevalence of fraud, waste, and abuse**	? **Data validation:** automating compliance-related coding tasks to develop software which ensures compliance with regulations – **Compliance monitoring and reporting:** Identify potential in/external compliance breaches through identification of non-compliant events; automate drafting of compliance reports – **Claims risk detection, e.g.,** rationalizing a claim denial based on risk of FWA or non-compliance, generating communication material (claim outcome, appeal responses, etc.), etc.
	Data Management & Analytics	**Poorly managed data (e.g., unstructured, unclean, fragmented)** prevents **timely data to action**	? **Assisted data management** across data quality improvement, data lifecycle management, data governance, data integration, data processing, data architecture enhancement, etc. ✓ **Automated analytics** of managed data, including generation of summaries of findings
	Legal	**Policy research and validation**	✓ **Policy research:** analyzing in/external regulations to benchmark policies ✓ **Policy assessment:** generating risk assessment scenarios to identify potential compliance risks and policy impact
Back Office	**Back-end Processing**	Difficulty across the talent acquisition and retention continuum: **identifying, assessing, hiring, training, and retaining talent**	✓ **Point solutions: Ingest, categorize, and/or process** applications with minimal human involvement to significantly reduce processing time; **Automated, proactive follow-up** to quickly address application issues – **End-to-end process automation:** Augment resource deployment and increasingly **automate** processes over time (e.g., automated self-services Chatbots and digital-first processes with human in the loop for verification/ transaction finishing)
	HR/People	Manual, time-consuming, and repetitive processes leading to **high backlogs and user deviation and error**	✓ **Identification:** Enhance **outreach efforts, documentation, and strategy** with generative content – **Assessment: Predicting hiring success** based on prior experience and skillset; identification of non-traditional candidates and fits – **Upskill and retain** employees with **personalized support from hire to retire** in a way that is more approachable and personalized than existing solutions (e.g., performance management, training) ? Improve employee experience by **removing mundane/repetitive aspects** of the job
Tech. Innovation & Modernization	**IT**	Slow and costly **legacy systems modernization** and **digital transformations**	✓ **Accelerate productivity and speed** throughout each step of the tech modernization journey: 1. Discovery 2. Identification of dependencies 3. Documentation 4. Coding (generation, specification, conversion) 5. Testing 6. Deployment
		Sub-optimal **data governance and retention**	– Natural language processing of data to **better and quickly understand what to retain and how for** compliance and storage optimization
		Slow IT **ticket resolution; limited self-service**	– **Automated** routing of the IT ticket to best respondent based on issue and respondent expertise (enhanced v. general queue) – Comparison of IT issue against prior to provide validated resolutions based on prior user feedback (dynamic v. general FAQ)

✓ = Validated – = Early stage ? = conceptual

Exhibit 2 - Generative AI can create meaningful clinical applications for stakeholders



Sources: "Multimodal Biomedical AI", Nature, 2022; "On the Opportunities and Risks of Foundation Models", Center for Research on Foundation Models, arXiv, 2021; BCG analysis.

Early use case experimentation across the ecosystem has delivered results. For labs and clinics, large language models are being trained on a body of sequences and amino acids to generate new protein structures and predict molecular interactions[2]. The University of Kansas is utilizing technology by Abridge to identify key points from patient-provider conversation and creating EMR-integrated summaries, reducing the documentation burden on physicians. These are merely examples of many new generative AI applications in healthcare.

Successful implementation of these real-world use cases can address some of the biggest healthcare challenges, including reducing the burden on providers by providing supplemental support to diagnostics; automating filing and fraud detection for payers; aiding in personalized medicine, drug discovery, and commercial operations within biopharma; allowing for AI-assisted robots and sensors within MedTech, and more (additional potential use cases are defined in Exhibit 3).

2. 2011.13230.pdf (arxiv.org).

Exhibit 3 - Overview of real-world use cases for generative AI across the health ecosystem

	Use case	Description and examples
Providers	1 Digital clinical voice analysis	Leverage AI to analyze voice patterns and codify voice biomarkers to noninvasively detect abnormalities for clinical diagnosis
	2 Ambient digital scribe	Documentation systems that leverage speech recognition and AI to automate documentation and summarize verbal encounters
	3 Diagnostic image interpretation	AI imaging interpretation uses deep learning and categorization on medical images for faster and more accurate image interpretation
Payers	4 Intelligent prior authorization	A predictive process that payers utilize to approve care by automating workflows after a provider submits treatment notifications
	5 Claim fraud detection	ML model to detect fraud patterns by finding connections based on different factors from previously processed claims
Biopharma	6 Precision medicine	AI-powered precision medicine provides clinicians with an opportunity to specifically tailor early interventions to each individual
	7 Drug discovery & repurposing	AI algorithms to analyze millions of molecules and potential interactions with target proteins to develop new drugs
	8 AI in commercial operations	Analytics to increase business impact and efficiency with commercial operations functions (sales, customer engagement, marketing, etc.)
Medtech	9 Robotic surgeries	AI-assisted robots to perform sophisticated surgeries with precision and speed and derive new methods by learning from previous surgeries
	10 AI enabled prosthetic arm	Neuroprosthetic system - AI decoder that learns the user's intention based on the nerve signals it senses in the arm to translate movement intent

Source: BCG analysis.

Note: Emerging AI use cases gathered from trend reports and latest Garnter Hype Cycle's.

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Exhibit 4 - Requirements to enable to the ecosystem across six dimensions, ASPIRE

Aspirations need to balance needs and perspectives of residents, public, and private sector organizations

	Dimension	Requirement
A	Ambition	Articulate AI vision (e.g., global leadership, pioneering ecosystem) and benefits for residents, public, and private sector
S	Skills	Attract, develop and retain talent for the workforce to thrive in the new age of AI
P	Policy & Regulations	Nurture developments and provide flexibility and certainty over AI activities to provide guidance to public and private sector. Drive innovation in state and federal regulation of benefits processing.
I	Investment	Deploy funding mechanisms to stimulate and attract AI-related private businesses and use cases
R	Research & Innovation	Build and enable core research and innovation institutions, public and private, in the domain of AI
E	Ecosystem	Stimulate AI adoption through commercialization and industry application

Source: BCG analysis.

Note: Detailed countries benchmarks available in appendix.

Public sector organizations can help ecosystem stakeholders improve their probability of successful implementation and maximize the impact of their investments in GenAI in several ways, as outlined in BCG's ASPIRE Framework described in Exhibit 4.

Public sector organizations are already taking strides to enable AI across the ASPIRE dimensions. For example, various countries are articulating their AI **ambitions** and establishing national AI strategies, including around healthcare (e.g., the US Department of Health and Human Services developed an AI Strategy in 2021). Other countries are enabling the ecosystem through investments in **skills**. For example, Qatar's AI strategy is highly focused on investing in K-12 education, apprenticeship programs, research funding, and attracting talent. Similarly, public sector organizations are enabling AI within the health ecosystem through the development of **policy and regulations**. The EU is finalizing the terms of the "AI Act" which will be the world's first comprehensive regulation of AI, and potentially a global standard. The US government appointed a committee to improve coordination of federal AI efforts and advise the White House on interagency research and development (R&D) priorities. Countries are similarly **investing** in AI, including specific investments into **research and innovation**. For example, the US National AI Initiative Act passed in 2020 allocated critical funding for AI R&D. Lastly, public sector organizations are enabling the AI **ecosystem** by making solutions accessible. In 2018, Britain enacted the AI Sector Deal to set out actions that would promote the adoption and use of AI in the UK.

How should public sector organizations get started with GenAI?

Generative AI is a new territory, with many organizations still in the experimentation phase, testing and building their AI capabilities through a series of pilots. More advanced organizations are cautiously implementing on a larger scale, while navigating concerns related to accuracy, safety, ethics, and privacy. Some organizations have well-defined strategies for integrating the use of AI within their organizations, while others are still determining how best to jumpstart their AI efforts.

Depending on the starting point, there are several steps that public sector organizations can take to accelerate responsible implementation internally, and to support wide-scale adoption across the health ecosystem.

First, they can **establish rules of responsible engagement**. At BCG, we define Responsible AI (RAI) as developing and operating AI systems that align with organizational values and widely accepted standards of right and wrong while achieving transformative business impact. Public sector organizations can define AI governance processes, policies, and decision rights to guide implementation internally. Further, they can help the healthcare ecosystem to more effectively adopt and deploy RAI by providing a framework that supports organizational decision making and offers guidance for developing and using generative AI. Additionally, by investing in the development of tools to monitor and manage generative AI risks, public sector organizations can create feedback mechanisms for users to report inaccurate or unhelpful results and proactively flag issues, such as biased outputs, intellectual property and copyright infringement, and cybersecurity risks.

Next, they can **define and communicate their AI ambition and strategy**, identifying top use cases considering their potential to impact operational efficiency and mission delivery. Prioritization may also be informed by conducting a "discovery process", engaging with ecosystem stakeholders to understand the big pain points and highest value GenAI opportunities to enable an efficient and high-quality health ecosystem. For prioritized use cases, they can design and launch pilots focused on generating incremental impact, evaluate their effectiveness, refine as needed prior to full scale-up, all the while strengthening their organizational muscle for disruptive change. Further, public sector organizations may play a role in coordinating AI investment across the ecosystem, creating awareness of ongoing investments and facilitating collaboration and partnership to accelerate outcomes.

To improve the likelihood of successful implementation, they can improve their "AI readiness" by **investing in infrastructure** by integrating data in the cloud, adding computing power to reduce time to train and run algorithms, provide shared environments where public and private sector organizations can collaborate, and make health data resources available to entities across the ecosystem to accelerate equitable healthcare. They can break down siloed data and technology systems which limit access to data needed to train and feed models, impacting the accuracy of the AI algorithms and quality of the generated output. They can also integrate new AI models into legacy technology and operational, policy, and other mission-specific workflows to drive adoption and improve usability. Externally, public sector organizations can provide guidance for industry on ways to improve system interoperability so that systems and AI technologies can work together, and varied data sources can be exchanged seamlessly.

Critically, public sector organizations must **build their talent and establish a culture of using AI**, ensuring that employees are familiar with how to operate GenAI-enabled applications by developing new educational courses, re- and up-skilling current employees, hiring new types of talent (e.g., data scientists), and supporting change management efforts.

Finally, public sector organizations can **provide thought leadership on ethics, trust, and regulation** to accelerate AI progress across the health ecosystem. Generative AI is still little understood by the public, leading to distrust in outputs which may be biased, false, or opaque unless models are reviewed and corrected by human experts and made more transparent. Furthermore, AI may be misused/over relied on unless hospitals, clinicians, payers, and other health ecosystem players clarify how specific solutions should be used, with clear messaging that AI-generated insights are recommendations rather than mandates. Guidance on how to mitigate emerging risks and capture early trust and value will depend on setting the right guardrails early to experiment in the right way.

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