pwc

The transformative power of GenAI in healthcare

January 2026

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01

An overview

Evolution of generative artificial intelligence (GenAI)

GenAI is a subset of AI that specialises in creating novel human-like outputs. It prioritises advanced learning approaches and versatility, blurring the lines between human and machine- generated content.

Capabilities

- Search, analysis, prediction
- Automated summarisation and augmentation
- Conversation
- Mathematical reasoning
- Chain-of-thought capabilities

Benefits

- Knowledge management
- Productivity and efficiency gains
- Accelerated innovation
- Accessibility and personalisation of care
- Data-driven decision making

Key challenges

- Ascertaining the rationale behind the system's 'hallucinations'
- Ethical responsibilities and regulatory requirements
- Concerns about privacy and surveillance

How did we get here? Gradually, then suddenly

2025

Agentic AI evolved as a natural progression of GenAI, shifting from passive content creation to actively making decisions and completing tasks on its own.

2024

Enhanced transformer capabilities: This year saw the emergence of smart transformers for efficient power systems, multimodal models like Vision Transformer (ViT) for integrated text and image processing, and efficiency enhancements through pruning and quantisation.

2023

Restricted Boltzmann Machine (RBM): RBMs started being used to detect various diseases such as diabetic retinopathy and classification of brain diseases by coupling them with generative adversarial networks.

2018

Emergence of large language models (LLMs): The development of transformer architectures led to the creation of LLMs like BERT, which excel in natural language processing (NLP) tasks.[4]

2012

Deep learning revolution: The introduction of **AlexNet** demonstrated that deep CNNs could outperform traditional methods in image classification tasks.[3]

1990s

Rise of CNNs and recurrent neural network (RNNs): LeNet-5, developed by Yann LeCun, became a significant milestone for CNNs in medical imaging.[2]

1980s

Modern neural network: The backpropagation algorithm was popularised, enabling multi-layer networks to learn complex patterns. **Neocognitron** is an early version of convolutional neural networks (CNNs).

1943–1957

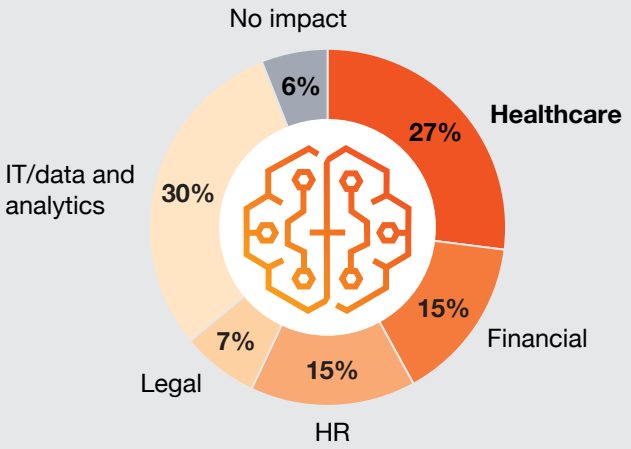
Early concepts: The **Perceptron**, developed by Frank Rosenblatt in 1957, was one of the first neural network models capable of learning from data.[1]

1, 2, 3, 4 Frank Rosenblatt, The Creator of the Perceptron in 1957

Potential impact of GenAI across business functions[5]

- Market: USD8.7 trillion market by 2032
- CAGR: 23.56% for 2024–2030
- Healthcare: USD4.2 billion by 2030

Potential growth of GenAI across sectors



Sources:

- PwC, 'Understanding the impact of GenAI on the Indian healthcare ecosystem'
- Survey conducted by PwC in 2024

Indian GenAI landscape[6]

Total earnings + investments

USD800 million

250 startups

GenAI in healthcare

Smarter healthcare with GenAI

Improved comprehension: The new-age algorithms have the potential to overcome the challenges posed by the earlier generation of models in terms of accuracy across datasets as well as their diagnostic capabilities.

Complex clinical scenarios: The latest models specialise in multi-step rationalising, allowing them to give accurate responses consistently. This capability helps human stakeholders (doctors, nurses, medical staff) leverage GenAI to make informed choices and improve their ability to diagnose complex clinical conditions more efficiently and effectively.

Increased contextual awareness: GenAI models can provide a complete background of a patient's medical history, including diagnoses, symptoms and past allergies/ medications by collecting this information from patients via interactive forms/ questionnaires. This information can be used to provide a comprehensive pre-visit summary for doctors, resulting in increased patient engagement and more individualised care.

Clinical data aggregation: Automating data aggregation from historical/legacy medical records to create a longitudinal patient record reduces the administrative burden on healthcare providers, allowing them to devote more time to patient care.

Health trend analyses: Newer models can help healthcare providers understand disease trends and respond proactively, resulting in better outcomes at the population level and enabling them to cater to various public health requirements.

5 Precedence Research, Generative AI In healthcare market size, share, and trends 2024 to 2034

6 NASSCOM, India's generative AI startup landscape

02

Opportunities in the Indian healthcare system

Potential of GenAI: Clinical outcomes and productivity

GenAI holds immense potential to transform the current healthcare system by supporting improved decision making and streamlining workflows while also reducing the administrative burden. Besides, it empowers healthcare providers to deliver more efficient and tailored patient care.

Public healthcare

- Disease surveillance and outbreak prediction
- Patient and population education
- Population health management
- Optimising vaccination and immunisation programmes

Private healthcare providers

- Clinical decision support system
- Discharge summary generation
- Wellness (self-care/corporate wellness)
- Mental health
- Medico-legal assistance
- Chronic disease/lifestyle management

To summarise, GenAI has the capability to improve provider productivity to a large extent.

It has the potential to cut down on manual effort and lower costs. GenAI can also improve clinical outcomes through early/better diagnosis, personalised treatment plans and proactive patient education for self-care protocols.

It can help with generating medical content, images as well as videos to streamline healthcare communication amongst different stakeholders in the journey.

Apart from routine data collection and responding to general inquiries, GenAI-enabled chatbots can help with patient inquiries, appointment scheduling and management.

Increased productivity

- Generate medical content, images and videos to streamline healthcare communication.
- Manage patient queries, appointment booking, routine data collection and general inquiries.
- Automate routine healthcare tasks such as patient data collection and document summarisation.

Improving healthcare outcomes

- **Individualised treatment plans:** GenAI creates precise and efficient tailored therapies by analysing a large amount of patient data, such as medical history and longitudinal health records.
- **Automated patient charting:** Gen AI can streamline and generate the content of a patient's chart, minimising the manual efforts of healthcare providers.
- **Health avatar:** An AI-powered digital twin can be used to capture the patient's comprehensive health status.

Healthcare payers

Gen AI can have a significant role in designing the health financing policy of a country and achieving Universal Health Coverage (SDG Target 3.8)

Designing health financing policy: Collating and analysing the vast amount of health spend data coming from different stakeholders (e.g. Insurance Regulatory and Development Authority of India [IRDAI], National Health Accounts, state budgets, National Health Mission [NHM])

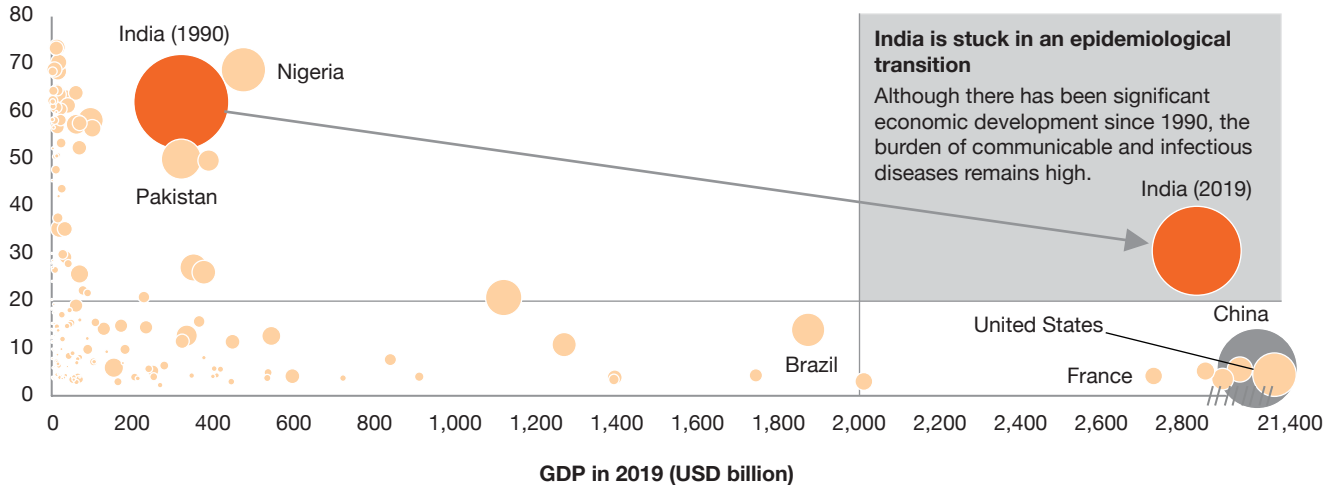
Developing tools to streamline the healthcare financing processes: This would involve constructing specific data integration portals, encompassing decision support systems. These systems would in turn assist stakeholders in analysing the patterns of scheme utilisation and benefit packages by consolidating information from a spectrum of insurance schemes, thereby helping to gauge practical insights for policy alignment. For instance, GenAI-powered analytical tools could be used for formulating the centralised beneficiary tracking systems. This would help in efficiently figuring out scheme utilisation trends or data on gaps in scheme coverage from large datasets.

Executing policy roadmaps: Using GenAI tools to identify beneficiaries via sociodemographic variables can help in reducing the administrative burden, improving utilisation of healthcare and claims management services, design compliance tracking dashboards, and resolving queries.

India's 'epidemiological transition' journey has lagged behind its economic transition (incomplete public health agenda)

In the last few decades, India has experienced significant economic growth. However, it has not been able to achieve a substantial shift in its epidemiological profile. As a result, the burden of communicable, neonatal, maternal and nutritional diseases continues to remain high in the country, indicating a wide gap between economic prowess and effectiveness in advancing the public health initiatives to curb basic public healthcare issues.

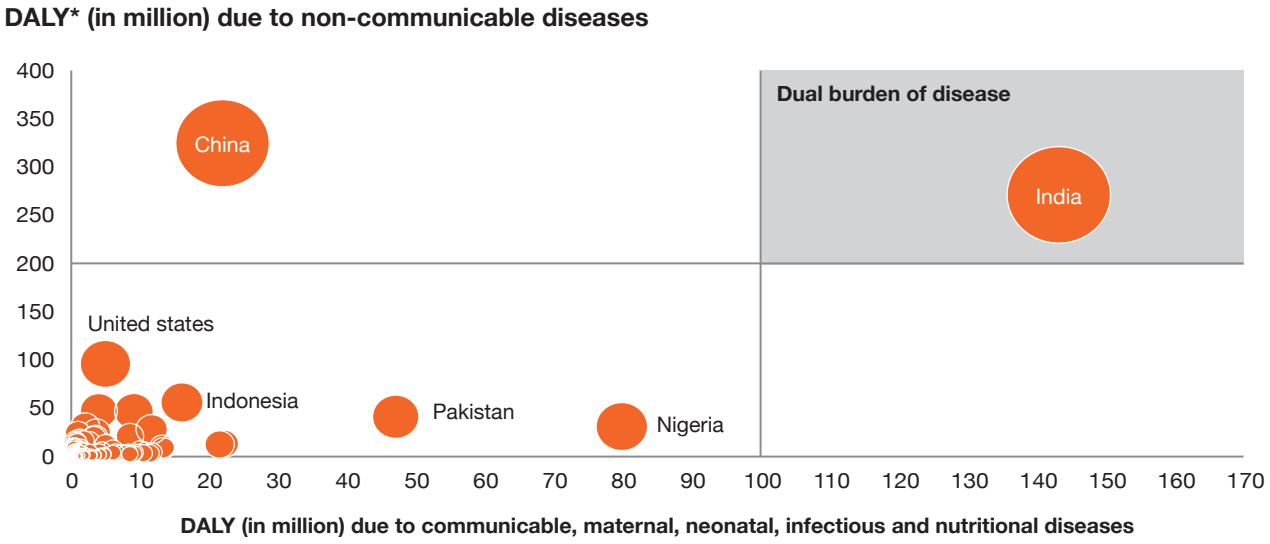
Percentage burden of communicable, maternal, neonatal, infectious and nutritional diseases



Source: World Bank data, Global Burden of Disease Study 2019 (GBD 2019) results, PwC analysis

Note: The bubble area represents a country's total burden of disease.

India has one of the highest dual burdens of disease:

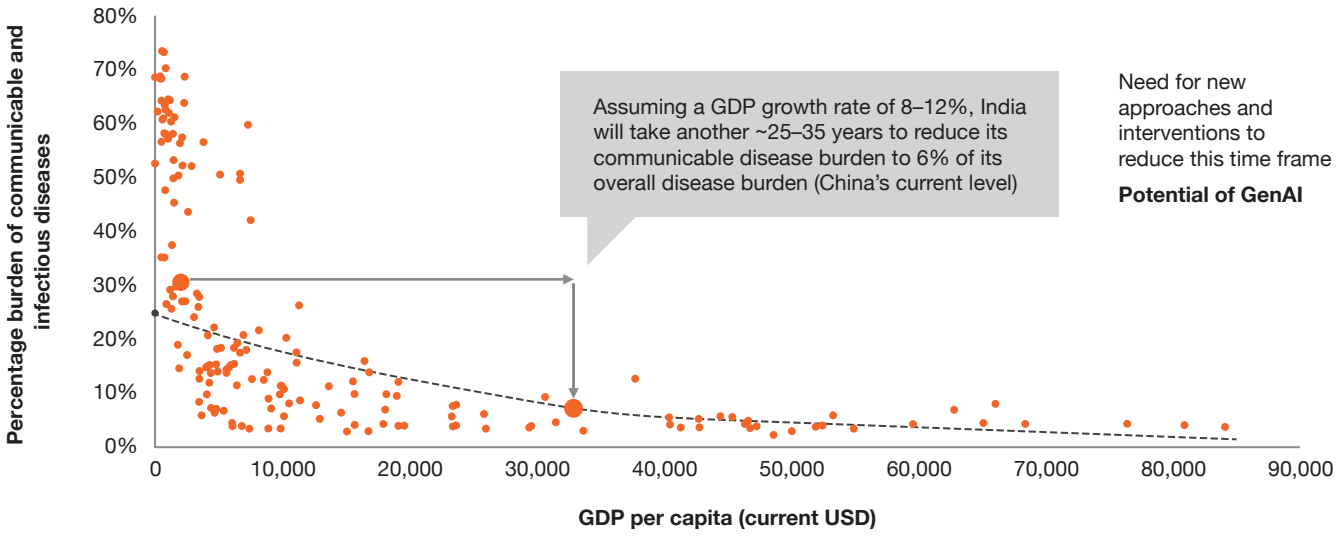


*Disability-adjusted life years

Source: GBD 2019 results, PwC analysis

Note: The bubble area represents a country's total burden of disease.

Even at an annual GDP growth rate of 8–12%, India will take another 25–35 years to reduce the communicable burden to 6% (China's current level).



Source: GBD 2019 results, World Bank data, PwC analysis

Note: The bubble area represents a country's total burden of disease.

The near-optimal health status and associated outcomes may be influenced by a significant reliance on traditional healthcare models. These models prioritise reactive care over preventive or promotive care and are myopic in terms of infrastructural abilities, further resulting in higher DALY rates. GenAI has the potential to enhance the capabilities of these outdated systems. Moreover, it could narrow the divide created by the existing limitations and pave the way for a more proactive and inclusive patient-centric care model by addressing the following challenges:

Disease burden:

India is currently dealing with a dual disease burden with extensive prevalence of communicable as well as non-communicable diseases.

Inequalities in healthcare access:

Disproportionate access to healthcare services persists across the nation. Moreover, various marginalised communities face barriers in access to quality healthcare.

Healthcare infrastructure challenges:

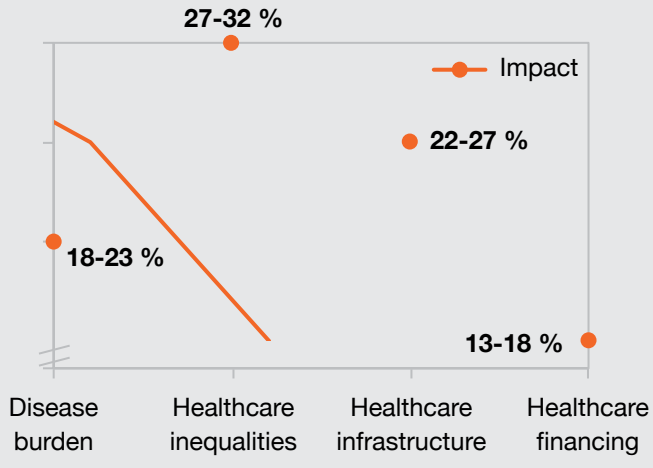
Healthcare facilities face heavy workloads owing to under-resourcing and high patient inflow, which in turn leads to compromises in the quality of care and high waiting time.

Healthcare financing:

Being able to afford quality healthcare services is still a challenge for many people. Due to higher costs, people are unable to seek timely healthcare services, leading to increased morbidity and mortality.

Potential of GenAI in Indian public healthcare

GenAI can tackle the challenges faced by the public healthcare system and streamline day-to-day operations.

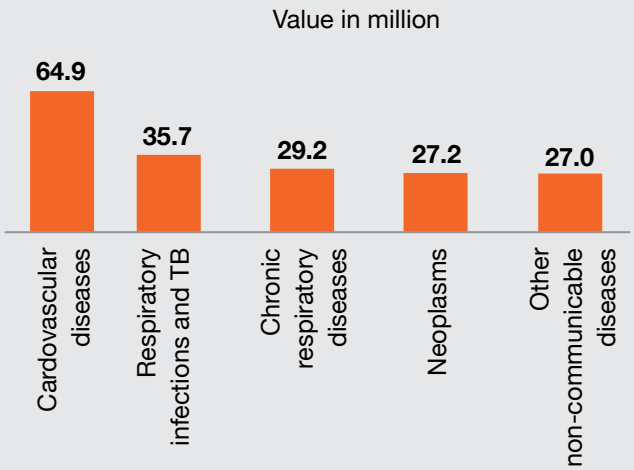


Source: Interviews conducted by PwC with industry experts

DALY

To tackle the DALY count, the Indian Government has taken several initiatives such as:

- national health programmes
- disease health programmes
- health education and awareness
- infrastructure development.



The graph represents the highest DALY contributors in the nation.

Source: VizHub 2021, GBD 2019

The impact of GenAI will be visible across the value chain via multiple use cases.[6]

Potential efficiency gains through GenAI

	Low	Medium	High
Preventive			▲
Promotive			▲
Curative			▲
Rehabilitative		■	
Palliative	▼		

Potential efficiency gains through GenAI across India's public health spectrum

Population health: Interventions and simulation of health behaviours to modify campaigns for specific populations and address prevailing health issues

Research and development: Generating new molecular structures and predicting their properties; developing therapies to combat prevalent diseases

Cost savings and reduced disease burden: Potential to unlock USD94 billion in cost savings while reducing DALYs[7]

6, 7 Annexure (b)

Use cases and their impact across various stakeholders

Preventive
■ Patient and population education
■ Virtual health assistants
▼ Personalised health risk assessment
▼ Disease outbreak prediction and surveillance
▼ Optimising vaccination and immunisation programmes
Promotive
▲ Community health engagement
■ Lifestyle optimisation
▼ Personalised wellness plan
Curative
▲ Diagnostic assistance
■ Drug discovery and development
■ Image interpretation and diagnosis
▼ Personalised treatment planning
▼ Integration with IoT and wearables
Rehabilitative
▲ Recovery monitoring
▲ Support system integration
■ Virtual reality rehabilitation
▼ Personalised rehabilitative plans
Palliative
▲ Telehealth support
■ Remote symptom monitoring
▼ Virtual support groups

Business impact of Gen AI

▲ High ■ Medium ▼ Low

Streamlining data: GenAI in data plumbing

Pain points:

1. Limited access to healthcare data that is rich in quality
2. Data privacy, security, safety and regulatory compliance
3. Challenge of data standardisation and interoperability while accessing healthcare data that is unstructured or fragmented and resides in silos
4. Data processing takes up a lot of time and is prone to errors
5. Dealy in healthcare interventions owing to limited availability of real-time data

Need for AI and GenAI:

1. Automating data collection, extraction, standardisation and summarisation
2. Integration of data points from various sources in order to create a data pool which becomes a single source of truth
3. Data analytics which facilitates decision-making process by leveraging real-time data (e.g. mobilising vaccination drives for an emerging disease)

Traditional AI:

1. Leveraging AI/machine learning (ML) algorithms in order to automate tasks that are labour-intensive like data extraction from multiple sources (EHR, radiology information system [RIS] and physician notes)
2. Cleansing of data to achieve standardisation while data enrichment is also taken care of
3. Managing and organising data to create data lakes, which ensures accessible and queryable data for building ML models
4. Monitoring and managing secure data pipelines so that data protection is ensured
5. Data masking and de-identification

GenAI:

1. **Facilitation of AI/ML use cases:** Synthesising realistic data to bridge gaps, manage errors and bring together diverse datasets in a format that is standardised
2. **Privacy protection:** Creating synthetic datasets that safeguard privacy by retaining the characteristics and statistical properties of the original data
3. **Data ingestion and integration:** Learning from various data schemas and formats, generating code for handling complex data transformations and integrations
4. **Predictive abilities:** Anticipating future data points and generating predictions and alerts based on data trends that are streaming

Adoption of GenAI is likely to be influenced by a multitude of factors – degree of cost savings achieved and residual impact on the workforce being the leading ones.

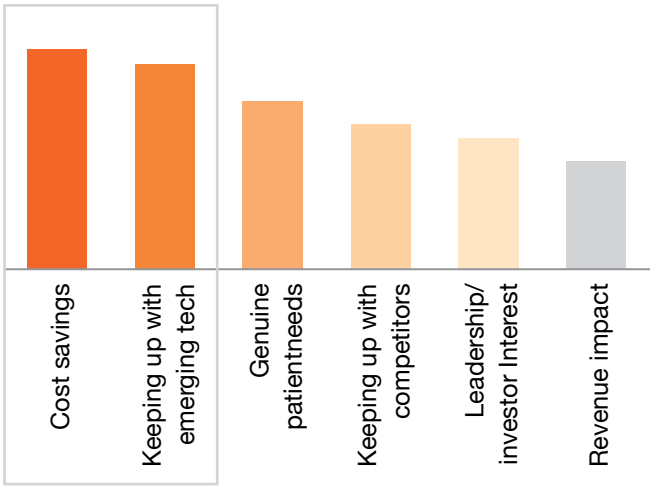
Productivity gains, diminishing earnings before interest, taxes, depreciation and amortisation (EBIDTA) margins, high running costs and frequency of errors are the primary challenges to be addressed in the healthcare sector. In addition, the shift in patient expectations warrants a re-evaluation of service delivery models in the private healthcare ecosystem. Private healthcare providers offer a spectrum of services – from consultation and acute care to rehabilitative care and catering to diverse medical needs.

Beyond conventional resource-intensive frameworks, Gen AI can offer intelligent automated solutions that reduce manual involvement, optimise operations, and transform patient care, refining care delivery, promising better prognostic outcomes, and facilitating personalised care and advanced analytics.

By embracing GenAI, private healthcare providers can significantly improve care delivery, ultimately enhancing the entire spectrum of care delivery.

Factors driving the adoption of AI:

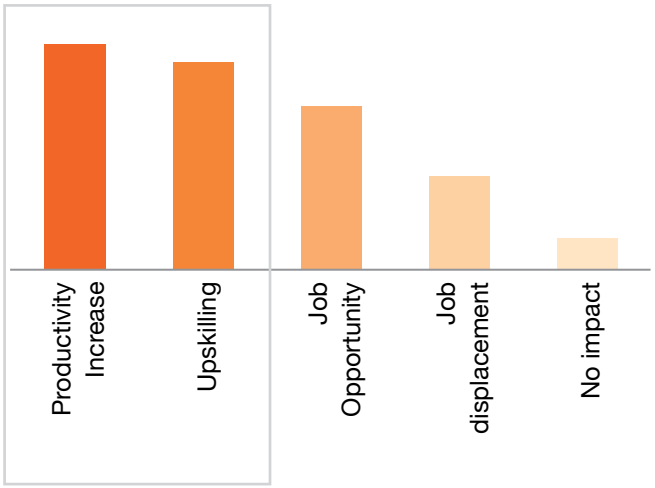
Cost savings, followed by a need to keep up with emerging tech, are the leading factors driving healthcare organisations to pursue GenAI initiatives.



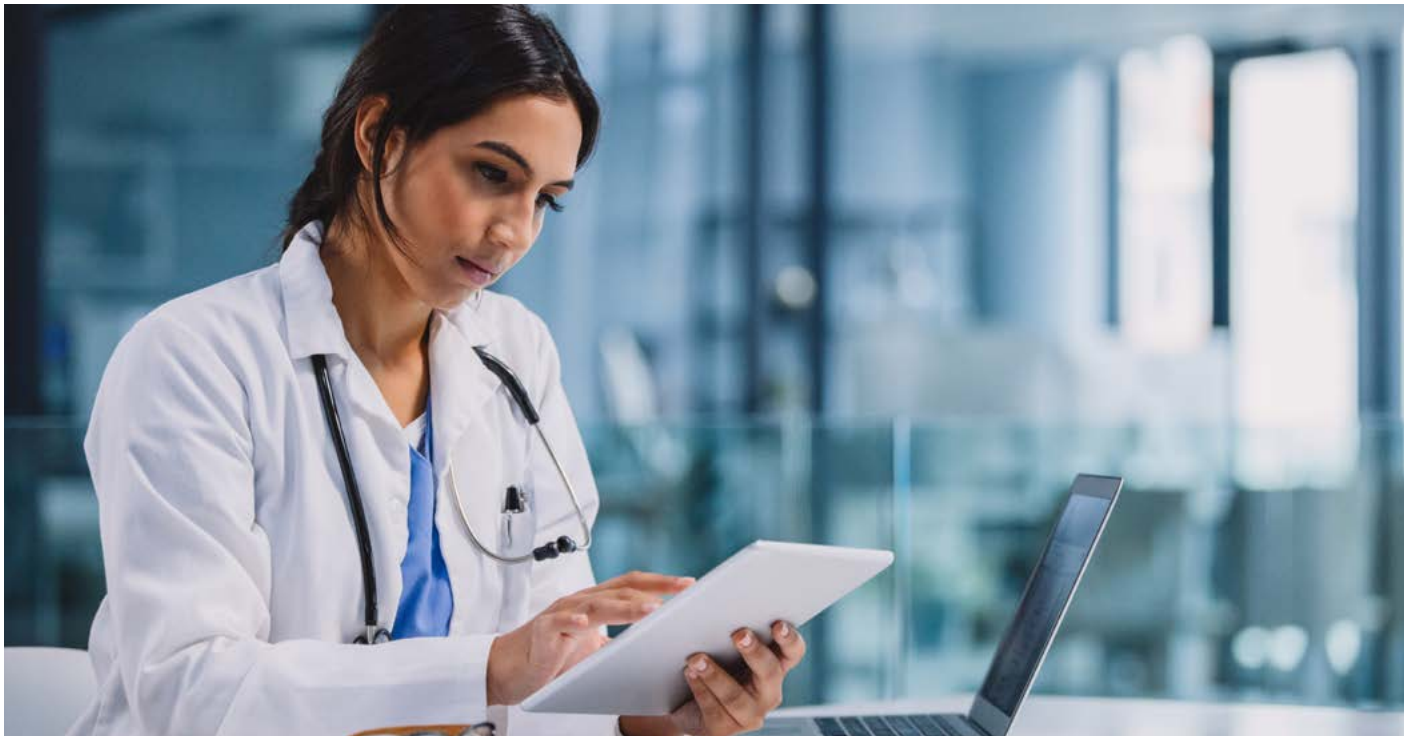
Source: Interviews conducted by PwC with industry experts

GenAI's impact on the workforce:

GenAI has entered the modern workplace and is disrupting, augmenting and improving work processes. PwC's India Workforce: Hopes and Fears Survey 2023 highlights the impact of GenAI on the current workforce.



Source: India Workforce Hopes and Fears Survey 2023 (https://www.pwc.in/assets/pdfs/hopes-and-fears/india-workforce-hopes-and-fears-survey-2023.pdf)



Considering the heterogeneity and fragmentation of India's private healthcare system, the adoption of Gen AI is expected to occur in phases (diffusion of innovation)

Phases of AI implementation journey

The journey of AI implementation within an existing system can be broadly categorised into seven stages, mapping the pathway from initial awareness and exploration of possibilities to being a transformational leader in the industry.

Laggards

The companies that are in the very initial stages of AI implementation focus on building digital awareness and implementing basic electronic systems – moving from manual to digital record-keeping and establishing fundamental data collection capabilities.

Market average

These companies emphasise system integration and automation – connecting lab systems with broader healthcare IT infrastructure and introducing AI for basic analytics and workflow optimisation.

Early adopters

This category focuses on achieving smart operations through full automation and comprehensive AI integration – enabling predictive modelling, real-time analytics and data-driven decision making across all laboratory functions.

Transformers

These companies establish the laboratory as an innovation hub – driving healthcare transformation through cutting-edge AI applications, research and cross-institutional collaboration.

Stage 1: Initial awareness and exploration

Stage 2: Basic implementation

Stage 3: Intermediate integration

Stage 4: Advanced automation

Stage 5: Smart operations

Stage 6: Data-driven decision making

Stage 7: Transformational leadership in healthcare

The GenAI advantage: Productivity gains for healthcare professionals

Potential time savings through GenAI for private health providers[8]

	Low	Medium	High
Clinical		■	
Para clinical		■	
Non-clinical (customer support, marketing)			▲

Cost savings:
GenAI has the potential to unlock **cost-saving opportunities worth around USD25 billion**[9] across various persona in healthcare delivery.

Support and efficiency gains:
GenAI can assist doctors with tasks like clinical documentation, summarisation of patient data and discharge summary generation, allowing them to dedicate more time to patient care.

Assistance in routine tasks:
GenAI can assist nurses with tasks like data entry, routine information gathering and progress note documentation, freeing up their time for direct patient care.

8, 9 Annexure (a)

Use cases and their impact across various stakeholders

Clinical
▲ Ordering and interpreting diagnostic test
■ Treatment plan and discharge summary
■ Patient education
■ Medico-legal assistance
▼ Clinical decision support system
▼ Medico-legal assistance
▼ Patient information documentation
▼ Assessment and diagnosis

Para-clinical
■ Managing patient care
▼ Medical info gathering and documentation
▼ Discharge summary generation

Non-clinical
▲ Brand management and PR activities
■ Scheduling reminders and follow-ups
■ Billing, payment and insurance checks
■ Delivery (offline and online)
■ Campaign performance tracking and analytics
▼ Wellness and mental health
▼ Lifestyle management
▼ Handling appointments
▼ Gathering information and feedback
▼ Maintaining MIS and other ad-hoc jobs
▼ Communication, development and design

Business impact of Gen AI

▲ High ■ Medium ▼ Low

GenAI solution 1: Chatbot – a tool to enhance productivity for a healthcare provider

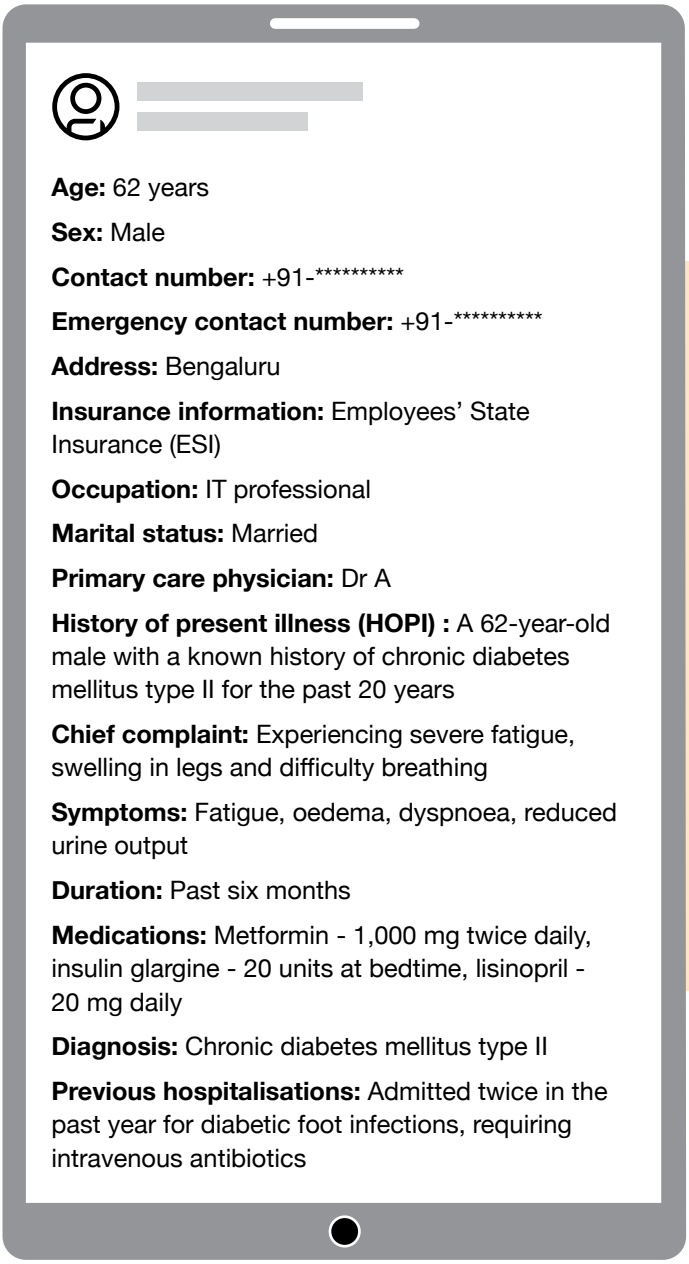
Solutions like chatbots leverage GenAI and serve as a crucial component in enhancing communication between the consumer (i.e. the patient) and the healthcare provider. They serve as a huge piece in the puzzle of productivity gains by automating routine tasks and streamlining mundane operations. By doing so, they not only enable patients to get a quick fix for their problems but also allow healthcare professionals to focus on complex clinical responsibilities.

GenAI solution 2: Clinical decision support – a tool to enhance productivity for a healthcare professional

The clinical support tool is another solution that leverages GenAI. It analyses a vast amount of patient data and associated clinical literature to provide real-time evidence-based recommendations that help healthcare professionals to make better prognostic decisions and reduce errors. These tools also empower clinicians to deliver treatment plans tailored to a patient's medical history. Besides serving as a tool to augment one's clinical practice, they also help in ensuring that the envisioned treatment plan complies with regulatory requirements.

Illustrative example:

User input: Chief complaint



Age: 62 years

Sex: Male

Contact number: +91-**********

Emergency contact number: +91-**********

Address: Bengaluru

Insurance information: Employees' State Insurance (ESI)

Occupation: IT professional

Marital status: Married

Primary care physician: Dr A

History of present illness (HOPI) : A 62-year-old male with a known history of chronic diabetes mellitus type II for the past 20 years

Chief complaint: Experiencing severe fatigue, swelling in legs and difficulty breathing

Symptoms: Fatigue, oedema, dyspnoea, reduced urine output

Duration: Past six months

Medications: Metformin - 1,000 mg twice daily, insulin glargine - 20 units at bedtime, lisinopril - 20 mg daily

Diagnosis: Chronic diabetes mellitus type II

Previous hospitalisations: Admitted twice in the past year for diabetic foot infections, requiring intravenous antibiotics

Output

Comprehensive review of the case

A 62-year-old male with a 20-year history of chronic diabetes mellitus type II presents with severe fatigue, leg swelling (oedemal difficulty breathing [dyspnoea], and reduced urine output over the past 6 months). He has been admitted twice in the past year for diabetic foot infections requiring intravenous antibiotics. His current medications include metformin (1,000 mg twice daily), insulin glargine (20 units at bedtime), and lisinopril (20 mg daily). There are no details provided about his physical exam findings, vital signs or results of any diagnostic studies. The patient resides in Bengaluru and works as an IT professional. There is no mention of his surgical, psychosocial or family history, nor any travel history. The site of care is not specified.

Clinical problem representation

Differential diagnosis

A 62-year-old male with a 20-year history of chronic diabetes mellitus type II presents with a six-month history of severe fatigue, oedema, dyspnoea and reduced urine output, with a background of recent hospitalisations for diabetic spot infections and current medications including metformin, insulin glargine and lisinopril.

Most likely differential diagnosis

a. **Chronic kidney disease (CKD):** The patient's long-standing diabetes and reduced urine output suggest the possibility of CKD, which can lead to symptoms such as fatigue, oedema and dyspnoea due to fluid overload and electrolyte imbalances. The use of lisinopril, an ACE inhibitor, is consistent with management of diabetic nephropathy.

b. **Congestive heart failure (CHF):** The combination of dyspnoea, leg oedema and fatigue is highly suggestive of CHF, particularly in a patient with diabetes, which is a significant risk factor for cardiovascular disease. The chronicity of symptoms aligns with a progressive decline in cardiac function.

c. **Diabetic cardiomyopathy:** This condition is characterised by heart muscle dysfunction in the absence of coronary artery disease, which can present with symptoms of heart failure such as dyspnoea, fatigue and oedema. The patient's long history of diabetes increases the likelihood of this diagnosis.

Expanded differential diagnosis

a. **Nephrotic syndrome:** This condition can present with significant oedema, fatigue and reduced urine output. It is often associated with diabetes and can lead to secondary complications such as hyperlipidaemia and increased risk of infections

b. **Chronic liver disease:** Conditions such as cirrhosis can cause symptoms of fatigue, oedema and dyspnoea due to ascites and pleural effusions. Diabetes is a risk factor for non-alcoholic fatty liver disease, which can progress to cirrhosis.

c. **Anaemia of chronic diseases:** Chronic diseases, including diabetes, can lead to anaemia, which can cause fatigue and exacerbate symptoms of dyspnoea. The chronicity of symptoms and the patient's history of diabetes support this possibility.

Most common differential diagnosis

a. **Acute coronary syndrome (ACS):** Given the patient's history of diabetes, he is at high risk for ACS, which can present atypically with symptoms such as fatigue and dyspnoea rather than chest pain. Immediate evaluation with ECG and cardiac enzymes is warranted.

b. **Pulmonary embolism (PE):** PE can present with acute or subacute dyspnoea and leg swelling, particularly in patients with risk factors such as recent hospitalisation and reduced mobility. This is a life-threatening condition that requires prompt diagnosis and treatment.

c. **Sepsis:** The patient's history and specific symptoms such as diabetic foot infections and current symptoms raise concern for sepsis, which can present with fatigue and dyspnoea. Sepsis can rapidly progress to septic shock, making it a critical diagnosis to consider and rule out.

GenAI can be of high significance when it comes to patient education and training. This sets the stage for enhanced healthcare delivery, enabling private healthcare providers to render tailored messages while supplementing their curative outreach.

Smart health: AI blueprint for personalised health education

Traditional AI:

1. AI can identify common health issues and prioritise and recommend educational topics based on relevance and severity.
2. AI can monitor trends in social media and perform search queries to identify emerging health concerns that require immediate educational focus.
3. AI can recommend educational material based on individual patient profiles, health profiles and content preferences.
4. AI can adapt educational content based on real-time feedback from the user.

GenAI:

1. GenAI can create dynamic content based on real-time data, ensuring that the most relevant health education topics are always covered.
2. Gen AI can provide real-time, context-aware translation and localisation of educational material to ensure it is linguistically and culturally appropriate.
3. GenAI can integrate different forms of content – text, image, video and interactive modules – into a cohesive learning experience.

Need for AI and GenAI:

1. Identifying high-risk population for educating and triaging, focusing on specific health risks such as non-communicable diseases as well as communicable diseases. This is done with the help of curated topics with tailored messaging and channel selection for targeted communication.
2. Extensive research across multiple data sources for evidence-based content

Pain points:

1. Identifying target population and prioritising suitable topics for health education
2. Understanding language for communication and the cultural limitations and sensitivities of the target population
3. Time-consuming research
4. Insufficient personalisation
5. Creating content that is evidence based, tailored, multi-modal, linguistically and culturally appropriate
6. Targeted communication – identifying and prioritising communication channels based on the target population

How can GenAI be leveraged by healthcare payers?

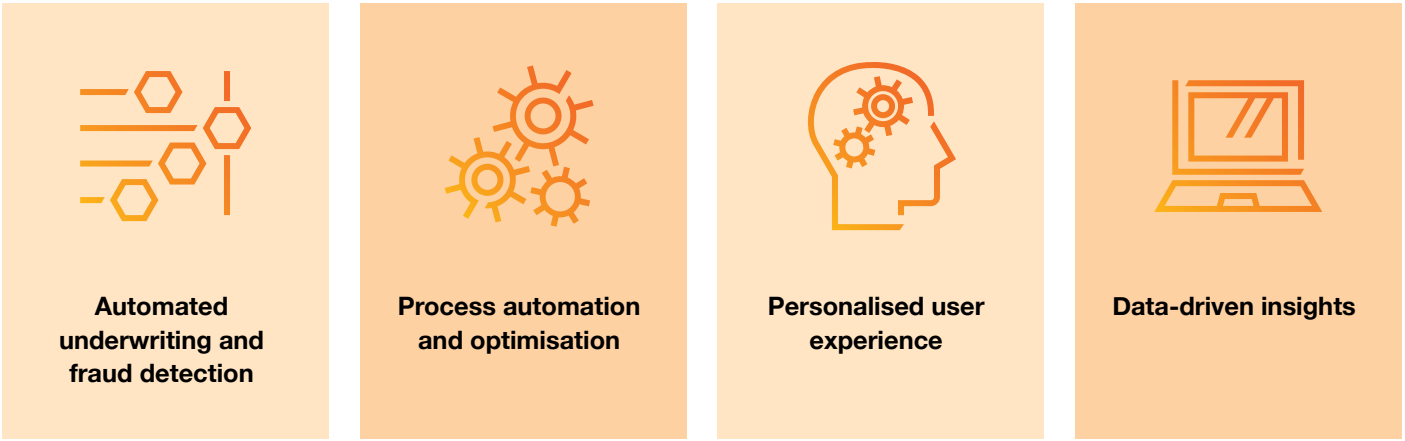
The insurance industry is gradually shifting from a reactive 'identify and fix' approach to a proactive 'predict and prevent' strategy. Despite this progress, challenges persist in delivering personalised plans, streamlined underwriting processes, including cost, and faster claims processing.

Integrating GenAI solutions like chatbots and virtual assistants can revolutionise customer engagement by providing instant responses to queries, expediting claims processing, and offering feedback to deliver quick wins along the defined value chain.

These business transformation strategies can not only optimise operational efficiency but also enable insurers to offer more tailored insurance solutions to meet the diverse needs of the population.

Considering these trends, future investments in GenAI are more focused on enhancing productivity, driving revenue growth and achieving cost reductions, ultimately leading to a more sustainable healthcare ecosystem.

Benefits of GenAI for healthcare payers



GenAI can make a significant contribution to the global health insurance business, particularly in the areas of marketing, sales, underwriting and pricing. Additionally, financial inflows from customised user experiences and products will make a significant contribution.

AI is set to become a standard instrument in the healthcare industry's revenue cycles over the course of the next few years. Both health systems and hospitals should anticipate better financial results, quicker claim processing, less administrative work, and better patient experiences because of GenAI's integration within payer systems.

Hospitals face several difficulties due to the complexity of payer systems in the healthcare industry, which include rejection management, coding, charge capture and patient payment projections. By automating time-consuming, high-volume processes like eligibility verification, claims status monitoring and payment posting, Gen Al offers the ability to alleviate these problems.

Benefits for government healthcare payers

GenAI holds the potential to transform the government health insurance sector and can assist in achieving Universal Health Coverage (UHC) by:

01 **identifying and enrolling eligible beneficiaries**

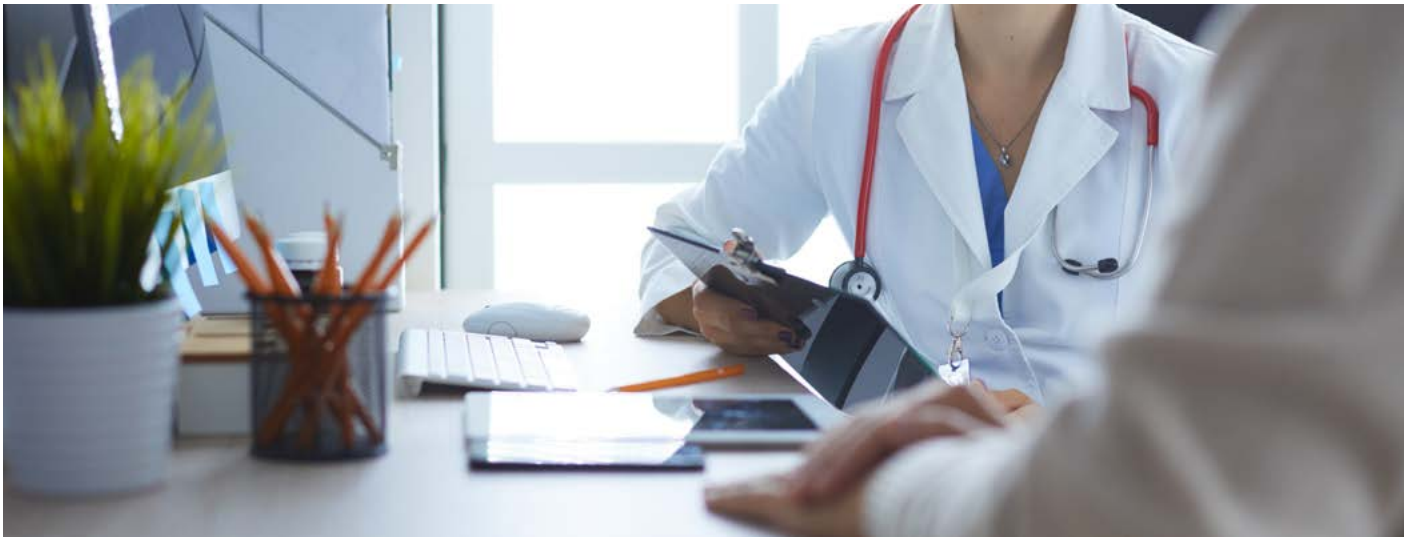
02 **enabling enhanced budgeting and resource allocation**

03 **enabling personalised communication for targeted acquisitions**

04 **detecting and preventing fraudulent activities**

05 **forecasting – market trends, financial projections, disease outbreaks and public health trends**

06 **facilitating risk mitigation.**



Benefits for private healthcare payers

Large data sets may be analysed using GenAI, providing commercial health insurance payers with the ability to:

01 **predict healthcare expense trends**

02 **assess risk factors**

03 **tailor insurance offerings to individual needs.**

Additionally, GenAI can help enhance customer experience by providing better customer care through AI-powered chatbots, tailored coverage choices, tailored communications and easily understandable policy explanations – all of which can promote customer retention.

Beyond claims: GenAI for healthcare payers

Potential efficiency gains through GenAI across the private health insurance value chain[10]

	Low	Medium	High
Marketing and sales			▲
Customer operations		■	
Product research and development			▲
Risk and legal			▲
Strategy and finance			▲
Claims management		■	

Optimisation of claims processing: GenAI can help in personalisation of policies, faster claims processing, and smarter fraud detection and reporting.

Enhanced risk analytics: Risk analytics is enhanced by improved risk assessments, wider coverage and lower healthcare costs.

Customer-centric services: GenAI can unlock greater potential for a more **efficient, personalised and affordable healthcare insurance** future for all.

10 Based on discussions with with industry experts

Business impact across various functions[11]

Marketing and sales	
▲	Dynamic content creation
■	Virtual health assistance
■	Health risk assessment
▼	Optimising claims reconciliation/adjudication
▼	Behavioural nudges
▼	AI-driven market need analysis
Product R&D	
■	Personalised product design
▼	Personalised product pricing and underwriting
▼	Real-time competitive analysis
Strategy and finance	
■	Personalised risk assessment
▼	Dynamic pricing
▼	Cost containment
▼	Automated recovery opportunity identification
Customer operations	
■	Proactive customer insights
■	Automated contract analysis and generation
▼	Automated real-time claims validation and verification systems
Risk and legal	
▲	Contract analysis and management
▼	Intelligent fraud detection using advanced pattern recognition
▼	Risk stratification
▼	Real-time policy compliance checking engines
Claims management	
■	Optimised underwriting
■	Health information exchange
▼	Automated pre-authorisation
▼	Intelligent workflow optimisation

Business impact of Gen AI

▲ High ■ Medium ▼ Low

11 Based on discussions with industry experts

03

Building a holistic GenAI ecosystem

Paradigm shift in data strategy with GenAI

As healthcare providers prioritise the collection, organisation, management and analysis of data to inform every decision, their insights will be grounded in evidence uncovered using data rather than intuition. Transitioning from a **data-driven approach** to a **data-first approach** empowers organisations to make smarter, data-powered choices and remain agile in responding to consumer demands and trends.

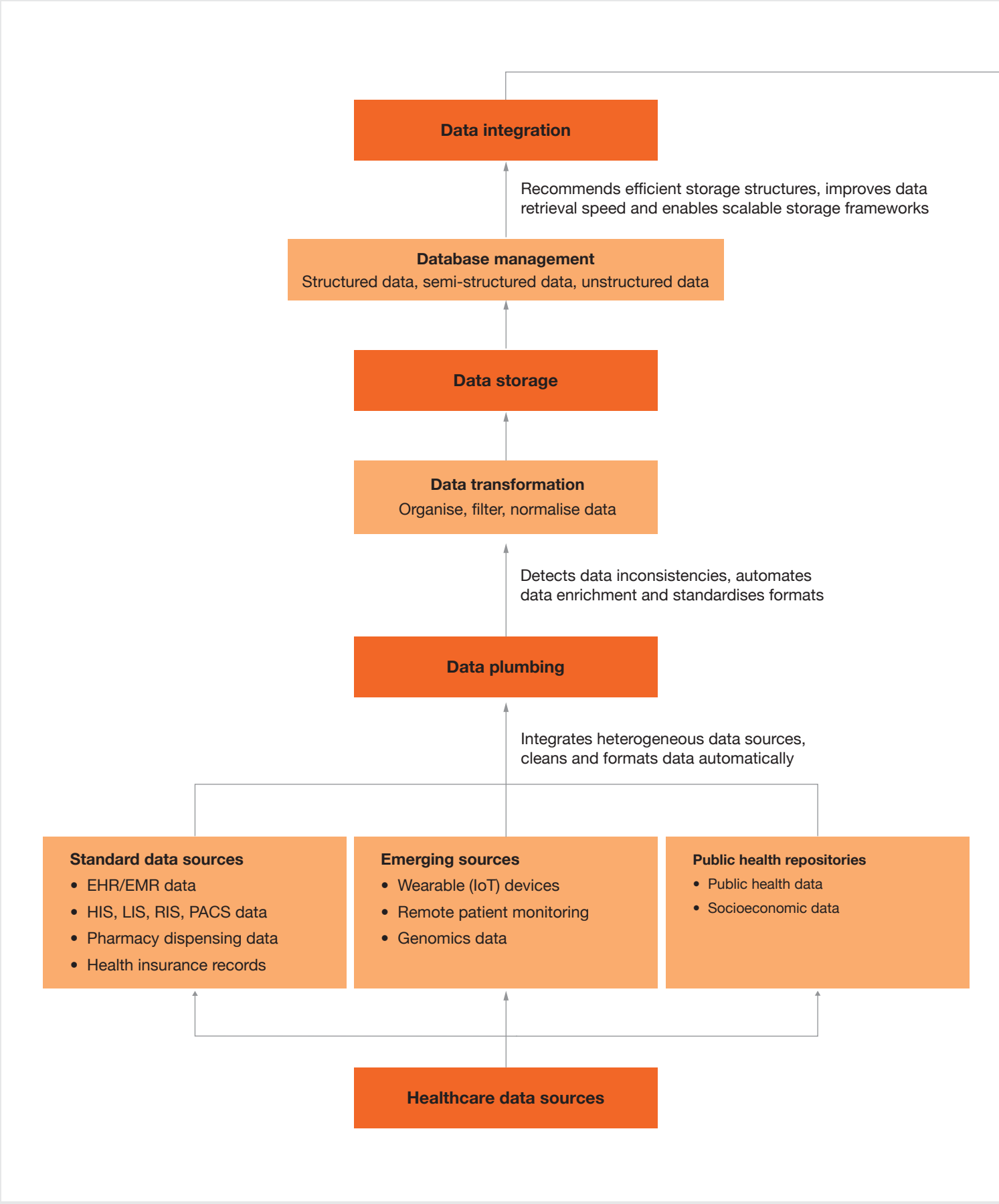
GenAI is transforming healthcare data management. Apart from addressing critical challenges in data analytics, it is amplifying data plumbing, integration and interoperability. As a result, varied datasets can be leveraged for analytics and individualised care plans. GenAI has the potential not only to enhance efficiency but also revolutionise the way care is delivered, paving the way for a more data-driven future in healthcare.

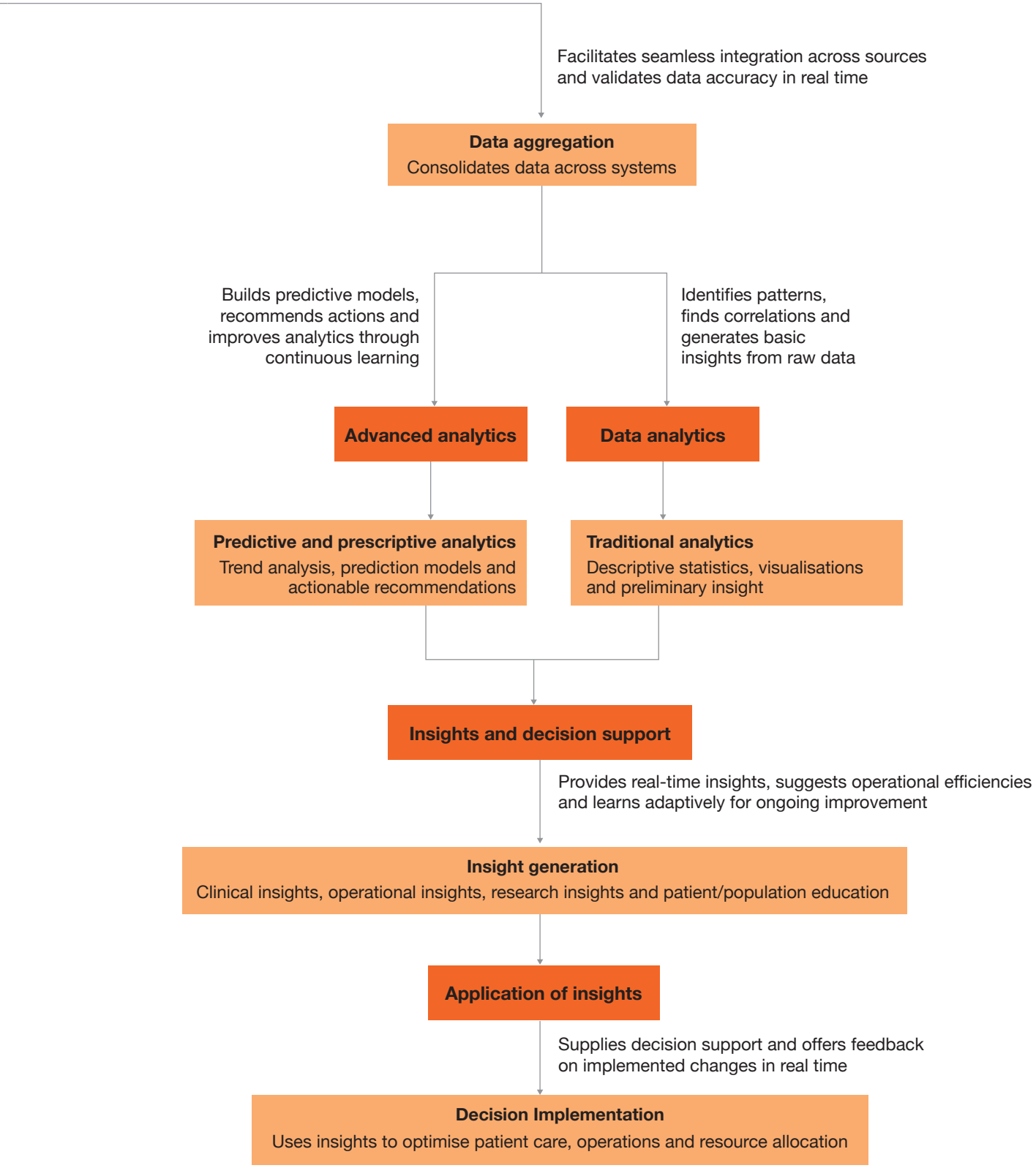
How can Gen AI help with data plumbing?

- **Handling unstructured data:** GenAI can enhance healthcare data plumbing by transforming unstructured clinical and diagnostic data into standardised, analysable formats in real time. Acting as an intelligent data harmoniser, it can automatically recognise, extract and map diverse data elements to consistent healthcare terminologies, enabling seamless flow of information across networks for effective disease surveillance and trend analysis.
- **Data silos and disparate data sources:** GenAI can tackle the challenge of data silos in healthcare by serving as a universal translator across disparate sources – from legacy electronic medical records (EMRs) and lab systems to modern digital health platforms, including integrated internet of things (IoT) devices. It can intelligently bridge these isolated systems by understanding varied data formats, automatically normalising inconsistent terminologies, and creating unified data models that enable seamless integration. This eliminates traditional manual reconciliation while maintaining data context and relationships across previously disconnected data silos.
- **Data normalisation and quality control:** AI models can be trained to find anomalies in patient data by detecting any discrepancies that could arise from errors in data entry or inconsistencies across different electronic health record (EHR) systems. Maintaining data integrity in such scenarios requires this functionality, especially when merging data from many sources, such wearables and EHRs.
- **Automated generation of documents:** A healthcare professional who was earlier involved in manual administrative work would now be able to cut down on this effort by using GenAI to produce documentation.

Data handling

- **ML models:** GenAI models are trained using extensive datasets that contain diverse healthcare data aggregated and normalised in compliance with Fast Healthcare Interoperability Resources (FHIR) guidelines. These models can provide better forecasts and recommendations because of their ability to comprehend complex data relationships.
- **Natural language generation (NLG):** With NLG approaches, it is possible for GenAI to transform structured data output from the FHIR APIs into human-comprehensible representations for better communication between patients and providers.


Data integration
Recommends efficient storage structures, improves data retrieval speed and enables scalable storage frameworks
Database management
Structured data, semi-structured data, unstructured data
Data storage
Data transformation
Organise, filter, normalise data
Detects data inconsistencies, automates data enrichment and standardises formats
Data plumbing
Integrates heterogeneous data sources, cleans and formats data automatically
Standard data sources
• EHR/EMR data
• HIS, LIS, RIS, PACS data
• Pharmacy dispensing data
• Health insurance records
Emerging sources
• Wearable (IoT) devices
• Remote patient monitoring
• Genomics data
Public health repositories
• Public health data
• Socioeconomic data
Healthcare data sources


Facilitates seamless integration across sources and validates data accuracy in real time
Data aggregation
Consolidates data across systems
Builds predictive models, recommends actions and improves analytics through continuous learning
Identifies patterns, finds correlations and generates basic insights from raw data
Advanced analytics
Data analytics
Predictive and prescriptive analytics
Trend analysis, prediction models and actionable recommendations
Traditional analytics
Descriptive statistics, visualisations and preliminary insight
Insights and decision support
Provides real-time insights, suggests operational efficiencies and learns adaptively for ongoing improvement
Insight generation
Clinical insights, operational insights, research insights and patient/population education
Application of insights
Supplies decision support and offers feedback on implemented changes in real time
Decision Implementation
Uses insights to optimise patient care, operations and resource allocation

Beyond national boundaries: The need for global regulation of GenAI

As GenAI penetrates our everyday lives more deeply, policymakers worldwide will need to expand their efforts to understand, regulate and safeguard this technology even as we continue to reap its potential benefits. Moreover, with the impact of GenAI set to extend across all sectors, integrating it into different operational processes necessitates a fine balance between implementation and responsibility. However, the existing legal framework is not sufficient to mitigate the risks involved.

As governmental and regulatory entities strive to create a centralised environment with appropriate risk controls, the frameworks that emerge tend to be fragmented and not in line with the risks associated with meeting the regulatory requirements. This situation poses considerable challenges for governments across the globe who are seeking to navigate the complexities around this technology.

As a result, there is a need for regulations that evolve with the times.

How are some parts of the world tackling the issue of regulation?

United States of America:[12]

- **On 30 October 2023**, the US President Joe Biden issued **'The Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence'**, which aims to grasp the potential benefits of and manage the risks posed by this technology.[13] However, this is an executive order and not a law, and its future under the new administration is yet to be determined.
- The United States Office of Management and Budget (OMB) issued **OMB M-24-10** in **March 2024**, which made history by being recognised as the first binding document released by the Government for agencies across the county to strengthen governance, innovation and risk management related to the use of AI.[14]
- **On 15 March 2024**, the Food and Drug Administration (FDA) issued a paper on **'Artificial Intelligence and Medical Products'**, focusing on how its subsidiaries are working together to establish a balance between fostering ethics, responsibility and innovation while considering safety, quality and effective discovery.[15]

12 President Biden issues Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence|

13 PwC, 'Overview of "The Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence"

14 Vice President Harris announces OMB policy to advance governance, innovation, and risk management in federal agencies' use of artificial intelligence

15 FDA news release: FDA roundup: 15 March 2024

European Union (EU)[16]

- **The EU Artificial Intelligence Act (2024)** is designed to assist in regulating AI systems, ensuring that these systems are used responsibility and ethically, especially within the field of healthcare.
- **The act encompasses four key areas:**
  - addressing the ambiguous fundamental rights impact assessment
  - working around the exemptions and scope limitations
  - providing recommendations for improvement
  - managing the required deployer obligation.

Singapore[17]

The 'Model AI Governance Framework' was proposed to facilitate future development of GenAI. This framework expanded the scope of the previous framework which was last updated in 2020, expanding the horizons of traditional AI. Its overall focus is on how AI must be explainable, transparent and fair.

India

The deployment and development of AI-related innovations are governed by the following policies and laws:

- Privacy and data protection: Digital Personal Data Protection (DPDP) Act, 2023[18]
- Intellectual property: Trademarks Act, 1999; Patent Act, 1970, Copyright Act, 1957[19]
- National Cyber Security Policy, 2013[20]
- The Digital India Act, 2023, is aimed at controlling and regulating the AI ecosystem. Moreover, programmes such as 'Responsible AI for Youth' are aimed at promoting vocational and technological skills in AI among Indian youth.[21]

16 EU AI Act: first regulation on artificial intelligence
17 Singapore proposes framework to foster trusted Generative AI development
18 Digital Personal Data Protection Act, 2023
19 The Copyright Act, 1957
20 National Cyber Security Policy -2013
21 Digital India Act, 2023

04

Regulatory frameworks around GenAI

Considerations around regulatory frameworks

As the field of GenAI is continuously evolving, it is imperative that a framework that is not only coherent and robust but also ethically durable is put into action, in order to maintain patient safety standards. Besides fostering oversight and accountability, such a framework would also help in the deployment of responsible AI. Below are five considerations that would come into play while implementing these regulatory frameworks:

Enhanced regulatory framework:
The framework must strengthen compliance with ethical, data privacy and clinical safety standards.

Transparency and accountability:
This principle mandates the disclosure of GenAI-based decision-making processes and the establishment of necessary measures for reducing associated errors and biases.

Collaboration and standardisation:
Partnerships between the government and healthcare organisations must be promoted to standardise interoperability around GenAI solutions.

Consumer rights:
The regulatory framework should protect patient consent, data ownership and the right of patients to challenge AI-driven healthcare decisions.

Limitations and exemptions of scope:
A clear boundary needs to be defined when it comes to deploying any form of high-risk applications.

How do these frameworks promote nationwide deployment of responsible AI?

Maintain ethical standards

The regulatory frameworks put the focus on advocating the philosophy of better and ideal GenAI deployment while ensuring ethical usage and application.

Foster partnerships

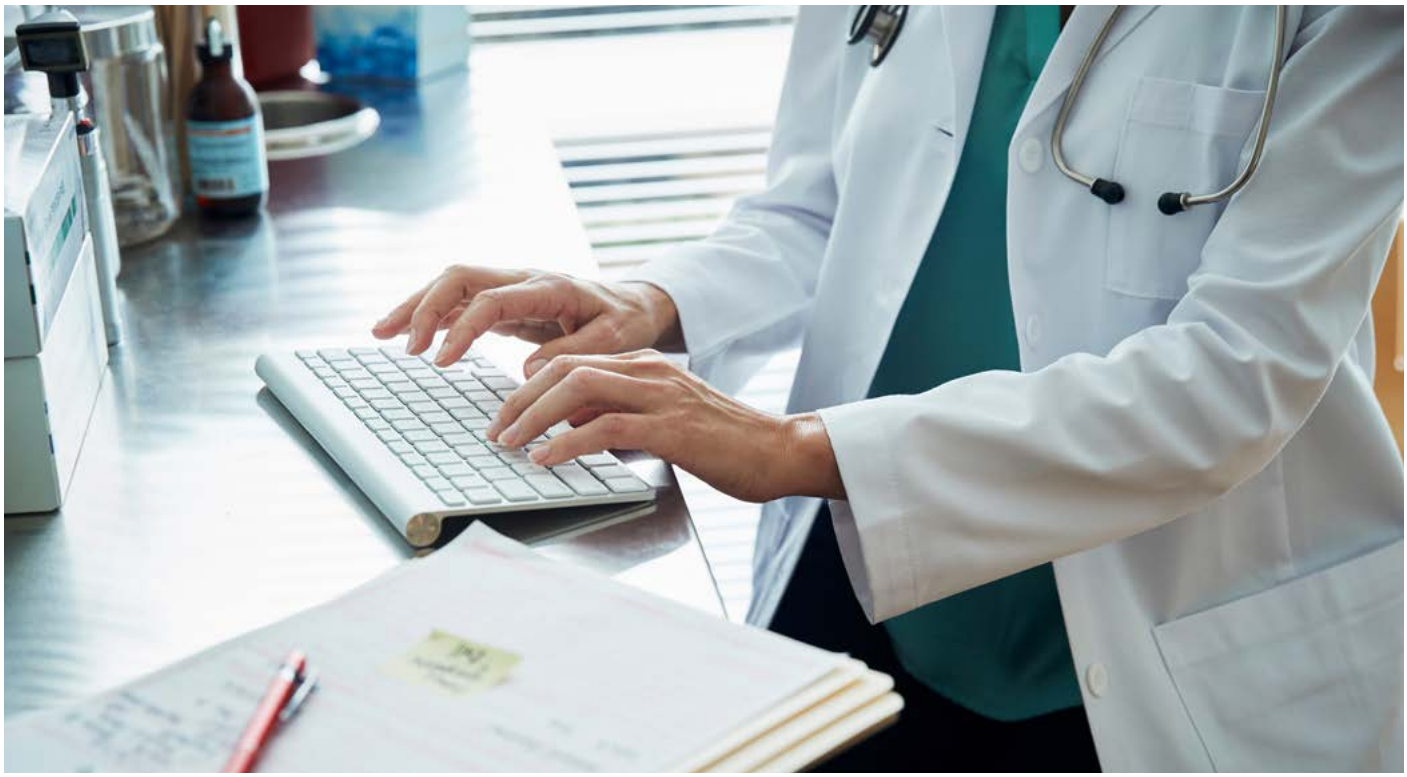
The frameworks help in creating partnerships across the healthcare value chain by establishing an ecosystem based on the ideology of collective AI governance across the participating stakeholders.

Create a foundational base

Regulatory frameworks assist in building a resilient foundation that, besides facilitating access to Gen AI-based applications, also contributes to enhanced research and development.

Challenges to the adoption of regulatory frameworks within the healthcare ecosystem:

- **Stakeholder participation and engagement**
- **Evolving solutions**
- **Absence of accountability**
- **Reducing any form of algorithmic biases**
- **Resistance due to existing organisation culture**



05

Navigating risks and challenges while deploying GenAI

Traditional AI

Risks and challenges

Traditional AI comes with its own set of risks that that may hinder various aspects of the user experience. However, with appropriate mitigation strategies and some checks, these issues be easily avoided.

Data privacy and security: Deploying the latest cybersecurity measures for data encryption, role-based access control (RBAC) and periodic audits performed by the dedicated security team(s) can help meet the regulatory/compliance requirements such as the DPDP, Health Insurance Portability and Accountability Act (HIPAA) and IT Act.

Interoperability: In order to integrate GenAI seamlessly into the existing healthcare ecosystem, IT organisations need to ensure there are no communication gaps between the existing infrastructure. This can be achieved with the help of various implementation strategies that result in a smooth interoperable environment.

Mitigation of bias and fairness: Mitigation of biases and fair results can be achieved by using diverse training data and techniques such as fairness-aware ML, accompanied by auditing of algorithms and regular checks to ensure bias-free results.

Quality and reliability: Algorithms must be trained and tested on varied datasets to ensure high accuracy of the output. In addition, the validity and reliability of AI outcomes needs to be cross-checked against results pre-attained by humans.

Ethical concerns: It is important to bring together different stakeholders in order to formulate guidelines and adopt frameworks that ensure transparent and accountable decision making that resolves the ethical challenges that may arise in the future.

GenAI

Risks

Deepfakes: Technologies like digital watermarking and training AI systems can detect content that is fabricated and not original, thus preventing problems that may occur due to deepfakes.

IP infringement: This can be tackled in two ways: (1) clear legal frameworks that establish data ownership and determine the usage rights for GenAI training data, (2) use of synthetic data to minimise the danger of copyright infringement during the training process of GenAI models.

Misinformation and manipulation: There are AI-powered technologies that verify facts and highlight fake claims in medical content.

Data exposure: Advanced access controls and encryption of data can be done along with extensive due diligence and designing of unambiguous contractual agreements. Also, frequent audits and personnel training can help in optimising resilience to breaches.

Accuracy through context: The data should be curated and must be of high quality to enhance accuracy. Also, models should be updated regularly to ensure strict adherence to medical criteria. Besides this, adjusting and optimising prompts increases data accuracy.

Agentic AI

Risks

Security vulnerabilities and cyberthreats: Agentic AI's autonomy increases risks of cyberattacks, such as memory poisoning or tool misuse, potentially compromising sensitive data.

Lack of oversight and accountability: Limited transparency in Agentic AI's decision-making processes can result in errors that are difficult to trace, thereby diminishing human oversight and accountability.

Integration and infrastructure challenges: Complex integration with existing systems often causes compatibility issues and performance bottlenecks such as agentic AI deployment.

Ethical concerns and bias amplifications: Agentic AI risks perpetuate biases from training data, leading to unfair outcomes in critical applications.

Regulatory compliance and vendor dependency: Evolving regulations and reliance on specific vendors create compliance risks and platform lock-in for agentic AI systems.

Mitigation strategies

Of the above risks and challenges, data accuracy is one of the most critical from a mitigation perspective. The following strategies can prove to be helpful for addressing this issue:

Managing data fidelity in GenAI outputs: Ensuring accurate and reliable output generation

Sometimes the output of GenAI contains errors, mainly due to inaccuracies in the data. Such scenarios damage the credibility and reliability of AI systems.

This problem can be tackled by adjusting and optimising the prompts provided as input. GenAI can accomplish this by refining its learning abilities while we integrate the 'human in the loop' approach throughout the process. Moreover, GenAI would eventually optimise and calibrate prompts in line with human feedback in order to provide a more contextually accurate response.

One solution is to use context-based prompts and other techniques in the processing layer.

Step 1: Context-based prompts and other techniques

Prompt design with relevant patient situations and symptoms

- **Chain-of-thought prompting:** This is an advanced AI technique with enhanced reasoning capabilities that mimics the way the human brain functions using a structured series of logical steps.
- **Few-shot learning:** It refers to the ML capability that allows models to learn from a limited number of labelled inputs ranging from three to ten per class.
- **Constrained generation:** These are approaches in NLP where the output generated with the help of language models is limited by restrictions and pre-defined rules to ensure that responses are significant and adhere to specific guidelines.

Step 2: Accurate dataset-based training

- **Healthcare providers validate and label data points for model training:** The dataset should include diverse clinical conditions, demographic variation and unique clinical scenarios.
- **Consistent dataset updates:** Periodic updates should be made to the training dataset in order to cover the latest diagnosis information as well as treatment protocols.

Step 3: Human in the loop

- Medical practitioners must validate AI results for clinical use.
- AI evaluates confidence levels and flags low-confidence responses for further evaluation.
- Use of AI by healthcare practitioners to clarify treatment plans, prognostic outcomes, ongoing diagnosis, and so on can be termed as interactive refinement.
- Clinicians provide comments to improve the model and eliminate hallucinations.

AI systems provide explanations that allow the human reviewer to comprehend AI's decision-making process.

Optimising prompt design: Increasing precision and reducing errors in AI-powered healthcare response

As GenAI improves, it alters human perceptions and interactions with technology. These AI systems are intended to have more intuitive and natural discussions, decreasing the need for specialist knowledge.

The premise is simple: anyone can communicate with AI as they would with a human. Our interactions with AI are projected to evolve in the next few years, resulting in a larger range of knowledge and response mechanisms.

As a result, AI will constantly refine itself in reaction to user interactions.

The discipline of prompt engineering is also advancing. What was once a tool that required well-produced input is evolving into a phase in which AI co-learns with its users. As prompt engineering phases out, new agentic approaches are beginning to take its place.

Several cutting-edge techniques are currently being used to enhance AI models with respect to healthcare applications:

Retrieval-augmented generation (RAG) amalgamates generative models with information retrieval to generate responses that are not only contextually relevant but also accurate in nature.

Transfer learning and fine-tuning involves the adaptation of pre-trained models to generate more accurate and context-specific output by fine-tuning it using tailored datasets and prompts.

Continual learning enables models to improve and adapt continuously with time. Newer datasets come into play with evolved prompts, allowing these models to maintain their relevance and positioning.

Federated learning allows for the decentralised form of model training across multiple devices, making sure that the data remains within local reach while collaborating continuously with other models to improve its overall performance.

Few-shot and zero-shot learning allows GenAI models to comprehend and deliver responses which range from minimal or prior examples, improving adaptability to newer tasks with limited data sources.

06

Way forward: Developing the winning ecosystem in India

GenAI-enabled healthcare ecosystem in India

Indian healthcare, with its strong focus on digital technologies, has the potential to position itself among AI leaders across the globe and transform healthcare significantly. This transformation can help in addressing key challenges in the healthcare domain such as healthcare access, affordability, infrastructure shortages and lack of skilled expertise. Overcoming challenges pertaining to AI implementation will further solidify India's position at the forefront of AI-driven healthcare innovation.

For such an ecosystem to flourish, the following factors must be taken into consideration:

Ethical concerns

As AI penetrates the fabric of healthcare, issues such as biases in algorithms and data privacy will come to the fore. Therefore, it is important that policymakers lay the foundation for ethical governance with robust plans to mitigate risks to patient interests.

Infrastructure readiness

For GenAI to be effective, India must plan for robust digital infrastructure. Besides, policymakers and individual stakeholders must make sure that these infrastructural components support data collection, storage and analysis across the spectrum of healthcare settings. This aggregated data could then be used to gather insights and deliver enhanced decision making, streamline key activities, train advanced analytical models, and so on.

Training and adoption

As the technology evolves and more complex structures come into play, healthcare professionals across the hierarchies will need to come together to ensure that they are trained to effectively leverage AI tools. Moreover, it is crucial for developers to create user-friendly interfaces that help optimise the output.

Integrating GenAI into India's digital future: Aligning with existing government initiatives

- **Ayushman Bharat Digital Mission (ABDM):** By providing each Indian with a unique health ID to help them access their medical information from multiple healthcare providers, the ABDM seeks to establish a digital health ecosystem in India across the hierarchy of care touchpoints. Another collaboration that showcases how the Indian government is leveraging GenAI is that between the National Health Authority (NHA) and IIT Kanpur. This collaboration would enable providers of healthcare applications to conduct any form of out-of-the set validations to establish verifiable performance benchmarks available within the public domain, fostering a sense of trust within the market for these applications.

  Why it matters: The ABDM will serve as a publicly available standard by which Al models for disease diagnosis and quantification can be measured and compared to other Al models. By guaranteeing that high-quality data is available for creating efficient Al applications, this programme will enhance public health results.

- Charged with managing the ABDM, the **NHA's main goal is to use publicly accessible medical data to promote digital innovation within India's existing healthcare ecosystem.** The three primary components of the ABDM are the Health Facility Registry, the Healthcare Professionals Registry (HPR), and Ayushman Bharat Health Account (ABHA) numbers.

- **In 2022, a dashboard for the public** that offers real-time information on these three components was launched. With the **National Medical Commission Act of 2019,** the ABDM programme recently integrated the National Medical Register into the Healthcare Provider Registry.
- **AI research initiatives:** Over the last few years, the Government has launched multiple initiatives to promote research within the field of AI through collaborations with multiple institutions such as **NITI Aayog.** These initiatives mainly focus on developing a coherent framework to deploy AI in a responsible manner within healthcare settings.

Hypothetical framework for GenAI adoption in India

As adoption of GenAI becomes more widespread, there is a need for a comprehensive roadmap that extends from the establishment of a foundation to building of capacity to the conversion of insights into actionable outcomes. An **adoption strategy** would outline the **steps to implement** this framework effectively.

Establish the foundation

1. Developing a robust governance framework

Establish a National AI Council to oversee the integration of GenAI in healthcare software solutions.

Develop regulatory standards to ensure ethical AI usage and data privacy, and mitigate algorithmic biases.

2. Building comprehensive technological infrastructure

Leverage the ABDM to unify the healthcare ecosystem with interoperable software solutions.

Invest in cloud-based platforms to handle large datasets, enabling real-time access to patient information.

Ensure data protection under the DPDP Act.

Integrate NLP and advanced analytics into EHRs.

3. Taking into account regulatory compliance and ethical considerations

Map foundational components to NHA guidelines on health data management and privacy.

Address concerns around data usage, especially in generating synthetic data or using protected health information.

Building on the foundation to deliver insights

4. Establishing partnerships with technology providers

Increase collaboration through public-private partnerships, particularly with AI-focused startups.

5. Developing patient engagement models

Develop platforms to empower patients to control and understand usage of their data for personalised treatment plans.

6. Working on enhanced diagnosis and treatment

Analyse multiple data sets, including medical images and patient data, to improve diagnostics, accuracy and treatment prognosis.

Combine advanced analytics with GenAI to support early disease diagnosis and enable proactive interventions.

7. Developing personalised healthcare solutions

Utilise GenAI to tailor treatment plans to individual patient profiles, enhancing prognostic value.

Facilitate drug discovery by analysing large datasets.

8. Increasing operational efficiency

Use GenAI to optimise resource allocation and streamline daily workflows in healthcare systems, optimising costs and delivery.

Turning insights into action

9. **Building capacity and training**

Implement training programmes on effectively using GenAI tools.

Adopt a culture of continuous learning to keep pace with evolving technological advancements.

10. **Creating a collaborative ecosystem**

Encourage partnerships with industry stakeholders.

Promote knowledge exchange to enhance healthcare software solutions.

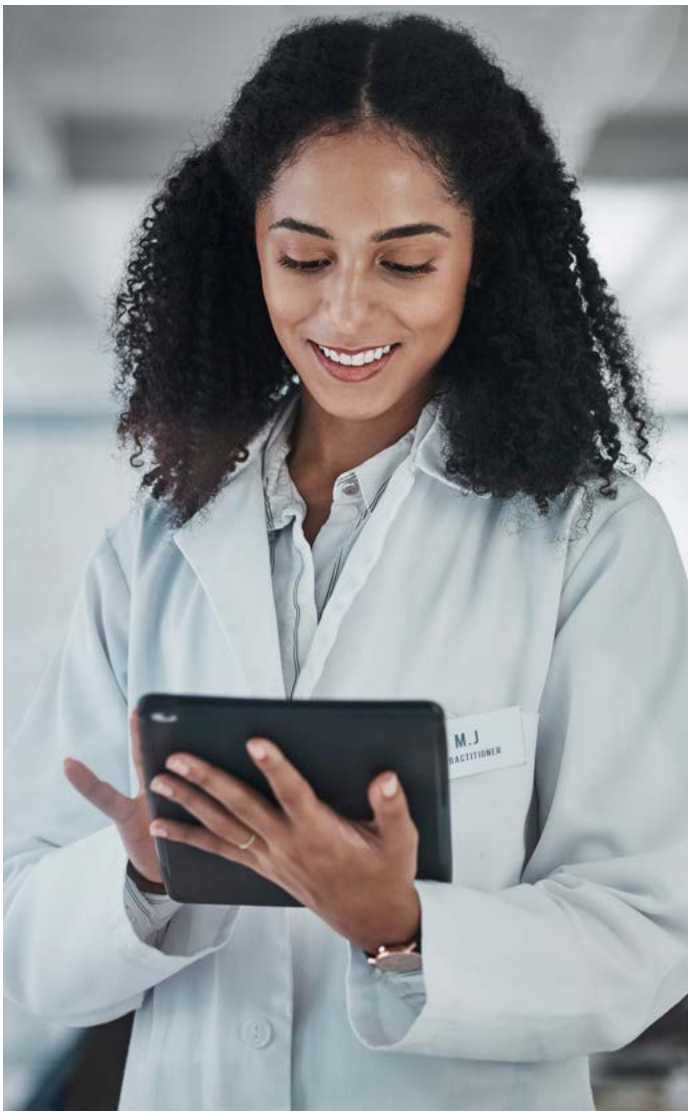
11. **Focusing on value-based care models**

Shift to a holistic value-based care framework that prioritises patient outcomes over service volumes.

12. **Undertaking continuous monitoring and improvement**

Establish mechanisms to evaluate GenAI applications in healthcare, ensuring they meet ethical standards and improve patient outcomes.

Regularly update guidelines and address emerging challenges.



GenAI adoption strategy

The adoption strategy with respect to GenAI can be broken down to two significant categories: The first involves **new clients** comprising **healthcare providers and organisations who are newly adopting GenAI technology** and the second involves existing users who are expanding their GenAI application skillset.

a) Involves new clients comprising healthcare providers and organisations

6–9 months

Scaling and integration

- Undertake **strategic growth** of AI applications.
- Enhance **infrastructure and technical support** for AI integration.
- **Foster an adaptive organisational** mindset.

3–6 months

Development, implementation and learning

- **Execute pilot projects** with feedback loops.
- Develop AI expertise through **training and partnerships.**
- **Ensure ethical compliance** via regulatory frameworks.

0–3 months

Foundation building

- **Assess AI readiness.**
- Implement **data strategy and management.**
- Select **pilot project** to identify quick wins and potential high-impact AI initiatives.

b) Involves existing users who are expanding their GenAI application skillset

15–24 months

AI-first healthcare

- Optimise AI-driven healthcare with **autonomous systems.**
- Develop integrated personal healthcare management.
- Enable **population-level health prediction.**

9–15 months

Ecosystem development

- Establish a **collaborative AI R&D** centre and expand AI-based telemedicine.
- Secure health data with **blockchain-supported health information exchange.**

3–9 months

Advanced applications

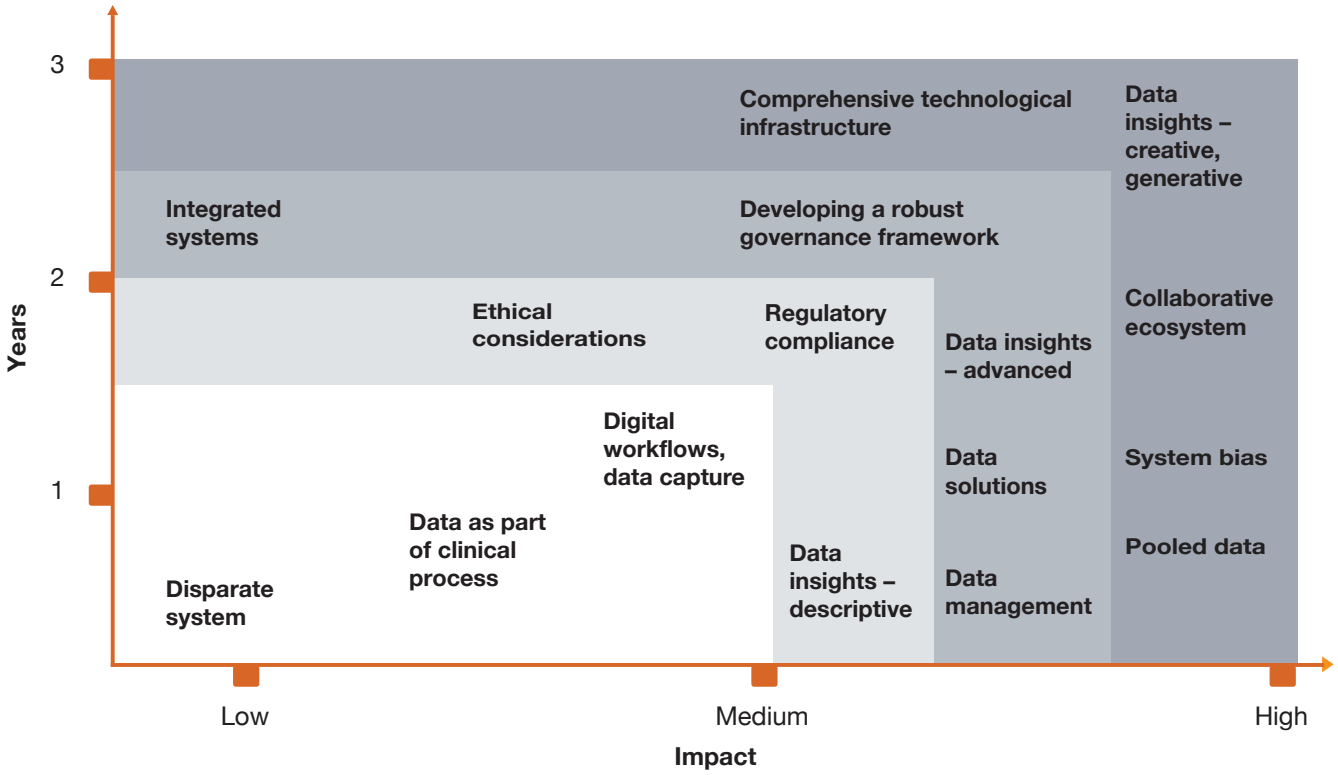
- Provide **AI-driven personalised treatment**.
- Implement **intelligent automation** for advanced AI solutions.
- Roll out healthcare delivery platforms powered by **patient engagement AI**.

0–3 months

Assessment and optimisation

- **Evaluate audit performance.**
- Work on **enhancing cross-functional** data capabilities.
- Establish a **governance framework.**

Creating a winning ecosystem for GenAI adoption in India



Annexure

a. PwC has arrived at these numbers based on extensive secondary research and our experience of working with clients across the Indian healthcare industry. Sources referred to:

1. **The Business Model of Corporate Hospitals** (https://www.thecitizen.in/index.php/en/NewsDetail/index/4/21546/The-Business-Model-of-Corporate-Hospitals)
2. **'No dearth of doctors; India's medic-population ratio better than WHO standard,' says minister** (https://www.livemint.com/news/india/no-dearth-of-doctors-india-s-medic- population-ratio-better-than-who-standard-says-minister-11658560707695.html)
3. **Shortage of radiologists a concern, fostering research in AI can augment capabilities of radiologists: Experts** (https://indianexpress.com/article/cities/bangalore/shortage- radiologists-research-ai-capabilities-experts-8884446/)
4. **Almost half of India's nurses are trained in five southern states: Centre** (https://www.newindianexpress.com/thesundaystandard/2023/Aug/13/almost-half-of-indias-nurses-are-trained-in-five-southern-states-centre-2604676.html)

b. These numbers were obtained via extensive secondary research, interviews with key industry stakeholders in the Indian public health domain and detailed analysis. Sources referred to:

1. **GBD Results** (https://vizhub.healthdata.org/gbd-results/)
2. **National AIDS Control Organization (NACO)** (https://naco.gov.in/sites/default/files/Annual%20Report%20NACO-2017-18%20(1).pdf)
3. **2021-2022 Annual report Department of Health & Family Welfare**
4. **Ministry of Health & Family Welfare**
5. **Goverment of India** (https://naco.gov.in/sites/default/files/2021-22.pdf)
6. **Cost per DALY averted in low, middle- and high-income countries: Evidence from the global burden of disease study to estimate the cost-effectiveness thresholds** (https://resource-allocation.biomedcentral.com/articles/10.1186/s12962-021-00260-0)
7. **World TB Day 2023: How India plans to achieve its target of eliminating tuberculosis by 2025** (https://indianexpress.com/article/explained/explained-health/world-tb-day-how-india-plans-to-achieve-its-target-of-eliminating-tb-by-2025-8515410/)
8. **Union Minister of Health and Family Welfare, Dr. Mansukh Mandaviya virtually addresses National Anti-Leprosy Day** (https://pib.gov.in/PressReleasePage.aspx?PRID=1894687)
9. **Citizen Charter** (https://ncvbdc.mohfw.gov.in/Doc/citizen-charter-NCVBDC-2023.pdf)
10. **National Viral Hepatitis Control Program (NVHCP)** (https://nhm.hp.gov.in/nvhcp#:~:text=Combat%20hepatitis%20and%20achieve%20countrywide,Hepatitis%20B%and%20C%20viz)
11. **Launch of National Viral Hepatitis Control Program** (https://nvhcp.mohfw.gov.in/Launch-of-National-Viral-Hepatitis-Control-Program)
12. **Anemia alert: Is the government aiming for cost-effective interventions?** (https://www.niti.gov.in/anemia-alert-government-aiming-cost-effective-interventions)

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