Experts in health

Future State Programme

The impact of data, digital and AI in healthcare

June 2025

CF, Narayana Health, Nesta

Purpose

In support of developing the NHS 10-year plan, Lord Ara Darzi has launched the “Future State Programme” to explore what the global future of healthcare could look like. This Future State Programme for Heath comprises four themes:

1. A new ecosystem of health promotion and protection
2. Faster, better and earlier diagnosis
3. New treatment paradigm
4. Innovation in healthcare delivery

This document has been developed to focus on Theme 4 – Innovation in Healthcare Delivery, which is broken down into three sub-themes:

- Integrated data and digital transformation
- Artificial Intelligence (AI) integration and virtual care expansion
- Digital therapeutics

This report sets out a vision for how data and digital technology could transform healthcare delivery in the NHS over the next 10 years. This vision has been co-developed by CF, Narayana Health and Nesta through desktop research, best practice case studies and interviews with leading global experts. It is intended as a visionary input for the NHS 10-year planning process, to inform the art of the possible over the coming decade.

Executive summary

The adoption of technology has revolutionised the consumer experience and delivery model in many sectors including retail, banking and travel, enhancing customer convenience and reducing costs. Healthcare, however, remains largely unchanged. While primary care has seen some digital advancements, hospital services like outpatients and A&E have changed little over the last century. Generative Artificial Intelligence (GenAI) and Natural Language Processing (NLP), when layered onto cloud-based health data, create the opportunity to transform care delivery. This enables a shift to digital for investment and healthcare interactions.

Looking forward over the decade to come, we should expect healthcare to experience the kind of transformation already experienced elsewhere. Instead of relying in turning up in person, using the telephone, or a letter we should expect digital communication to be the norm. This has started with the use of messaging and the NHS App for Covid vaccination and with the adoption of digital appointments (largely over teams) in primary care and in a range of other examples. But we should expect the use of digital and AI to enable natural language communication via voice as well as message and App — whichever is most convenient for the healthcare receiver. Patients should be able to access advice on emerging health concerns, communicate with healthcare staff directly, book appointments conversationally, navigate care pathways and manage their own health. For clinicians it enhances communication, improves access and accuracy of patient information and streamlines core processes; releasing time spent on admin and for direct patient care. Providers should be able to optimise use of scarce resources, reduce admin spending, running intelligent data driven services. Payors (or commissioners in the UK) should be able to optimise spending, while regulators can enhance care assessment. Early disease or risk factor identification can benefit all stakeholders by enabling earlier intervention, which improves health and reduces costs.

This future exists already: it can be found in India at Narayana Health and in many examples around the world. Narayana has expanded its reach and reduced its costs through a transformational approach to data, digital and AI. This includes 100% digital EPR coverage and a truly paperless approach, integrated data from across all sites and a suite of digital and AI driven applications which deliver core business functions. For example, a single diabetologist now effectively manages over 30-40 thousand patients instead of 3000 through use of integrated data, AI driven supporting applications and novel approaches to skill mix. Through digital ICUs, Narayana have drastically reduced rates of hospital acquired infections and staff turnover whilst boosting care quality and workforce productivity. Many other examples around the world also exist.

The path to success has been delivered by achieving paperless records – delivering baseline reliable data and a robust data and digital infrastructure, on which to layer digital tools which deliver impact. The critical success factor across digital pioneers is driving digital engagement and adoption from patients and staff. 100% digital adoption at Narayana has led to cost reduction of 20-40%. In the UK, 85% of people have smart phones and adoption of NHS App has rapidly increased. Adoption of AI by staff lags. Realising the benefits requires adoption of both consumers and staff, making this a rate limiting step.

Data, digital, and AI now offer potential productivity gains that could blunt the seemingly inexorable rise of healthcare. Healthcare cost per capita growth has been outstripping GDP by 1.5%; addressing this requires accelerating productivity growth. Key opportunities exist to 1) intervene earlier and reduce costs, 2) resolve demand digitally and eliminate need for current activity; 3) increase labour productivity through use of ambient NLP and gen AI, and 4) optimise core operations. Data, digital and AI provides the opportunity to transform productivity, patient experience and outcomes of the NHS. These are vital for preserving the consensus that the NHS holds the potential for saving healthcare costs relative to GDP for a healthcare service that is free at the point of delivery.

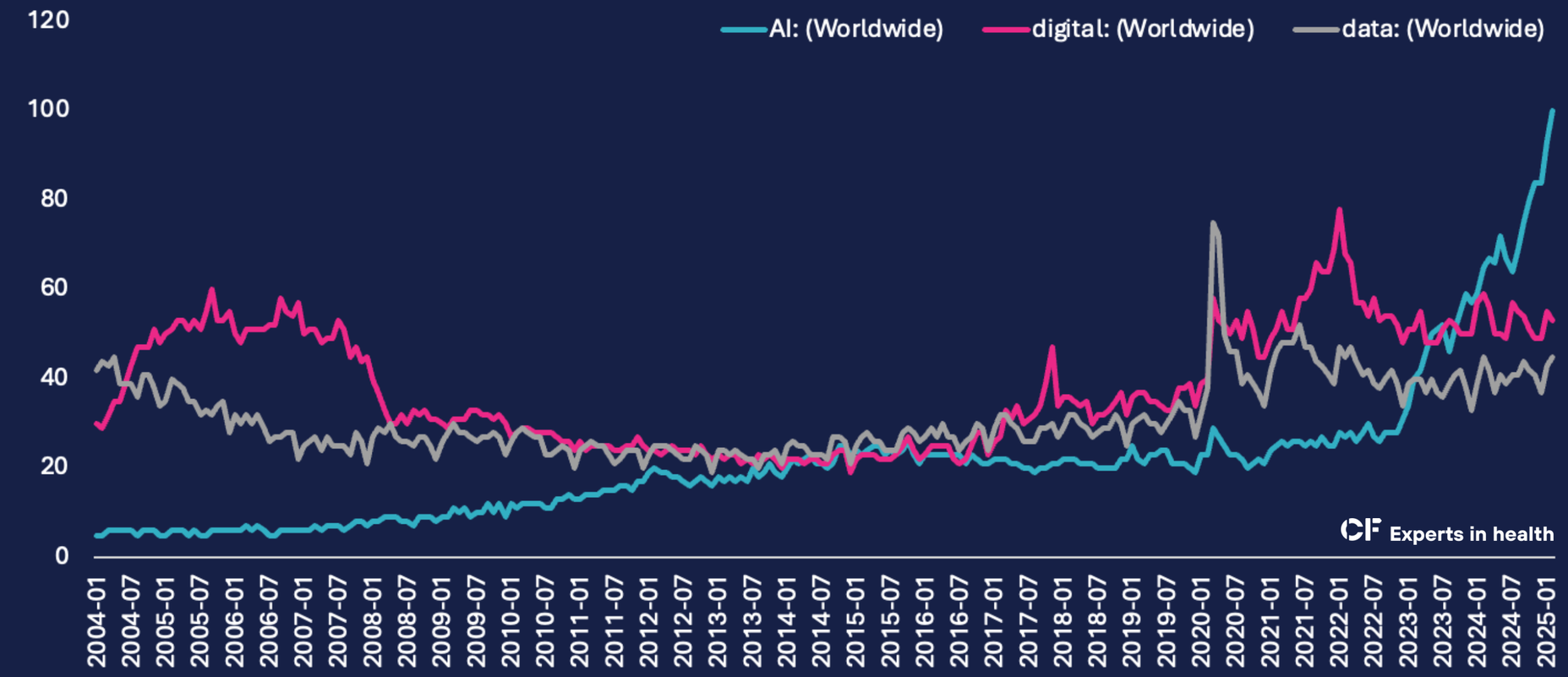
Achieving this will require embracing the technology investment and the change management needed to enable the NHS to deliver the significant gains that are now materialising around the world.

Context

The potential of Data, Digital and AI in health has captured imaginations worldwide

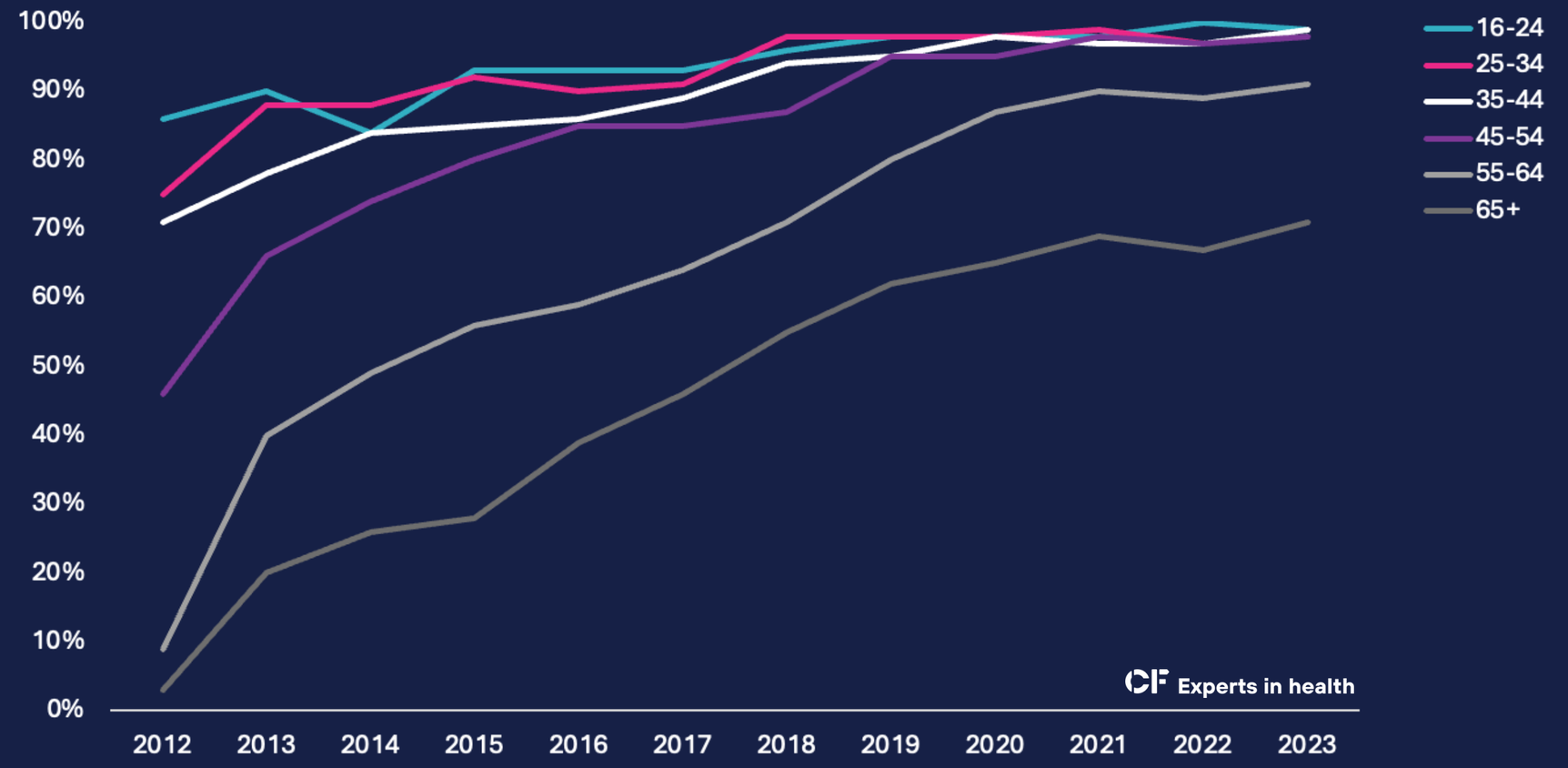
- Use of Data, Digital and AI is at the forefront of people's minds, not only in health but for every sector.
- The rapid development and integration of digital technologies and artificial intelligence and the tangible improvements they have delivered in parallel sectors, has brought it's potential in health to the public's attention.

Web searches of Data, Digital and AI in health since 2004



There is nearly universal coverage of smart phones in all age bands in the UK with many industries using this as standard for customer care

Web searches of Data, Digital and AI in health since 2004

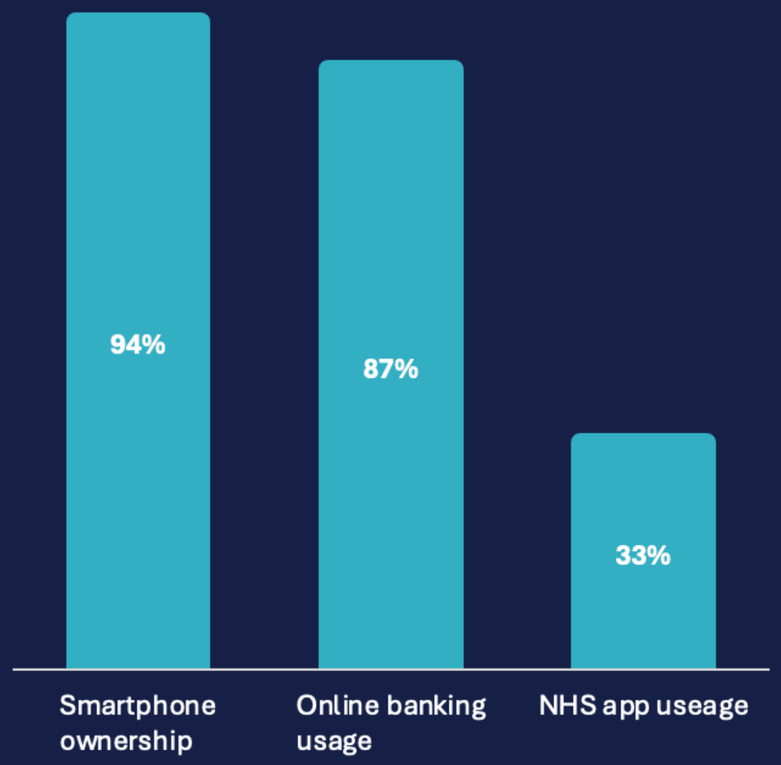


- There is nearly universal coverage of smartphone use across the UK adult population, with the lowest percentage seen in the 65+ age group.
- Many sectors use digital first as standard customer care, with the majority of interactions in banking occurring through online banking.
- It is important to note however that this coverage may be lower within deprived populations.
- Compared to other industries healthcare displays digital maturity below the global average, indicating that it is yet to make the most from digital innovations.

Even with near universal coverage of smartphones in the UK, the healthcare sector continues to lag behind with low levels of adoption of digital

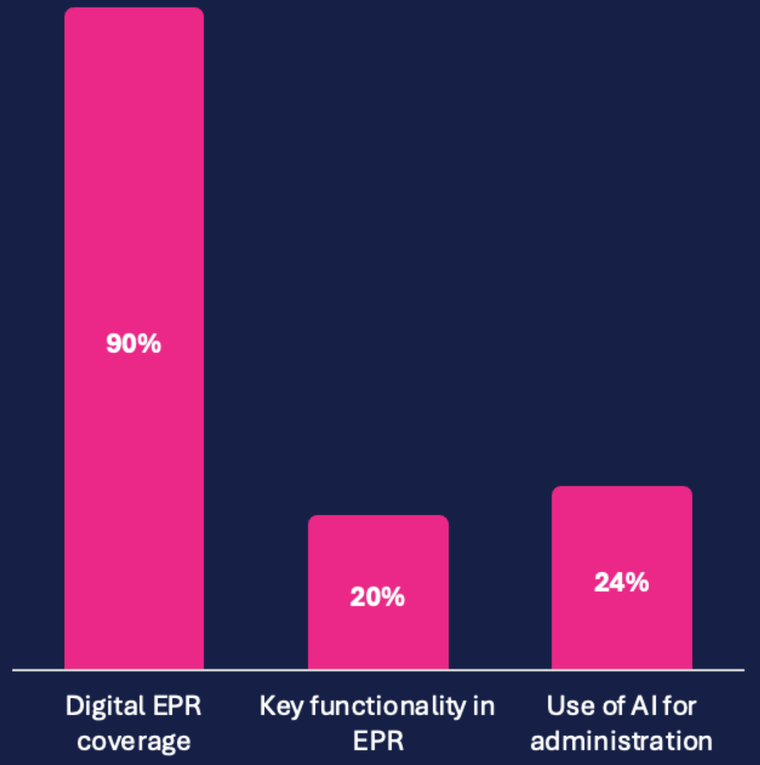
General population

% ownership or usage



NHS and Healthcare Professionals

% coverage, functionality available or adoption

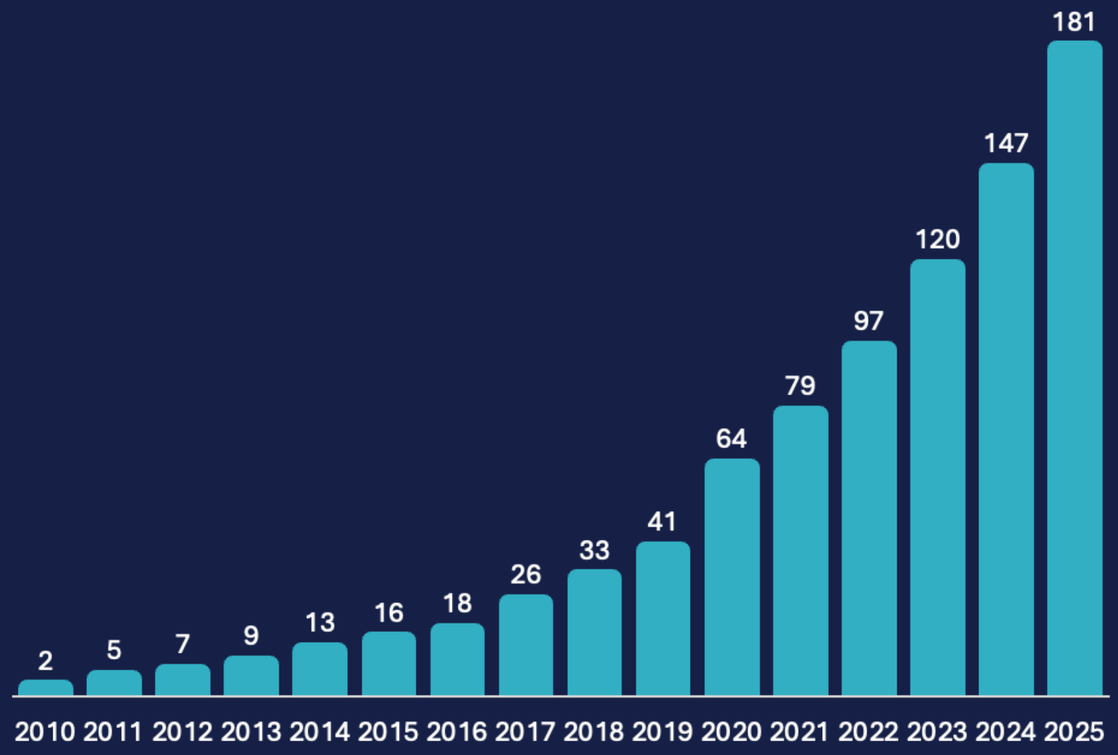


- Lord Darzi's independent investigation into the state of the NHS in England highlighted that:
  - Despite the Covid-19 pandemic leading to a rapid increase in registrations and nearly 80% of adults are now registered, less than 20% of patients use the app monthly.
  - Although there has been "growth in ordering repeat prescriptions and managing hospital appointments", only 1% of GP appointments are managed via the app.
- Reports illustrate that whilst 81% of NHS staff favoured the use of AI for administrative tasks, almost 73% of those surveyed had never done so:
  - Three-quarters of NHS staff surveyed (76%) said they support the use of AI for patient care, and an even greater proportion said they support the use of AI for administrative purposes (81% of NHS staff surveyed).

Data has seen exponential growth globally but the ability to access integrated data remains a challenge particularly in healthcare

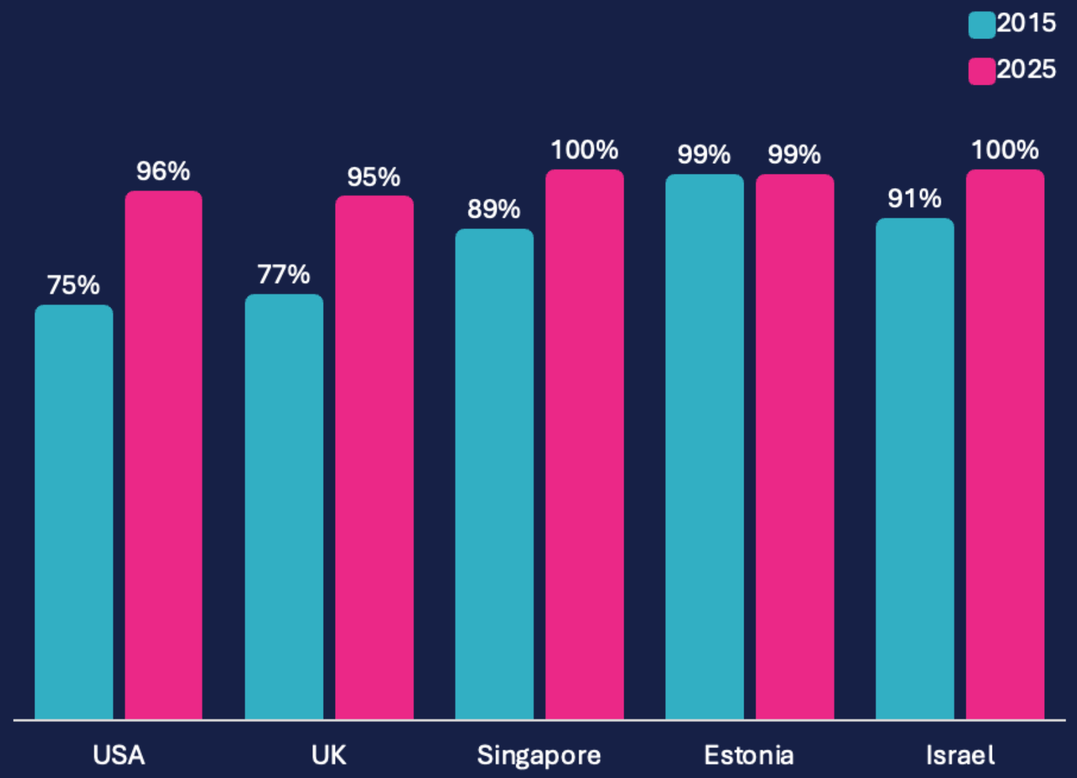
Volume of data created worldwide

Data volume in zettabytes, 2010 – 2025



Hospitals with Electronic Patient Records

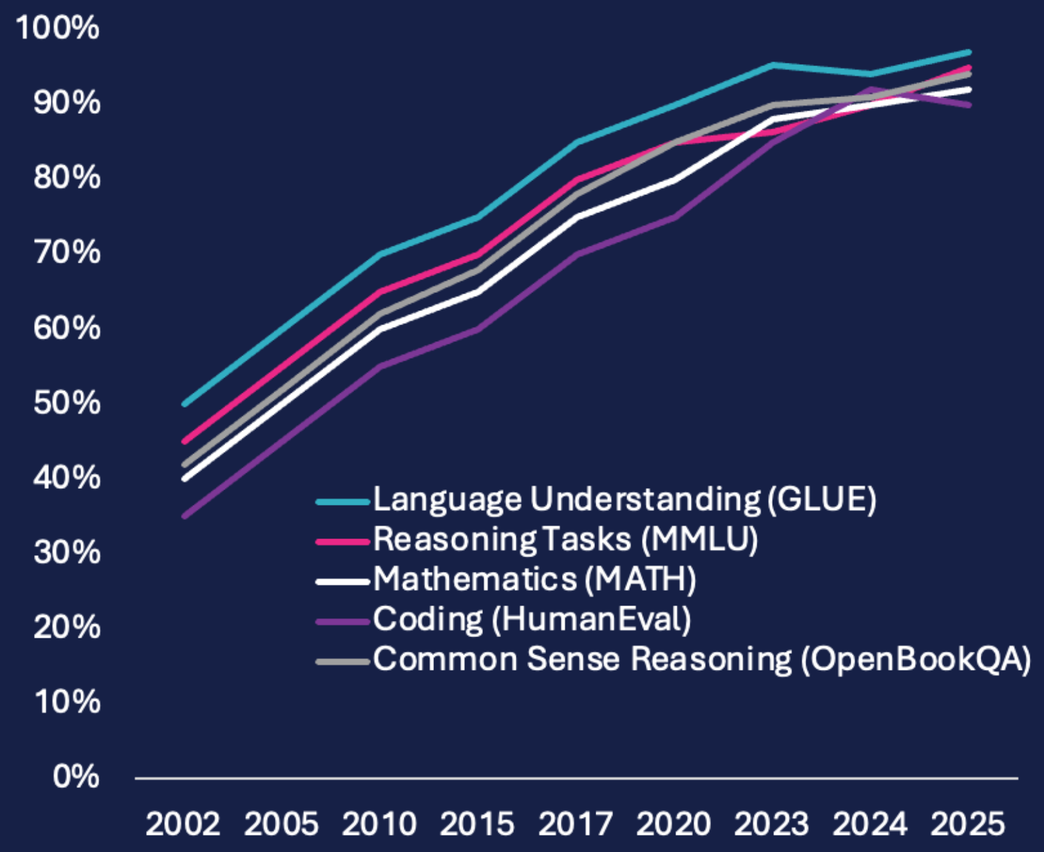
2015 – 2025



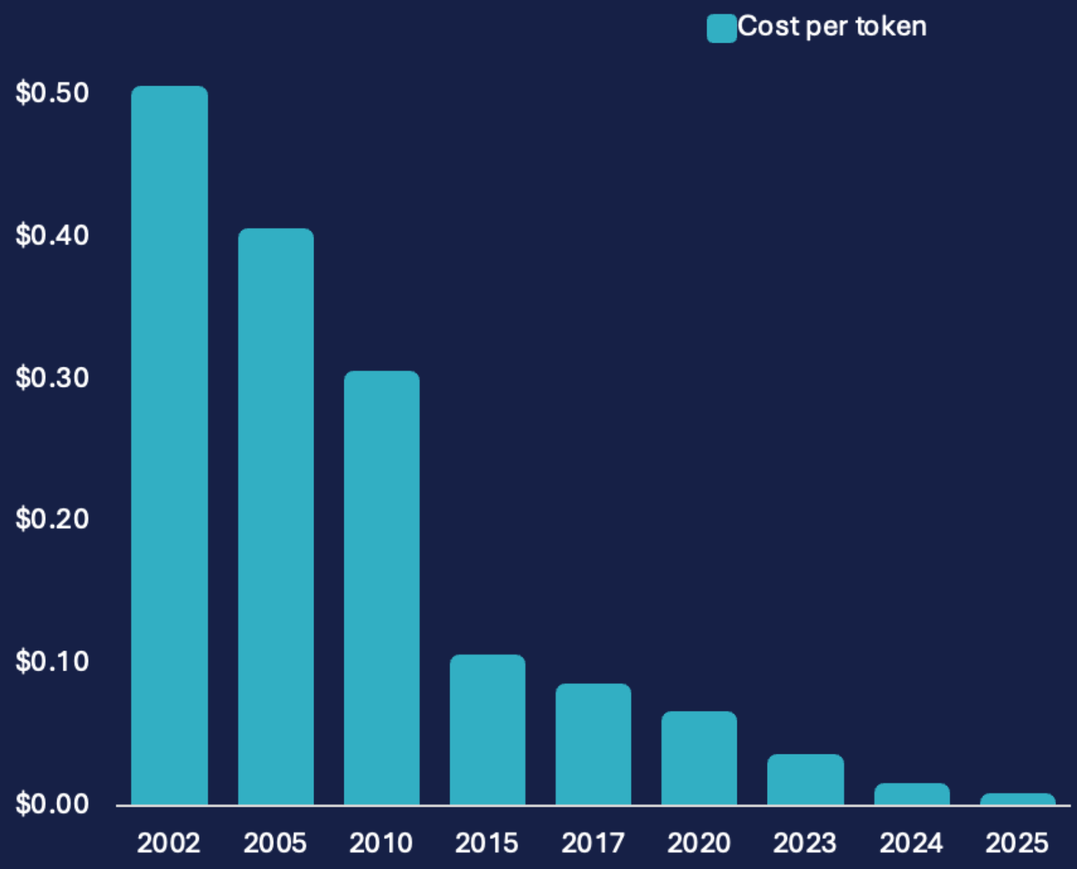
- We are nearing universal coverage targets for EPR systems – but it is important to note that a proportion of these EPRs do not meet the basic EPR standards to enable digital transformation e.g. enabling meds management, electronic prescribing or the booking and management of appointments.
- There is therefore still work to do to truly deliver universal EPRs and the current 95% coverage is estimated to be closer to 60-70%.
- The UK is well placed to create the largest longitudinal integrated data set globally, with the potential to work closely with European countries, to link data and create a globally competitive asset.
- This is enhanced by robust IG processes that align with European and US standards and our expertise in Secure Data Environments.
- However, there are ICB data access challenges that need to be addressed.

Advances in AI processing capabilities and the reduction in processing costs create the opportunity to increase adoption and realise associated benefits

AI performance



AI processing costs



AI is advancing at such a rate that it is impossible to predict what the future will look like, other than that **further progress is certain,** driven by continuing improvements in computing power and increasing affordability.

The only thing I can be certain of is that whatever opportunity we can foresee around AI is a gross underestimate.

Healthtech entrepreneur

We shouldn't limit ourselves by trying to imagine what AI will look like in 10 years' time.

Technology provider

Future uncertainties around AI are impacting its use:

Data to train models

Only 5% of 519 studies (2022-2024) used real patient data for LLM evaluation[1].

Reliability & regulation

Changing perception to risk as seen by Trump's revocation of Biden's AI risk order.

Adoption in health systems

UK healthtech start-ups are advised not to launch in the NHS but in the US first due to regulation and market access.

Then

Now

The majority of banking services and interactions have shifted to online, with services continuing to evolve today with the emergence of new technologies

Digital banking is continuing to evolve today and is currently being shaped by new technologies such as blockchain and AI:

- Enhancing security through enhanced fraud detection using predictive analytics and AI pattern recognition
- Enhancing efficiency
- Improving customer service through use of chatbots and AI assistants

London’s taxi industry has faced a decade of transformation, with traditional roadside hailing now largely replaced by online services

London’s taxi industry has experienced a considerable shift in the last decade, this move to online services has enabled:

- Improved customer experience through increased convenience and choice
- Technological innovation in payment systems
- Improved route optimisation through machine learning

Then

Now

Then

Now

Airline check-in processes in the past and today

Airline check-in processes have experienced major transformation, with most airlines utilising online check in as industry standard.

- Improved customer experience due to increased convenience, decreased wait times and greater flexibility
- Reduced staffing needs have cut airline operating costs and improved resource allocation

Access to GP opinion has begun to change, although the greatest leap to digital has been primarily via the telephone

GP practices have changed with a move towards telephone and digital appointment:

- Digital or more commonly telephone appointments now possible post Covid; asynchronous digital not yet common
- Triage models have allowed more effective management in much shorter period of time
- Payment model has allowed seeing more patients in shorter time slots without penalising GP

Then

Now

Then

Now

Electronic prescribing has begun to make a difference to prescription services

Progress has been made with the move towards e-prescribing services:

- EPS is now widely used in primary care with over 95% of all prescriptions now being produced electronically.

Outpatient services remain unreconstructed

Huge opportunities remain to improve outpatients:

- Typical use of outpatients is relatively low value of checking results of investigation and ordering new ones where necessary
- Multiple follow ups often used simply to check diagnostic result or see patient
- Patient bears the inconvenience of travel and wait times

Then

Now

The vision

Leveraging the power of technology to deliver personalised, preventative and proactive care, that empowers patients and the workforce and puts health and wellness at its core

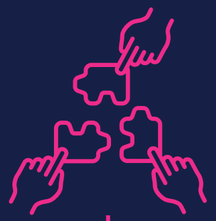
Imagine a world where healthcare extends beyond its traditional boundaries, **integrating digital advancements** with the **expertise of caregivers.** In this world, everyone's **health journey is unique** yet seamlessly connected to a **comprehensive ecosystem of data** and knowledge. Everyone is supported with routine health screening in the community with all **diagnostic insights instantly** entering the digital record.

In this future, your **health information flows smoothly across borders and systems**. The days of repetitive paperwork and fragmented records are gone. Instead, your complete health profile, from genetic predispositions to daily wellness metrics, is securely accessible. This isn't just data; it's your health legacy, speaking a **universal language** that **any healthcare provider worldwide can understand** and build upon.

The relationship between patients and healthcare professionals has evolved. Freed from administrative burdens, healthcare professionals can focus on what matters most – **the human connection**. They become **partners in your wellness journey,** their expertise enhanced by AI that processes vast amounts of health data to identify patterns and possibilities that might otherwise go unnoticed. Virtual consultations feel as natural as in-person visits, with AI assistants working in the background to capture insights and suggest personalised care pathways.

Prevention becomes the cornerstone of health, with sophisticated AI systems analysing patterns across populations while maintaining a focus on individual needs. Your wearable devices don't just track your steps – they're part of an intelligent network that anticipates health challenges before they arise. Digital therapeutics adapt in real-time to your needs, offering **personalised support** for everything from chronic condition management to mental wellness, available whenever and wherever you need them.

Planning for future healthcare needs becomes more precise and proactive, with all stakeholders working from the same rich pool of insights. The result is a healthcare system that not only treats illness but also nurtures wellness, enriching life. Healthcare leaders are empowered to **design services that meet people's needs** and free staff from administrative burdens.



In this vision, technological advances have not only changed how we manage health but also transformed our understanding of wellbeing. It's a future where living a healthy life is a daily reality, supported by a seamless integration of digital innovation and human compassion, working together to create a healthier, more connected world.

Data digital & AI should change experience for patients, clinicians, providers, payors and regulation

Patient

- **Ask and receive advice** through health agents or application
- **Communicate with** health team via message, app, agent
- **Access urgent and emergency care services** when needed
- **Access diagnostics** all on one spot for multiple conditions
- **Book/manage appointments**
- **Create/manage** treatment plan
- **Personalised medicine** based on biomarkers (including genomics)
- **Remote monitoring** of POC tests
- **Manage medications** including daily reminders and refills
- **Engage support** to commit to and reinforce healthy behaviours
- **Enrol** in trials
- **Access health records**

Clinician

- **Communicate** with patients about **follow up, diagnostic, etc**
- **Virtual assistants** to help with scheduling, patient queries etc
- **Access integrated patient records** across all care
- **Enhance diagnostics** with AI assisted lab and image reading
- **Capture data** for ward observations on remote monitoring and wearables data
- **Clinical decision support** using real time insight on all data
- **Record a note using ambient diction** eliminating admin
- Manage prescriptions, including interactions and e-prescribing
- **Collaborate** with providers

Provider

- **Communicate** with patients about **booking, appointment confirmation** with virtual agents, etc
- **Communicate about patient "hotel" requests** in hospital (e.g. food, linens, assistance)
- **Manage staff scheduling** including rostering and agency
- Manage operations including theatre, clinic, beds, ED, porters, etc
- **Manage procurement and supply chain,** including medical supplies, pharmaceuticals, etc
- **Coordinate with other providers** and systems across the UK
- **Reporting and analytics** to create insight to performance
- **Improve regulatory compliance** with automated reporting

Payor

- **Communication** with patients
- **Integrate data** to understand risk factors, condition, costs, adherence and behaviours
- **Risk stratify** by high cost to manage high utilisers, clinical risk factors to investigate, care gaps to close and behaviour to change
- **Optimise resource allocation** based on Return on Investment Reporting and analytics to identify opportunity in quality /cost by population and provider
- **Measure ROI of interventions**
- **Manage provider network** including coding review, contracting, outcomes
- **Utilise incentives** to improve patient outcomes

Regulator

- **Enhanced oversight:** AI and digital platforms improve monitoring and compliance
- **Real-time data analysis:** AI enables quick identification of trends and issues.
- **Streamlined approval processes:** Digital platforms automate approval workflows.
- **Safety and efficacy:** AI aids in evaluating new treatment.
- **Bias Mitigation:** AI helps identify and reduce biases in regulatory decisions.
- **Enhanced transparency:** Digital tools improve regulatory process transparency.
- **Predictive analytics:** AI assesses risks proactively.
- **Collaboration and data sharing:** Digital platforms facilitate better collaboration.

This future of healthcare delivery is underpinned by a universal data and digital foundation, which users will interact with through user centric applications

01

- Suite of technological applications that act as the interface with a range of stakeholders, these will range from mobile applications to Gen AI and Natural Language Agents, and AI Digital Twins
- Stakeholder groups will use same applications, with differing interfaces designed for them
- Information will flow to these applications through application programming interfaces with defined specifications of which stakeholders can access information

02

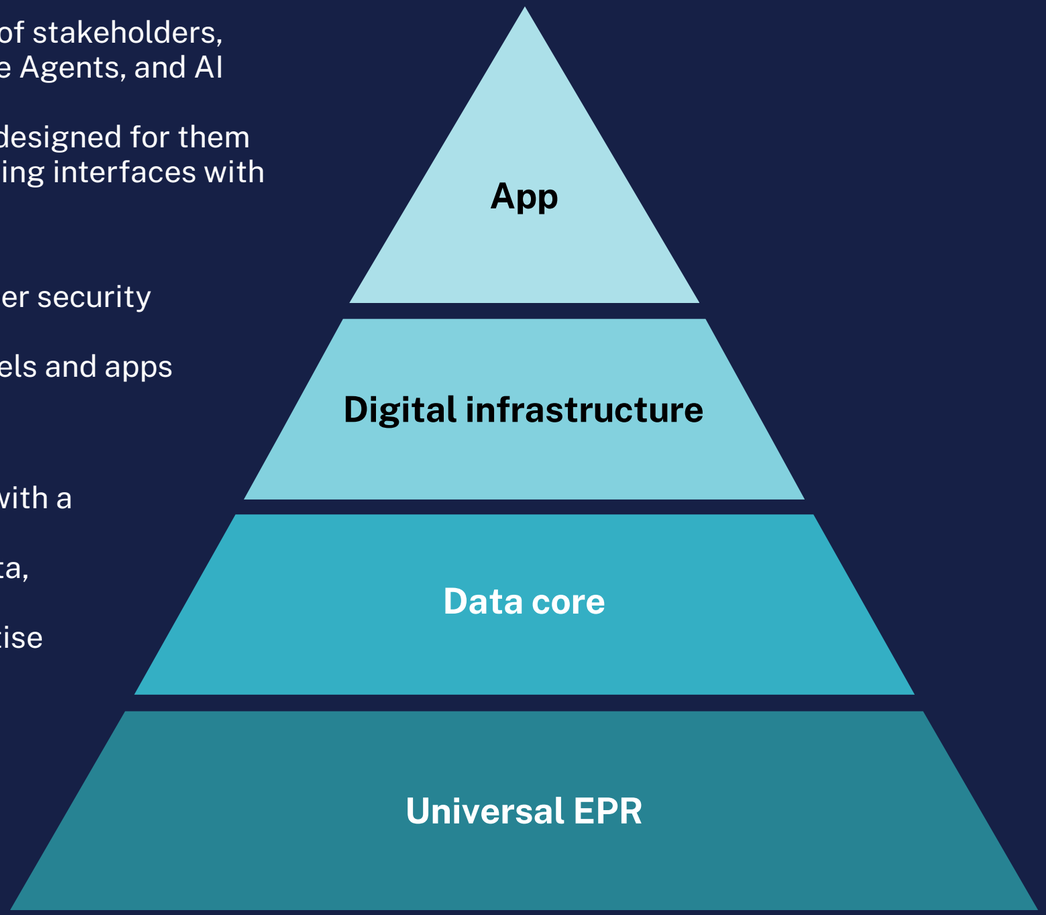
- Implementation of secure digital infrastructure including appropriate cyber security allowing secure data sharing across platforms
- This infrastructure will allow the data to flow into, feed and train the models and apps

03

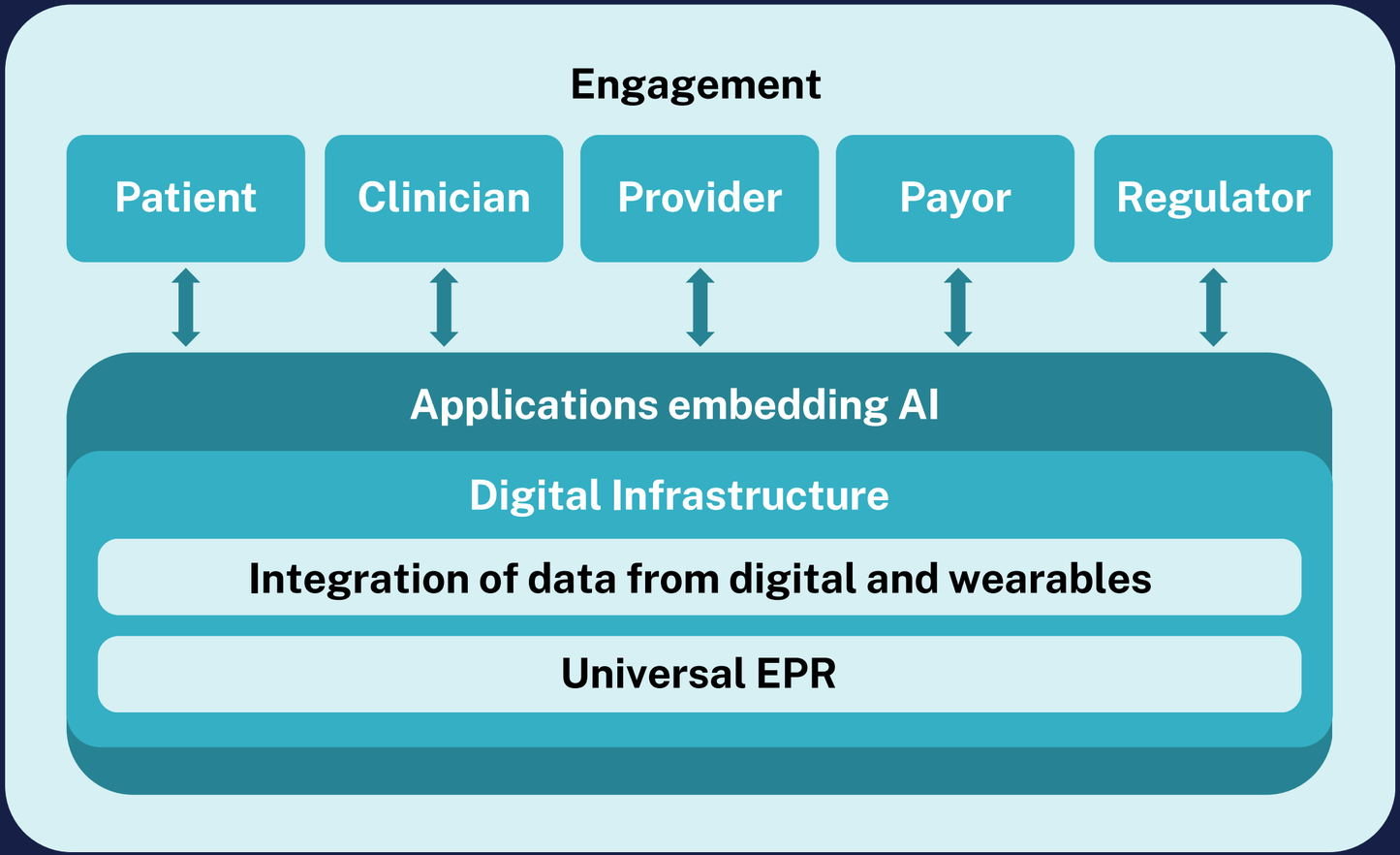
- This may be in a centralised model, a federated model or a hybrid model with a core set of data stored centrally
- Citizens should have the option to upload wearables data, microbiome data, genomic data, and real time environmental data
- Over time, new feeds of data could be added in as parallel industries digitise

04

- Digital transformation of patient records and data sharing to enable seamless integration between different healthcare settings
- This will empower patients to take greater control of their own health, putting their data in their hands as well as providers, whilst allowing individuals to own their own data



Stakeholders will interphase with these technologies through a layer of user centric applications which are underpinned by a secure and unified digital infrastructure



- Stakeholder groups interphase with user friendly applications that put the latest AI and digital tools in their hands
- These AI and digital tools are underpinned by robust digital infrastructure and strict data security
- This supports the development of integrated data which is fed by a universal EPR coverage

In the future, the new front door to health services will be digital first, through voice NLP, messaging chatbots and the NHS App for all care settings

Current

Primary care

General Practitioners, community pharmacy, dentistry & optometry

- Ability to prescribe and treat many common conditions
- Can refer on to specialist services
- Management of chronic conditions and ongoing care
- Preventative services incl. vaccines, screening and lifestyle advice

Outpatient

Outpatient referral /appointment

- Access to specialist opinion via referral to a consultant
- Information exchange remains by letter
- A consultant wishing to speak with patient can write a letter to GP or patient or ask team to schedule an appointment
- A patient wishing to speak with consultant needs to ask for appointment

UEC

Access to urgent and emergency care, through 111 24/7 ambulance services (999) and emergency departments (A&E)

- Paramedic respond to life-threatening emergencies
- Can refer onwards to specialist services
- Access to advanced diagnostic equipment including CT scanners and blood testing facilities

Future

Voice agents

Patients access support for routine, urgent and emergency care through all voice mediums supported by voice NLP, which will route them to the correct service to meet their needs.

This access route will be supported by a voice agent that will manage appropriate cases or divert to appropriate pathways.

Message

Patients will also be able to access support via messenger chatbots, which may be the preferred route for some patients, and will support those unable to verbalise support needs.

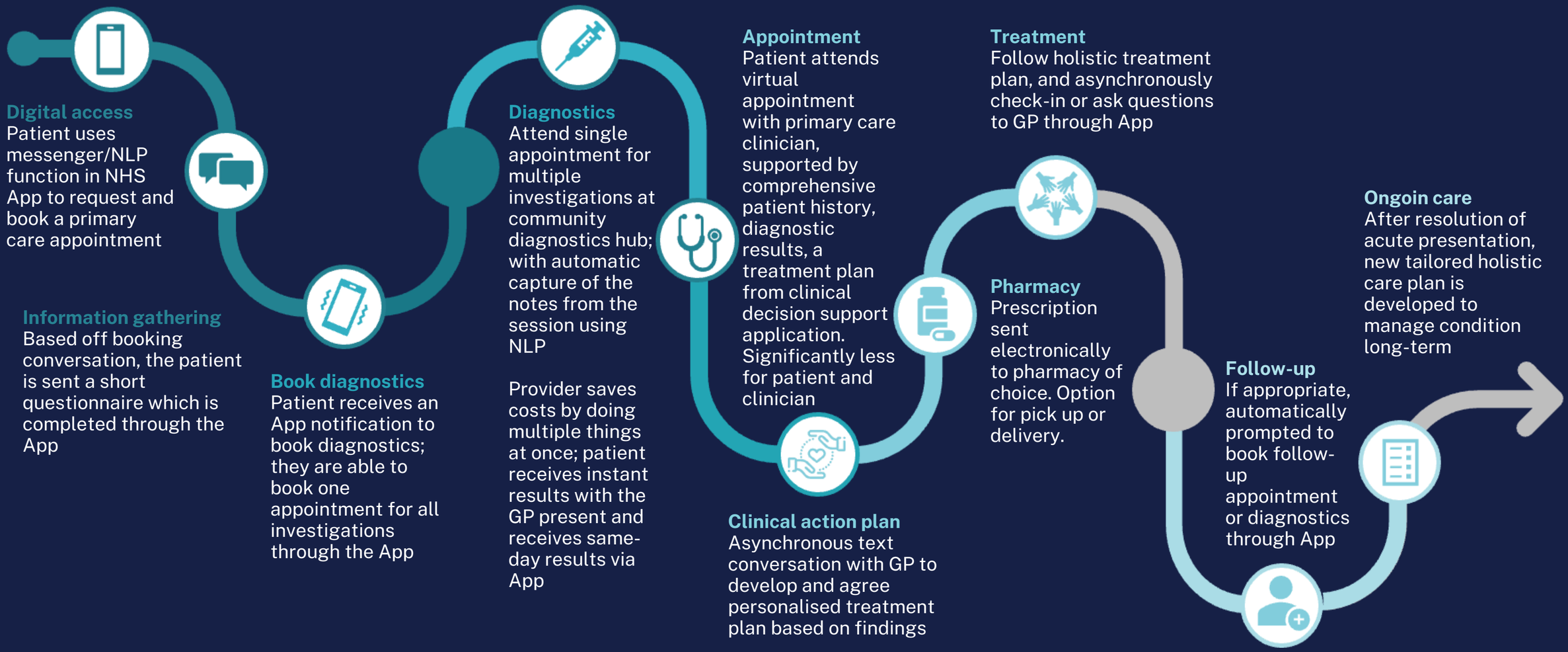
Similarly, the chat bot will manage cases to conclusion where appropriate or route patients to the right clinical service.

App

The NHS App will be a single source of the truth for patients to get advice and guidance, to carry out administrative tasks, upload information, and review results.

The app will support patients to access complete core activities and route them to appropriate services, including digital ones.

A patient's journey through primary care for a new diagnosis of a chronic condition



Digital access
Patient uses messenger/NLP function in NHS App to request and book a primary care appointment

Information gathering
Based off booking conversation, the patient is sent a short questionnaire which is completed through the App

Book diagnostics
Patient receives an App notification to book diagnostics; they are able to book one appointment for all investigations through the App

Diagnostics
Attend single appointment for multiple investigations at community diagnostics hub; with automatic capture of the notes from the session using NLP

Provider saves costs by doing multiple things at once; patient receives instant results with the GP present and receives same-day results via App

Appointment
Patient attends virtual appointment with primary care clinician, supported by comprehensive patient history, diagnostic results, a treatment plan from clinical decision support application. Significantly less for patient and clinician

Clinical action plan
Asynchronous text conversation with GP to develop and agree personalised treatment plan based on findings

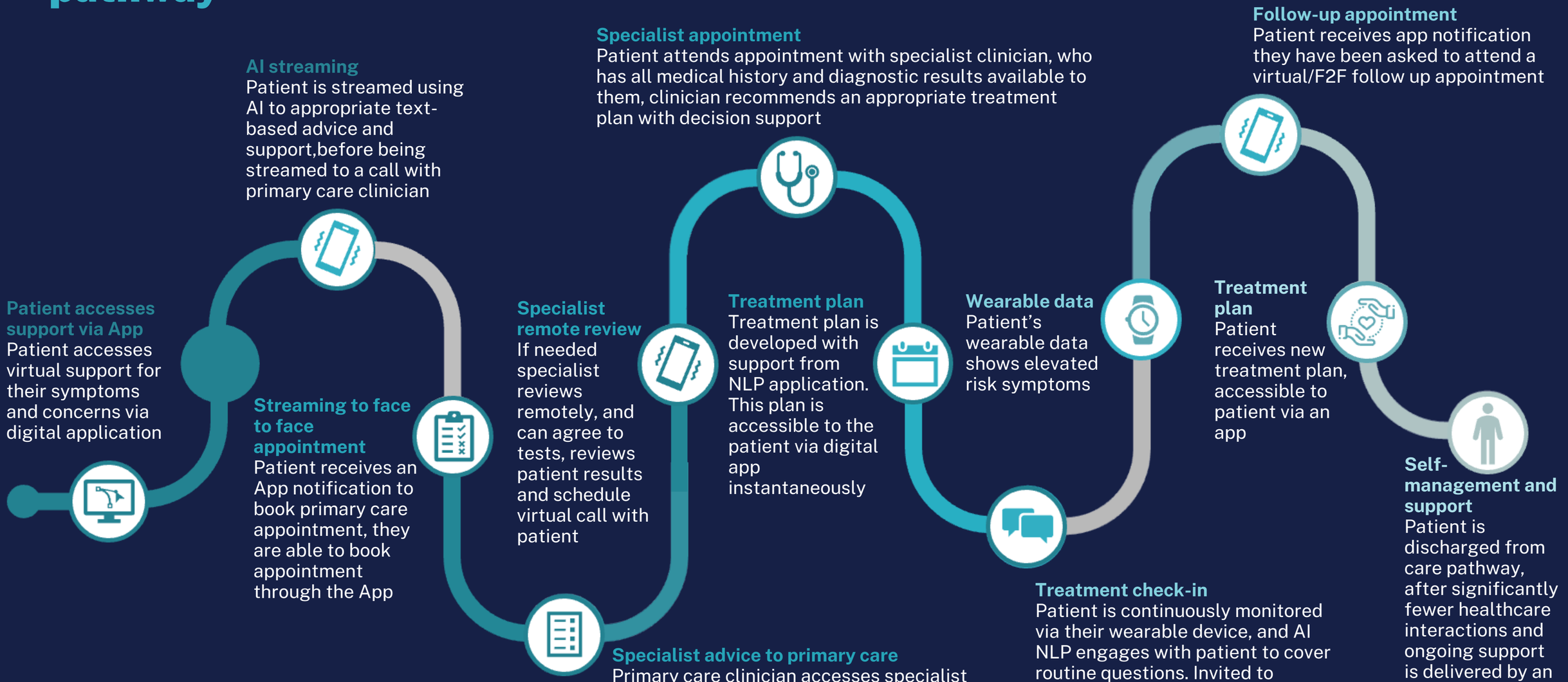
Treatment
Follow holistic treatment plan, and asynchronously check-in or ask questions to GP through App

Pharmacy
Prescription sent electronically to pharmacy of choice. Option for pick up or delivery.

Follow-up
If appropriate, automatically prompted to book follow-up appointment or diagnostics through App

Ongoin care
After resolution of acute presentation, new tailored holistic care plan is developed to manage condition long-term

A patient's journey through outpatient care significantly accelerating the pathway



Patient accesses support via App
Patient accesses virtual support for their symptoms and concerns via digital application

AI streaming
Patient is streamed using AI to appropriate text-based advice and support,before being streamed to a call with primary care clinician

Streaming to face to face appointment
Patient receives an App notification to book primary care appointment, they are able to book appointment through the App

Specialist remote review
If needed specialist reviews remotely, and can agree to tests, reviews patient results and schedule virtual call with patient

Specialist advice to primary care
Primary care clinician accesses specialist advice remotely via digital system with patient receiving ongoing automatic updates directly to their digital application

Specialist appointment
Patient attends appointment with specialist clinician, who has all medical history and diagnostic results available to them, clinician recommends an appropriate treatment plan with decision support

Treatment plan
Treatment plan is developed with support from NLP application. This plan is accessible to the patient via digital app instantaneously

Wearable data
Patient's wearable data shows elevated risk symptoms

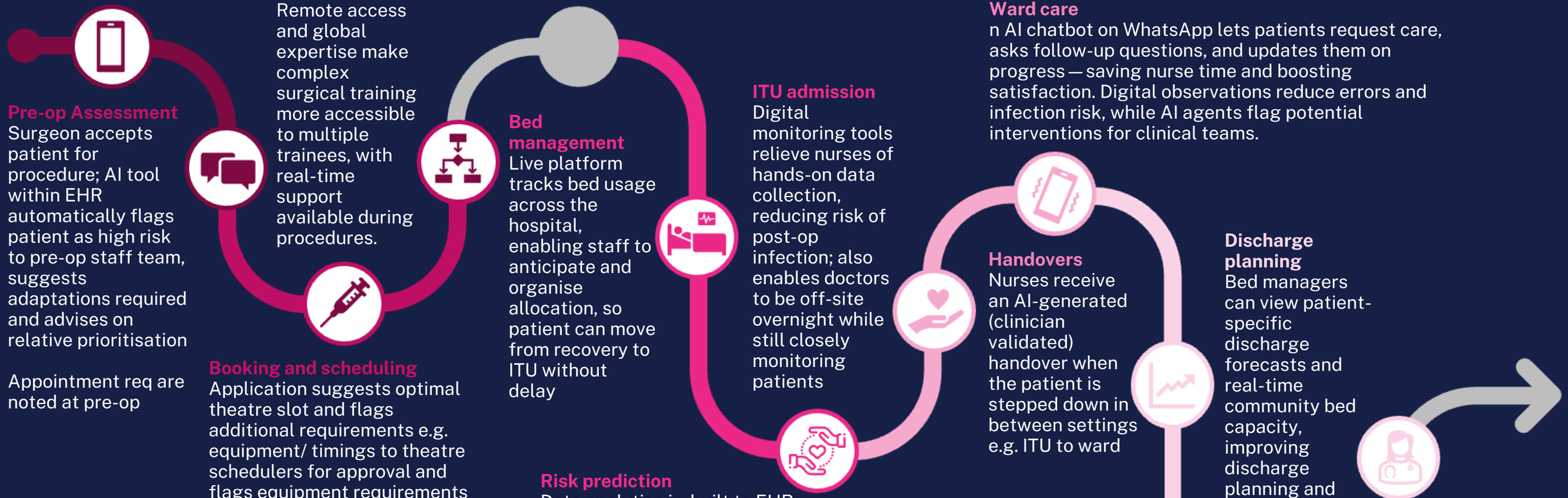
Treatment check-in
Patient is continuously monitored via their wearable device, and AI NLP engages with patient to cover routine questions. Invited to asynchronous text conversation with clinician as needed by AI

Treatment plan
Patient receives new treatment plan, accessible to patient via an app

Follow-up appointment
Patient receives app notification they have been asked to attend a virtual/F2F follow up appointment

Self-management and support
Patient is discharged from care pathway, after significantly fewer healthcare interactions and ongoing support is delivered by an AI NLP agent

How technology supports different healthcare professional within a patient's elective inpatient journey



Pre-op Assessment
Surgeon accepts patient for procedure; AI tool within EHR automatically flags patient as high risk to pre-op staff team, suggests adaptations required and advises on relative prioritisation

Appointment req are noted at pre-op

Booking and scheduling
Application suggests optimal theatre slot and flags additional requirements e.g. equipment/ timings to theatre schedulers for approval and flags equipment requirements to supply chain management tools for optimisation

Procedure
Remote access and global expertise make complex surgical training more accessible to multiple trainees, with real-time support available during procedures.

Bed management
Live platform tracks bed usage across the hospital, enabling staff to anticipate and organise allocation, so patient can move from recovery to ITU without delay

Risk prediction
Data analytics in-built to EHR accurately predicts a patient's risk of surgical complications, so they can be prevented, and the post-surgical care can be customised

ITU admission
Digital monitoring tools relieve nurses of hands-on data collection, reducing risk of post-op infection; also enables doctors to be off-site overnight while still closely monitoring patients

Discharge documentation
EHR-integrated AI generates draft discharge summaries and prescriptions to be checked by a clinician, significantly reducing clinician admin time

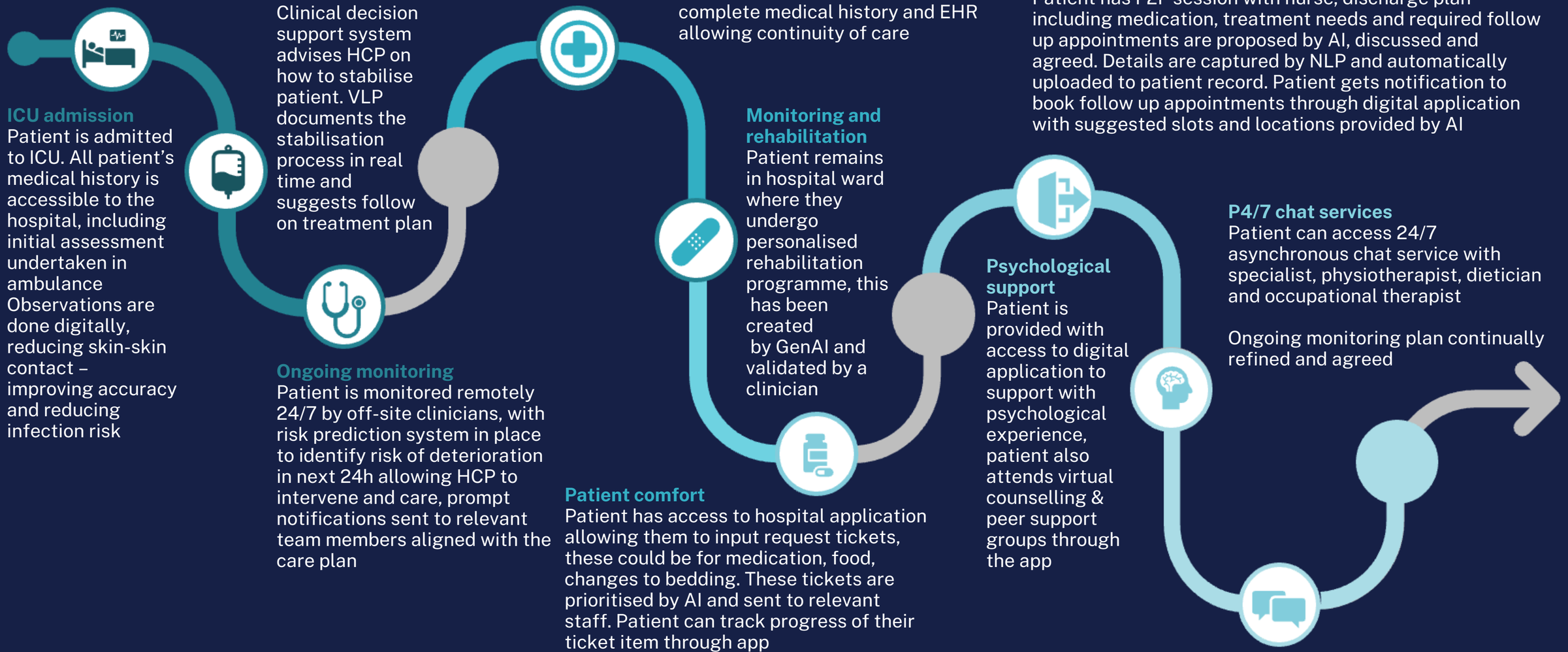
Handovers
Nurses receive an AI-generated (clinician validated) handover when the patient is stepped down in between settings e.g. ITU to ward

Ward care
n AI chatbot on WhatsApp lets patients request care, asks follow-up questions, and updates them on progress — saving nurse time and boosting satisfaction. Digital observations reduce errors and infection risk, while AI agents flag potential interventions for clinical teams.

Discharge planning
Bed managers can view patient-specific discharge forecasts and real-time community bed capacity, improving discharge planning and reducing acute stays.

Discharge communication
GP and patient automatically receives electronic discharge summary, but can also see all inpatient records from the admission

A patient's journey from Intensive Care Unit through to discharge



ICU admission
Patient is admitted to ICU. All patient's medical history is accessible to the hospital, including initial assessment undertaken in ambulance
Observations are done digitally, reducing skin-skin contact – improving accuracy and reducing infection risk

Stabilisation and treatment
Clinical decision support system advises HCP on how to stabilise patient. VLP documents the stabilisation process in real time and suggests follow on treatment plan

Ongoing monitoring
Patient is monitored remotely 24/7 by off-site clinicians, with risk prediction system in place to identify risk of deterioration in next 24h allowing HCP to intervene and care, prompt notifications sent to relevant team members aligned with the care plan

Move to hospital ward
Patient is moved to regular ward where all clinicians have access to complete medical history and EHR allowing continuity of care

Monitoring and rehabilitation
Patient remains in hospital ward where they undergo personalised rehabilitation programme, this has been created by GenAI and validated by a clinician

Patient comfort
Patient has access to hospital application allowing them to input request tickets, these could be for medication, food, changes to bedding. These tickets are prioritised by AI and sent to relevant staff. Patient can track progress of their ticket item through app

Psychological support
Patient is provided with access to digital application to support with psychological experience, patient also attends virtual counselling & peer support groups through the app

Discharge planning
Patient has F2F session with nurse, discharge plan including medication, treatment needs and required follow up appointments are proposed by AI, discussed and agreed. Details are captured by NLP and automatically uploaded to patient record. Patient gets notification to book follow up appointments through digital application with suggested slots and locations provided by AI

P4/7 chat services
Patient can access 24/7 asynchronous chat service with specialist, physiotherapist, dietician and occupational therapist

Ongoing monitoring plan continually refined and agreed

How technology supports different healthcare professional within a diagnostic pathway

Referral and scheduling
AI system automatically triages patients and categorises based on urgency before offering patient appointment times via digital app to book and scheduling the patient into the corresponding clinic

Pre-diagnostic assessment
Clinical support system provides HCPs with referral details, medical history, and scan recommendations, while pre-test instructions are sent to patients via a digital app, with an NLP chatbot for queries.

Pre-test assessment
Patients receive accessible pre-appointment info and at-home diagnostic prep by delivery, with follow-up reminders and confirmation to ensure readiness and informed consent.

Diagnostic results
Clinical decision support system, aids HCP to form diagnosis

Treatment planning
AI analysis images confirming or refuting differential diagnosis and recommending further investigations/referrals where needed based on diagnostic or creation of a suggested treatment plan to support referrer

Diagnostic test
AI support for scan technician provided to optimise imaging as well as real time analysis to support additional imaging within the appointment where required. Appointment is captured using VLP with notes written up and uploaded to system

Implementation of treatment plan
Treatment plan validated or amended with clinician and enacted with NLP chat-bot providing patient ongoing support releasing clinical capacity

Follow-up appointment
Follow up appointments are booked into HCP schedule automatically based on availability, all details of patients progress are created in easy to read report for HCP

Continuous monitoring
HCP is able to monitor patient's reaction to treatment through wearables data and patient app promoting to gather intel as required. This data is automatically uploaded to system and treatment plan is updated to reflect progress

Treatment plan
AI produces new personalised treatment plan and communicates to patient – treatment plan continually amended to optimise for compliance

Patient is discharged from care pathway

Global exemplars

Making vision a reality

Insights from success cases that have driven adoption of integrated data, digital and AI

01

Start with paperless EHR and then deploy digital and AI on top

- Universal coverage of EHRs is needed with cloud allowing improved accessibility, cost saving, improved collaboration and analytics
- Digital provides basis for engaging patient/clinician and increase data capture
- AI can then be laid on top

02

Target ”safe” areas of management operations to start

- Improved reporting is often the first step from integrated data, although avoid dashboard proliferation
- Admin tasks for patients, clinicians and non-clinicians provide safe space to prove the benefits

03

Expand to convenience and labour productivity saving things that don’t need regulator approval

- Bring 65%+ of cost within scope
- Use of NLP for notes and queries have huge productivity gains but require 4x increase in adoption
- Potential exists not just to improve supply productivity by ±20%

04

Deploy clinical as trust and regulatory approval has been gained

- Brings up to 90% of patient interaction in scope
- Significant regulatory hurdles and negligence risk
- Potential exists to resolve up to 80% of demand digitally depending on the situation

Bold aspiration

Don’t digitise today’s practice– transform and enhance whilst leveraging potential for digitalisation

Change management

Engage clinicians and managers throughout the process, gaining trust, building capabilities, incorporating feedback

Invest in technology and skills

Tech needs to be paid for but skills need to be developed across the NHS including tech and non-tech roles

Measure benefits

Clear benefits in productivity, reduced costs, improved satisfaction and outcomes should be measured and reported

Case example: Narayana health

Revolutionising healthcare with affordable AI and analytics solutions.

Context

Narayana Health is one of the largest multispecialty hospitals in India currently, **operating 23 Hospitals and 47 facilities.** The rapid growth and scaling of Narayana meant manual and excel based processes were unsustainable. Performance and Analytics capabilities were insufficient to support growth and were resulting in exponential workforce requirements and therefore an unsustainable cost base. c. 80% of patients at Narayana are self paying and typically low income.

Journey to a world leading organisation

- Narayana Health focused on a core set of corporate metrics - revenue growth, operational costs and workforce productivity.
- Built their own in-house solutions including a robust data platform, universal EPR and smart applications for patients and clinicians to interact with.
- Redesigned clinical and non-clinical processes embedding a digital first approach. They have a complete view of patient pathways and collect turn around data for every station in every hospital to identify and resolve bottlenecks and respond to emerging patient flow challenges.
- Invested in proactive comprehensive diagnostic health checks at scale to enable early intervention and significant cost reductions.
- Created one of the world's largest telemedicine networks, increasing their reach without requiring additional physical estates, utilising mobile outreach vans and semi-urban diagnostics facilities across rural parts of India.

Key drivers of operational efficiency:

- Real-time monitoring of wait times and advanced analytics by hospital, specialty, and doctor.
- Enhanced resource planning and throughput with AI driven booking and scheduling.
- AI initiatives to reduce turnaround times.
- Digital document assistance linked to EMR with NLP/Voice activated AI to support patient data capture and forms.
- AI for scanning and tagging past documentation relevant for the clinicians.
- AI supported diagnostics.

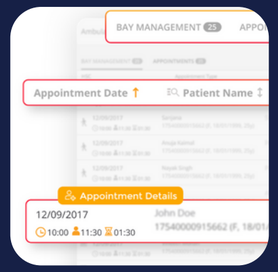
Results

- Scaled rapidly - grown to 7000 beds, 23 hospitals, 47 facilities. Employing 20,000 staff including 6,000 doctors.
- National centres of excellence, especially in cardiac surgery where they deliver up to 15% of total cardiac care volumes.
- Deliver high quality care c. 40% cheaper than competitors, which is a competitive advantage as 80% of patients are self-paying.

Illustration of Narayana health applications

Ambulatory

- 36% reduction in administrative workflows vis-a-vis streamlining patient registration process
- 32% improvement in patient wait times with optimized OPD management
- Order services, access consultation lists, and manage appointments with ease
- 75% appointments are booked online with access to order services, consultation lists, and more



Laboratory Information System (LIS)

- End-to-end workflow automation from patient registration to delivering result to the patients
- Auto-certification leading to decreased turnaround time.
- Transmit data to EHR solutions for advanced reporting and cohesive audit trails
- Home sample collection app and an exclusive partner portal
- **45% Improvement** in turnaround time

Namah

- **15% reduction** of duplicate data entries, easing nurses' documentation struggles
- Simplify daily tasks, and empower nurses to focus on primary patient care duties
- **2.8 days monthly saved** in documentation workflows, facilitating easy shift handovers for efficient task management
- **40% reduction in TAT**

Admission discharge transfer (ADT)

- Increased IP volumes by 50% with streamlined workflows via on-the-go clinical records access and easy appointment scheduling
- Enabled medication prescribing, vital sign tracking, and access to investigation reports
- Reduced ALOS by ~ 1 day with instant notifications for prompt care delivery
- 23% reduction in TA

Aadi - reimagined EMR

- Enable remote access & real-time collaboration via mobile phones
- 40% time saved during ward rounds through streamlined workflows among care teams
- 5.5 hours of doctors' time saved weekly with easy access to patient data and diagnostics for coordinated care
- 65% reduction in medical errors

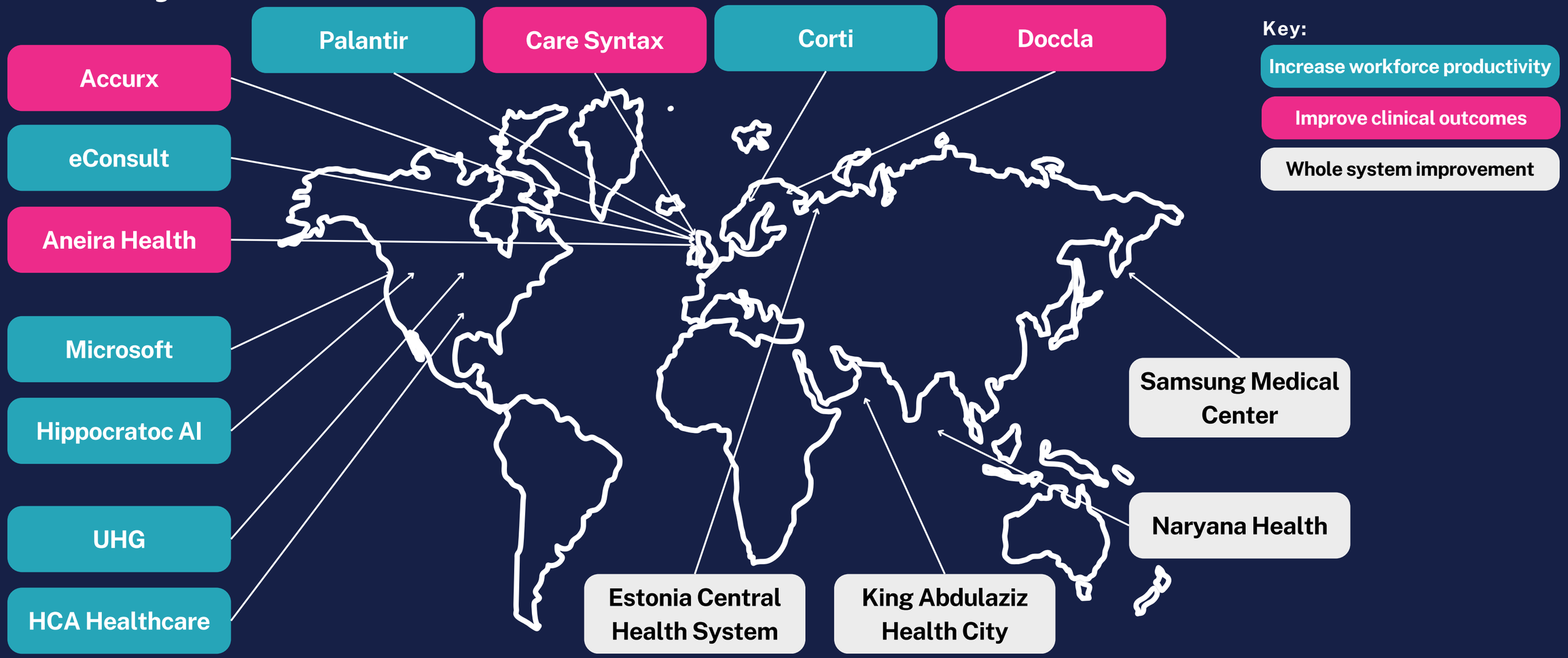
Operation theatre management

- 50% man hours saved with seamless OT scheduling and report generation
- 1.59 hours less in wheel-in delays, with end-to-end patient journey tracking
- Completely manage surgery teams from within the module
- INR 600m revenue increase in 4 years

Athmâ care patient app

- 1/3rd hours saved in appointment bookings, empowering patients with online management and self check-ins
- Facilitate easy online bookings, check-ins, and payments for patients
- 36% reduction in administrative workflows for seamless healthcare access
- 2.4m downloads for the NH care app with an excellent rating of 4.8 on play store

There are many global examples of both digital innovation at scale in health and small-scale impactful point solutions transforming care delivery



Solutions around the world offer insights around the potential of data, digital and AI

USA

HCA Healthcare	Use of ambient scribe technology (Augmedix) in and pilot of Google AI LLM which summarises nurses' 12h shifts into a report.
UnitedHealth Group	Early detection using machine learning to risk stratify population, predict outcomes and propose interventions allowing earlier diagnosis and intervention.
Hippocratic AI — Do No Harm	LLM for patient-facing non-diagnostic clinical skills, AI agents for patient-facing interactions such as follow-up appointments.
Nuance® Dragon® Professional	Cloud-based clinical speech recognition solution that accurately and efficiently captures the patient story into all major EPR platforms.
Palantir	AI powered intelligent staffing and dynamic scheduling based on real-time events, supported by AI shift handover tool to validate actions and trace activities.
Microsoft	Generative AI automatically converts multiparty conversations into specialty-specific standardized clinical summaries embedded into workflows.

Europe

corti	Healthcare-trained LLMs. Ambient scribe products medical coding AI, interaction documentation, medical dictation, AI chat function.
caresyntax®	AI-powered data platform which provides real-time intraoperative support, pre-op and post-op planning.
Streamline HEALTHCARE	Use of AI and ML for revenue cycle management and operational efficiency. Focusing on clinical documentation financial analytics, and revenue integrity.
OKRA.ai	Uses AI, NLP and ML to predictive and actionable recommendations for patient outcomes, drug development, and commercial strategies.
Palantir	Voice AI agents, text to speech/ speech to text and interruption models to manage calls and deliver admin requests as well as identifying and actioning preferences.

Rest of world

د. سليمان الحبيب DR SULAIMAN AL HABIB medical group المجموعة الطبية	Technology enabled end to end care pathways utilising telemedicine, AI powered diagnostics, robotics and blockchain for medical records.
PURSEHEALTH	Pura health app acting as a digital front door for healthcare services which integrates medical records, wearables data and diagnostics to personalise care.
微医 WE DOCTOR	Digital healthcare services, including online consultations, appointment scheduling, electronic health records, and smart diagnostics.
wysa	Use of AI and NLP to provide an anonymous, text-based support and self-help tools to help users manage stress, anxiety, and depression.
Microsoft	Mental health AI chatbot providing support and guidance, particularly where access to mental health practitioners is constrained.

Within the UK with some adoption although not without challenges

Primary and community care

accurx	30 minutes saved per staff per day in primary care (both clinical and admin) by using Accurx.
eConsult	Digital triage and remote consultation platform, particularly used in primary care.
NHS Frimley Health	Remote monitoring pilot reduced GP contact by 19.4% in Frimley ICS.

Mental health

Sleepio	Virtual CBTi saves £90.08pp over three years v standard treatment.
	Digital therapies could save ~ 6,000h for anxiety and ~ 6,800h for depression, per 1,000 therapist hours.

Acute services

doccla	Remote clinical monitoring tools and platforms for both patients and clinicians. Deploy virtual ward service, reducing costs & improving outcomes.
eTriage	14% reduction in nurse triage duration in ED when eTriage is used for patient check-in.
NHS Frimley Health	Remote monitoring reduced ED attendances by 38.6% in Frimley ICS.
m	Digital health app for COPD patients cuts readmission rates by 50%.
	MyHealthCall digital health app for care home staff reduced ED attendances by 11%, admissions by 25% and length of stay by 11%.
	VR-based rehabilitation for stroke patients resulted in a 31% reduction in outpatient physiotherapy visits without affecting recovery outcomes.

Outpatients

skin analytics	AI-assisted triaging of skin lesions helped 94% of patients avoid an urgent face-to-face appointment.
	Reduction of DNAs by up to 80% by sending appointment reminders.
Dr	Reduction in DNAs by 1% point and £2.6M saved by through patient-led booking system.
	Up to 17% of face-to-face follow-up appointments replaced which take 2 mins compared to 15.
	At-home blood test with tailored feedback from doctors delivered via App.
KHEIRON MEDICAL TECHNOLOGIES	AI radiology tools to improve screening, particularly in mammography. Partnered with several NHS providers.

The NHS has pursued three main technology platforms to put data, digital and AI into the hands of staff and patients in the NHS

Federated data platform

The Federated Data Platform represents a £330m investment by NHS in integrating data across multiple providers.

It has been deployed to 71 acute trusts to support wait list management and theatre booking. In trusts that have implemented the solution there have been on average 119 extra operations per month and a 6% increase in theatre utilisation and up to 30% reduction in inpatient waiting list. The FDP has also been deployed at 35 ICBs.

Plans for this year call for the roll out to remaining acute trusts and further develop use cases in vaccines, supply chain, coordination and population health management.

NHS App

The NHS App emerged during Covid as key interface with the population. It cited impact of £504m in 2024/25:

- Used by one in five of the population of over 13-year-olds in the country.
- Via responsible adults able to cover all children and all older people.

Logins per month have increased steadily:

- 16.8 million 2022
- 25.7 million 2023
- >50 million 2025

Repeat prescriptions have increased:

- 3 minutes saved for every repeat prescription ordered online.
- 4.7 million ordered in Feb 2025.

Microsoft Copilot

NHS and Microsoft £774m 5-year deal licensing MS teams & office 365 to 1.5m staff:

- **M365 Copilot** being trialled by NHS England and ±90 Trusts. It offers productivity gains from summarising meetings and documents and generating insights from data. A cross-Whitehall trial showed ±30 minutes per user per day saving or 14 days per year. Scaling across the NHS could deliver 2.5% productivity saving and over 4:1 ROI.
- **Dragon Copilot** is an ambient AI tool being trialled NHS Trusts which saves 5min/clinical encounter. Integrated AI workflow, with some capability built natively into EPIC. Scaling this across primary care and outpatient could have a dramatic impact on waiting times, clinician burnout and patient experience.

An illustration of the promise and frustration of AI in the UK is provided by mammography, which was invented here and sidelined whilst accelerated in US

Google deep mind

Google DeepMind began exploring the potential of AI in mammography around 2017. They partnered with leading research institutions, including the Cancer Research UK Centre at Imperial College London, to develop machine learning models aimed at improving breast cancer detection.

Their AI system, trained on large datasets of mammograms from both the UK and the US, demonstrated the ability to surpass human radiologists in predicting breast cancer.

Kheiron medical technologies development of MIA

Kheiron Medical Technologies, a UK-based company, developed an AI solution called Mia (Mammography Intelligent Assessment). Mia was designed to assist radiologists in detecting breast cancer more accurately and efficiently. In a prospective evaluation as part of the GEMINI study with 10,889 patients, Mia helped doctors find an additional 12% more cancers compared to routine practice.

A retrospective analysis by iCAIRD on four years of anonymised screening mammograms showed that Mia detected 33.8% more interval cancers that would have been missed by two specialists.

In the UK mammography has faced challenges

Despite these promising results, the adoption of AI technologies like Mia in the UK faced significant challenges. Stringent regulations and extensive checks created delays in widespread implementation.

The UK National Screening Committee has been cautious, citing insufficient evidence for widespread implementation. With a population of around 69.5 million, the proportion of the population benefiting from AI-supported mammography is significantly lower.

A new trial of 700k patients for 3 years has been launched to see if it is safe to reduce to 1 consultant reviewing scans if AI is being used.

Kheiron has shifted to the US and was acquired

These hurdles led Kheiron to shift its focus to the US market, where regulatory processes were more accommodating for emerging technologies.

In the US, Kheiron's Mia has been integrated into various breast cancer screening programs, demonstrating its effectiveness in real-world settings. Approximately 34.7% of imaging centers in the US have adopted AI for disease detection. With a population of about 342 million, this translates to roughly 118.7 million people potentially benefiting from AI-supported mammography.

“All the evaluation of AI performance is relative to specialists — that’s the wrong comparison. It should be relative to the GP or A&E doctor. Or nothing at all.”

Gary Ford, Oxford Health Innovation Network ChE

To fully realise the potential of these technologies, the NHS must address a number of structural barriers that impede its ability to embed and scale innovation

Universal data	Universal EPR coverage and ensuring the healthcare system is paperless is a critical first step to ensuring a comprehensive and reliable data set that covers the whole UK population. All healthcare data sources must be integrated into a single view underpinned by a standard data model which can be used to train AI models and enable digital support tools.
Information governance	The approach to information governance must be overhauled, to ensure it enables appropriate access to support patients and staff to fulfil their roles. The IG frameworks and templates must be simplified to make them more accessible and to support using the data to drive transformation safely. The current application of IG is a barrier to change.
Digital infrastructure	The digital infrastructure must be modernised and made fit for purpose to avoid unnecessary complexity and instability. Legacy system/mobile and cloud providers must be managed to enable interoperability of novel technologies and limit barriers to adoption. Frameworks to standardise integration with existing infrastructure are also needed
Regulation and clinical evidence	Given the rapid advancements in AI, regulation must be adaptive and forward-thinking to not stifle innovation. Clinical evidence requirements should be right-sized to accelerate acceptance of innovation and standards for AI approvals should be set appropriately relative to existing human standards.
Commissioning	Data standards should be embedded in all NHS contracts to level up data quality. Commissioning criteria need to be adjusted to encourage novel technologies and shift from outdated solutions. Multi-year funding is needed to enable transition from pilot to scaled innovation. These pathways for scaling should be codified to simplify the process.
Adoption	The NHS must invest in digital literacy and engagement of the population and its staff to ensure the NHS can benefit from any implemented technology. Robust change management programmes will be needed to overcome resistance aligned with policy and incentives. Leaders must be encouraged to make strategic investments to embrace innovative technology.

Healthcare cost curve bending

The digital and AI opportunity

Universal coverage and mass adoption of the technologies by patients and staff will enable the NHS to improve outcomes and bend the curve on rising care delivery costs

01

Improved clinical outcomes

- ML can identify subtle patterns and risk factors, enabling earlier intervention in conditions resulting in better clinical outcomes and a shift to preventative care.
- AI-enabled imaging analysis tools can enhance diagnostic accuracy and speed across radiology, pathology, and other specialties by providing automated second opinions, potentially reducing missed diagnoses and enabling faster treatment initiation.

02

Increased workforce productivity

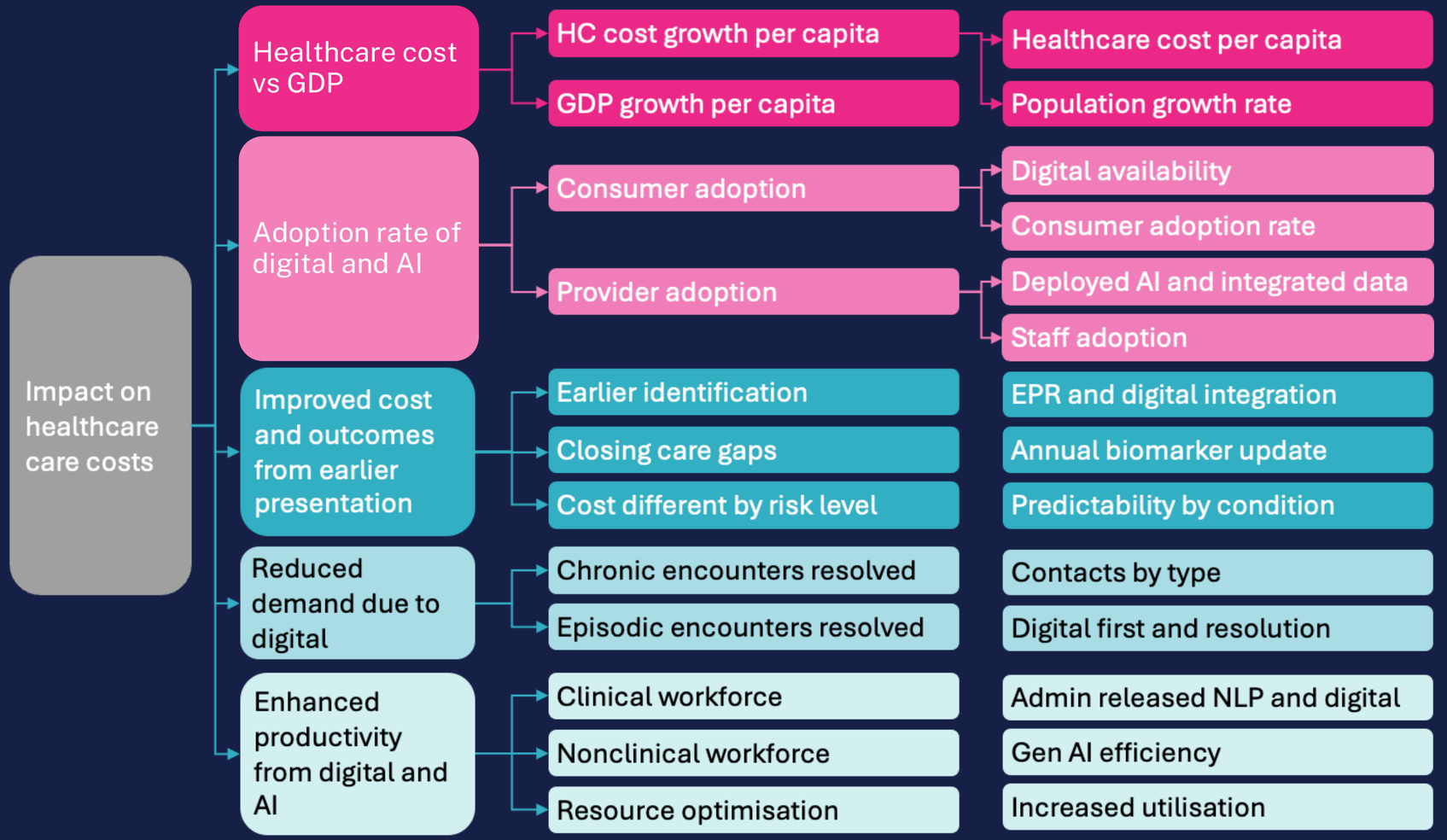
- NLP and automation tools can reduce administrative burden on both administrative and clinical staff by automating tasks like appointment scheduling, documentation, patient communications and triage.
- AI-powered clinical decision support systems can streamline diagnosis and treatment planning suggesting potential diagnoses, and flagging high-risk cases, enabling faster and more informed decisions.
- However, implementation and training requirements often created initial productivity dips before benefits were realised.

03

Overall financial savings

- Predictive analytics and AI can optimise resource allocation and capacity planning across the NHS, accurately forecasting patient demand, reducing unnecessary admissions, and better managing bed capacity and staff scheduling.
- Automation of administrative processes and improved operational efficiency through digital tools could lead to significant cost reductions in back-office functions.
- AI enabled preventative care could reduce expensive emergency admissions and complications, generating substantial long-term savings for the NHS.

This report has developed a benefit framework for “bending the curve” to reduce growth of healthcare cost through adoption of data, digital and AI by consumers and providers



Healthcare cost grows at 1.5% faster than GDP on per capita basis.

Rate limit on transformation of healthcare cost is **adoption by patients (today 20%) and clinicians (today between 4 and 27%)** and existence of digital and data and IG.

Through this gateway three major opportunities are unlocked:

- **20-40% lower** cost and better outcomes due to ability to identify earlier, close care gaps and the lower cost of earlier intervention.
- **20-70% reduction in demand** by resolving encounters digitally.
- **20-40% productivity gain** in clinical and nonclinical.

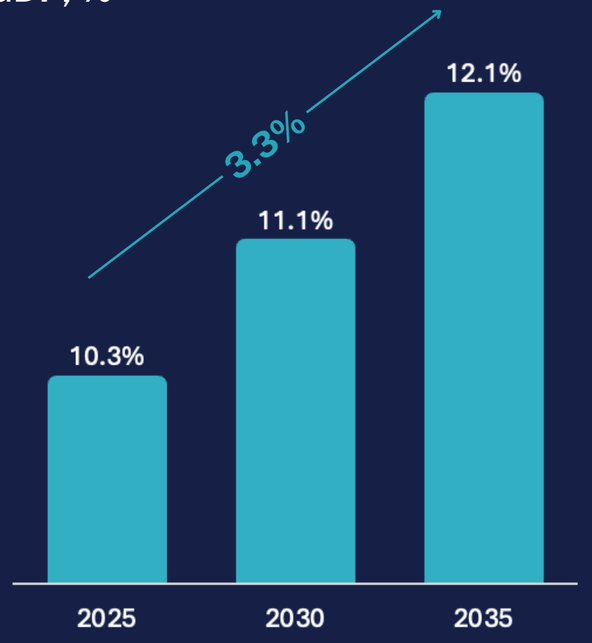
This report has developed a benefit framework for “bending the curve” to reduce growth of healthcare cost through adoption of data, digital and AI by consumers and providers

- The fundamental challenge facing healthcare systems is that spending continues to grow faster than the economy.
- In the UK, healthcare spending has historically grown at about 3.3% annually while GDP is projected to grow at only 1.6% over the next years.
- This creates a widening gap that puts pressure on public finances and is ultimately unsustainable.

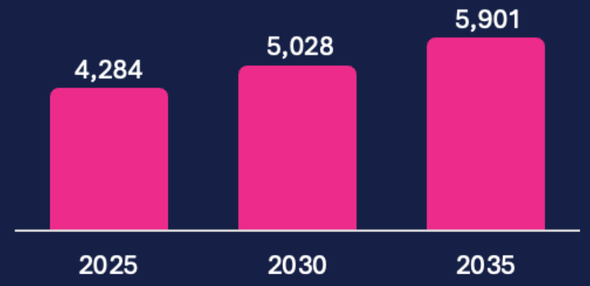
Assumptions and references:

- Healthcare spending per capita in 2025: £3,158
- Annual healthcare spending growth rate: 3.3%
- GDP per capita in 2025: £41,720
- Annual GDP growth rate: 1.6%

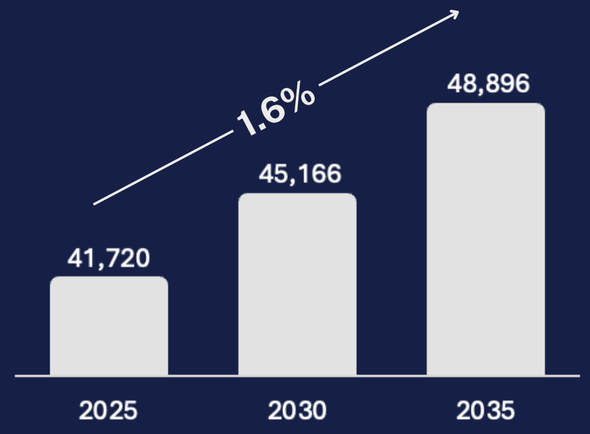
Healthcare spend as percent of GDP, %



Healthcare spend per capita, £



GDP per capita, £



Achieving the full potential of digitally enabled healthcare requires a systematic approach to addressing adoption barriers for both consumers and providers

Digital transformation impact is rate-limited by adoption factors across several dimensions (e.g., digital coverage, consumer adoption, EPR systems, clinician adoption, and administrative efficiency).

Driving overall engagement of patients and staff by enhancing digital literacy and effective change management will unlock the potential of the digital transformation agenda in healthcare.

"If someone can use a smart phone they can use the App. We do know that some older people can't use the app themselves, but with a responsible adult as a proxy user on their behalf we should get universal coverage of adults. Similarly a responsible adult can access the App on behalf of children."

-Joe Harrison, SRO for the NHS App

2025 adoption estimates	Smartphones		NHS App		Internet use	
	2025	2035	2025	2035	2025	2035
Children*	99%	99%	20%*	95%*	100%	100%
Adults	98%	98%	20%	95%	91%	95%
Older people	82%	82%	20%*	95%*	77%	80%

*figure assumes proxy usage with responsible adult; Note: People aged 25-34 and 35-44 have been used as a proxy for children (parental figures).

The system's target is for 96% of trusts to have implemented an EPR by March 2025, with 70% of trusts having an EPR that adequately meets the required standard

2025 adoption estimates

Electronic Patient Record (EPR) system coverage

	Start April 2024	Current March 2025	Target March 2026
Trusts with no EPR, but in process of getting one	29 (14%)	19 (9%)	9 (4%)
Trusts with an EPR needing upgrading or replacing to meet standard	129 (63%)	105 (51%)	52 (26%)
Trusts with an EPR that already meets standard	47 (23%)	81 (40%)	144 (70%)

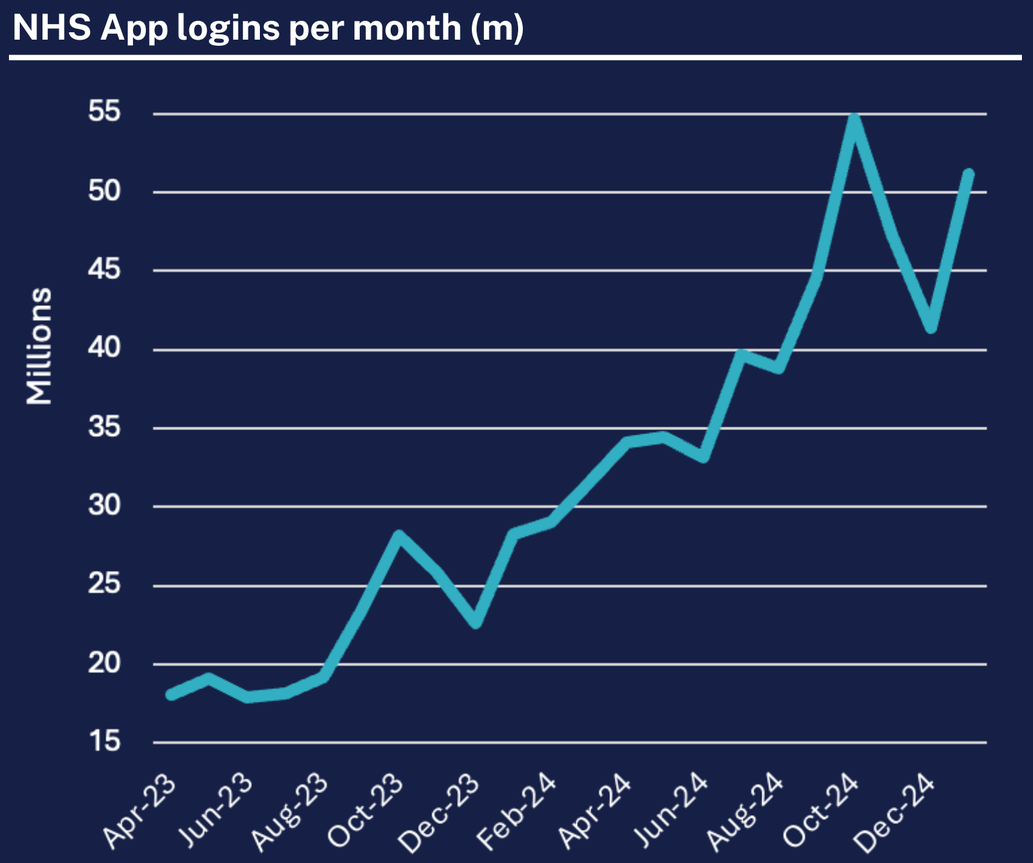
The Frontline Digitisation (FD) programme aims for all secondary care trusts to have an EPR that meets the standards for the core level of digitisation set out in the "What Good Looks Like" policy.

Clinical adoption of AI

Current	2035
4-27%	90%

Consumer enthusiasm for data digital and AI has already begun to be shown by NHS App — and already started to generate significant savings

NHS App Usage has dramatically accelerated



NHS App cites impact of £504m in 2024/25

Over 860k outpatient DNAs avoided.

Over 7m fewer letters and 50m fewer GP SMS sent.
Equal to over £8.8m in cash releasing savings.

55m repeat prescriptions ordered online.
Equal to 2.7m hours saved for GP practices.

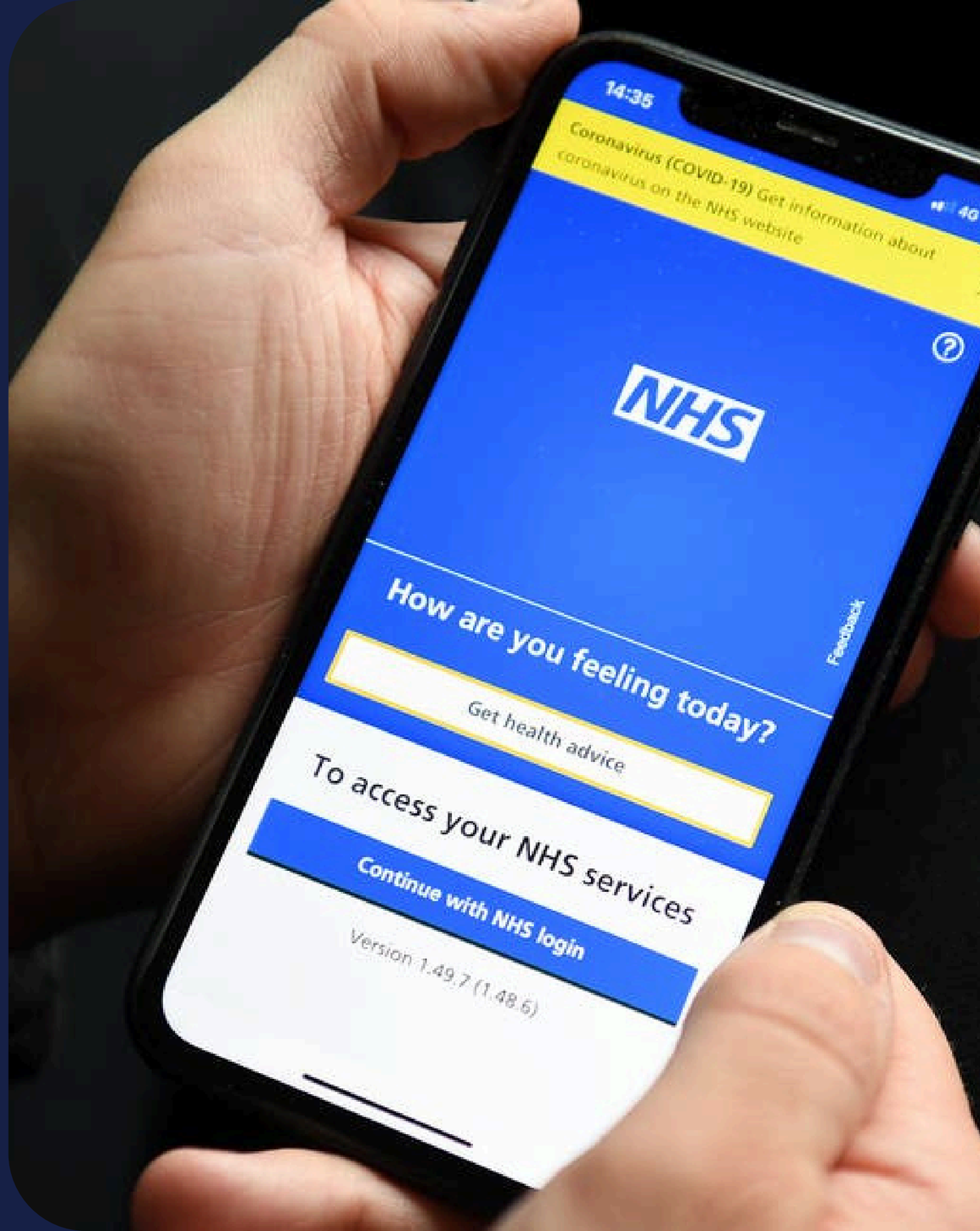
Over 6m test result related GP appointments prevented.

- The rapid increase in adoption of the NHS App indicates the potential for widely becoming the front door of many NHS services.

- The NHS App is used by over 1 in 5 adults every month, covering primary care, secondary care and prevention services. This is only going to grow in its range and depth in the coming years as the new government , healthcare organisations and patients demand more of the NHS App.

- 87% of Acute Trusts are now live in the NHS App.

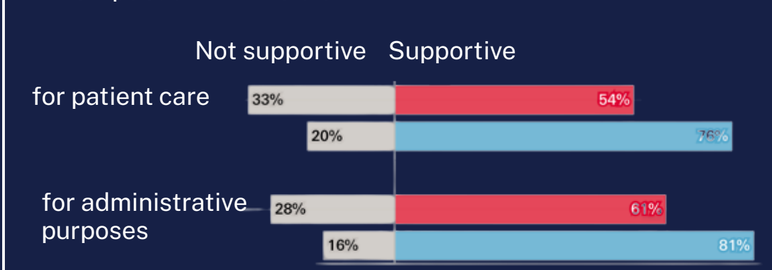
- 99.7% GPs can send messages and 75% of GP online consultation solutions are live too, it will be 95% by the end of 2025/26.



At present healthcare workers express interest in AI but evidence suggests little use

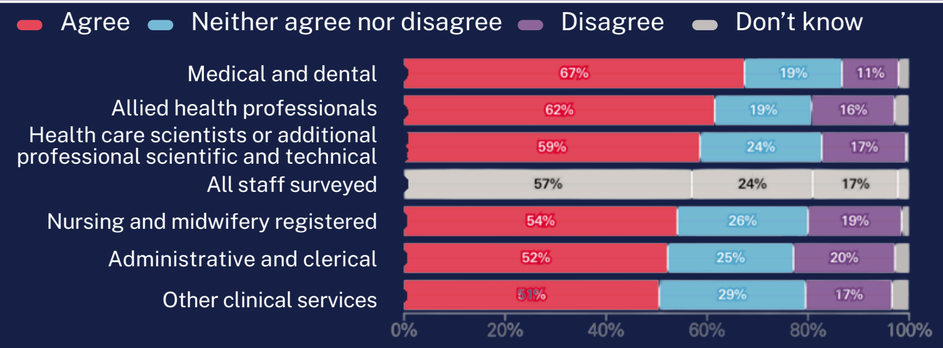
UK patients and staff broadly positive about AI usage

The public and NHS staff, on balance, support the use of AI in the NHS, particularly for administrative purposes. How supportive, if at all, are you of the NHS using AI...



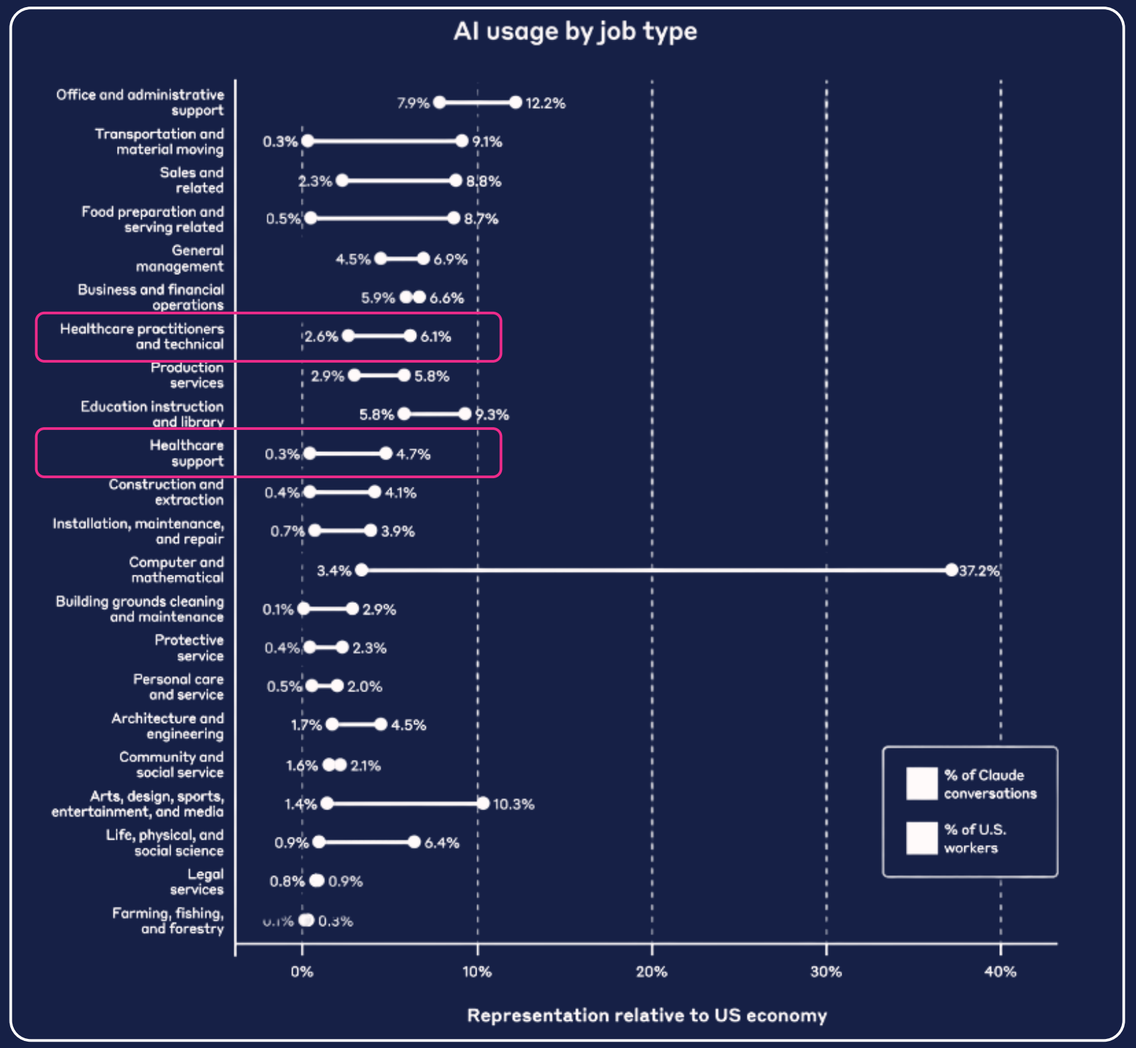
UK public survey fieldwork carried out online and by phone by Censuswide, 7 June to 8 July 2024; total sample size 7,201 adults (85% from England, 8% Scotland, 5% Wales and 3% Northern Ireland); figures have been weighted and are representative of all UK adults (aged 16 years and older).;

Some staff groups are looking forward to using AI more than others
To what extent do you agree with the statement: 'I look forward to using AI as part of my job?

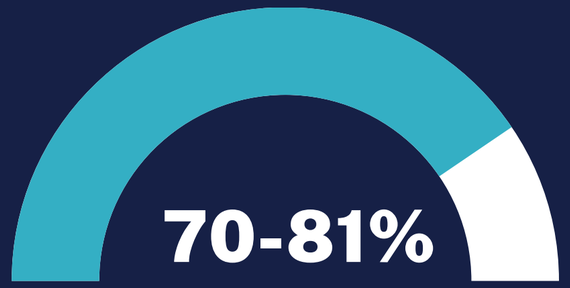


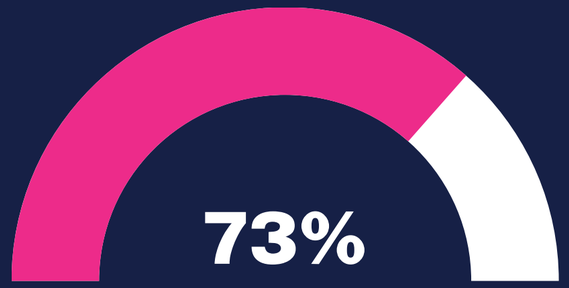
UK NHS staff survey fieldwork carried out online by Censuswide, 7 June to 8 July 2024; total sample size 1,292 NHS staff aged 16 years and older

Evidence from abroad suggests healthcare lags other industry



Adoption of AI by clinicians and other staff will be a rate limiting step in the impact of AI





Nuffield

70-81% of staff supported AI

Anthropic

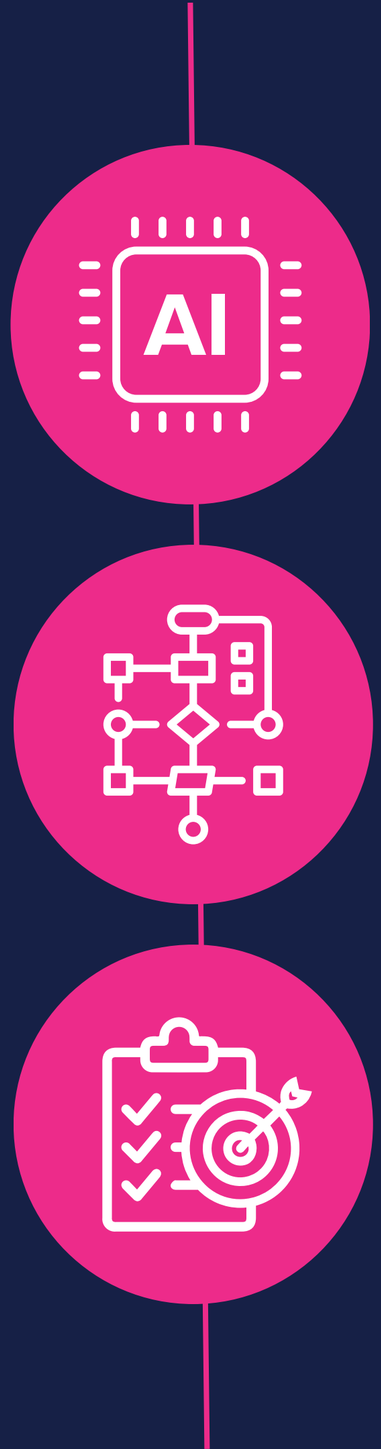
Poor usage of AI reported

Corti & You Gov

73% of clinicians indicated they never use AI

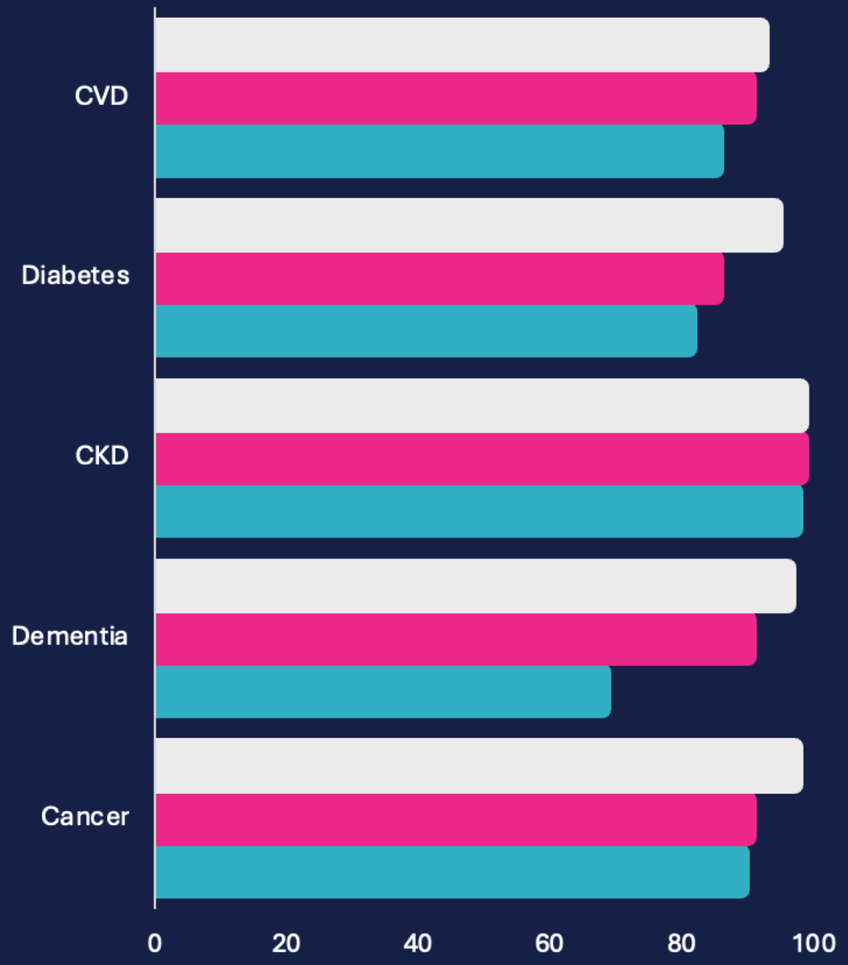
Example impact 1:

AI promised the potential to apply predictive algorithms to lead to targeted interventions



High predictive accuracy has been reported for algorithms applied to five major health conditions

Reported accuracy of predictive algorithms



Demonstrated efficacy of risk reducing treatment or earlier intervention

- **CVD**
  1 mmol/L reduction in LDL results in 25% reduction in CVD events

- **Diabetes**
  1% reduction in HbA1c associated with a
  - 14% reduction in risk of heart attack
  - 21% reduction in the risk of death from any cause

- **CKD**
  Treating CKD to maintain an eGFR above 90 mL/min/1.73 m^2 can result in
  - 30% lower risk of major adverse cardiovascular events (MACE), incl heart attacks strokes
  - up to 40% reduction in the risk of all-cause mortality

- **Dementia**
  - 45% of dementia cases may be preventable
  - Treatment with AChE inhibitors can result in a 20-30% slower decline in cognitive function DMTs will require successful identification of MCI to be effective

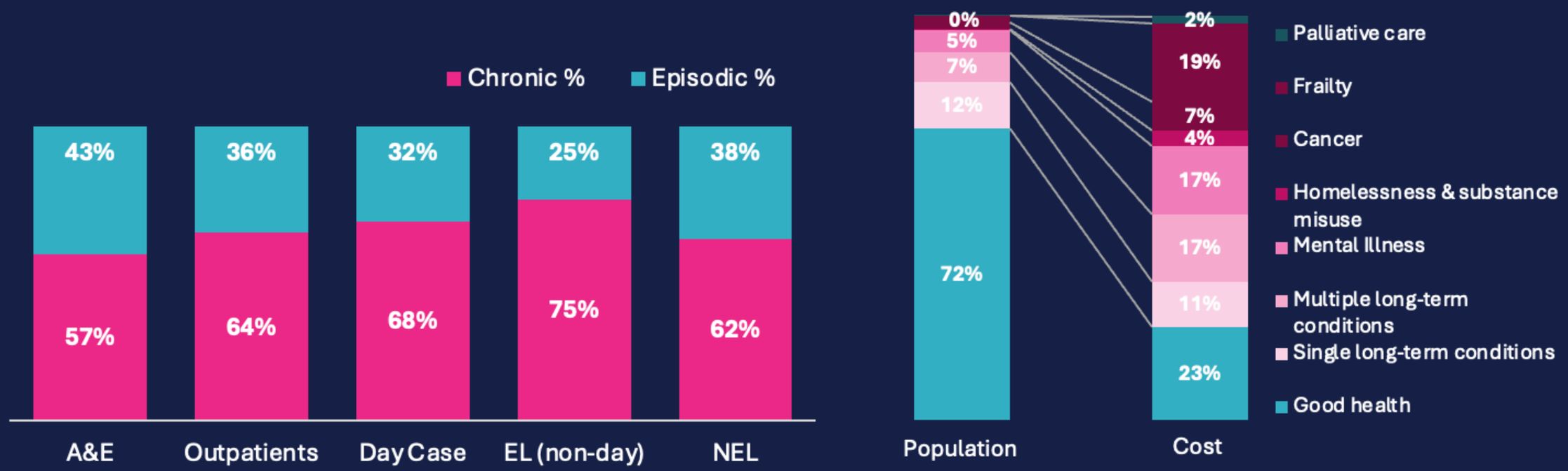
- **Cancer**
  - 24% reduction in mortality achieved from targeted lung health checks
  - Earlier stage intervention can save 40-60% of cost of treament
  - Further potential of earlier intervention with new discoveries

Example impact 2:

Case examples, analysis and interviews suggest significant potential to address and resolve demand through AI and digital interactions

Majority of healthcare costs are in chronic conditions

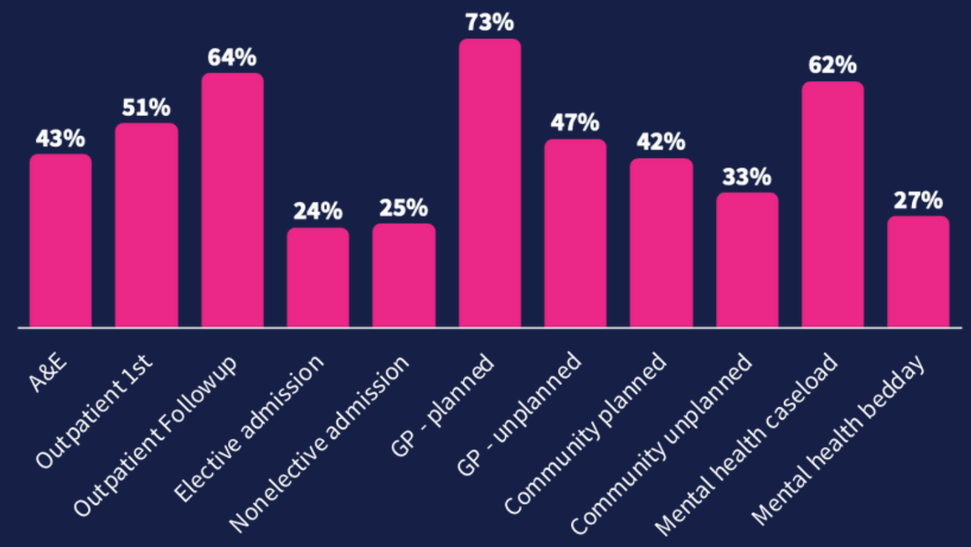
Distribution of care

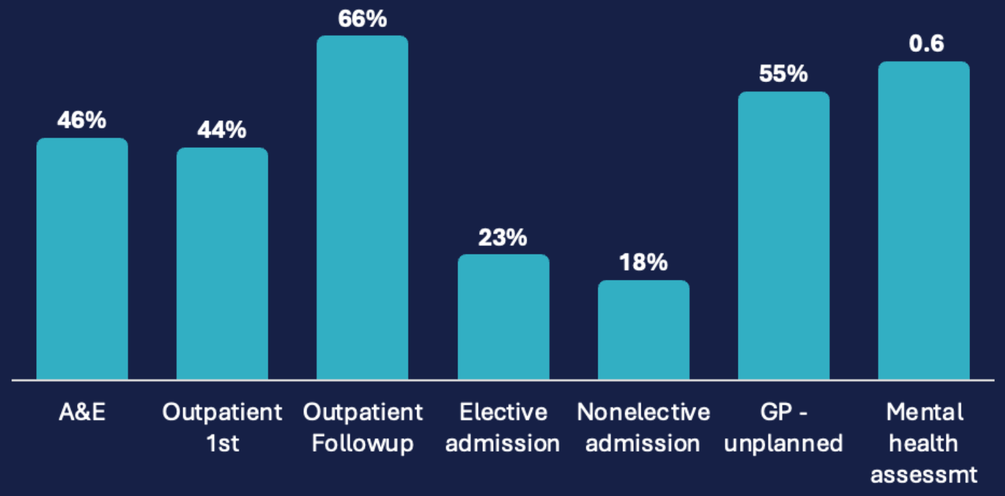


Chronic care consumes up to 75% of total NHS resources and many appointments are due to routine follow ups, further diagnostics or simply communicating with patients. This can be demonstrated from segmentation of patients and their data.

Illustrate of demand that could be met digitally

Chronic care





Interviews and case studies indicate asynchronous digital engagement via App, message or voice presents the opportunity to reduce demand particularly in chronic care:

- **First engagement:** capture information including presenting condition, relevant history, diagnostics, accessing integrated data, and leveraging AI tools to ensure routed appropriately.
- **Digital resolution:** resolving patient's complaint through digital channels, used to advise on course of action and/or manage submission of remote monitoring, capture of routine follow up information, providing advice.

Analysis

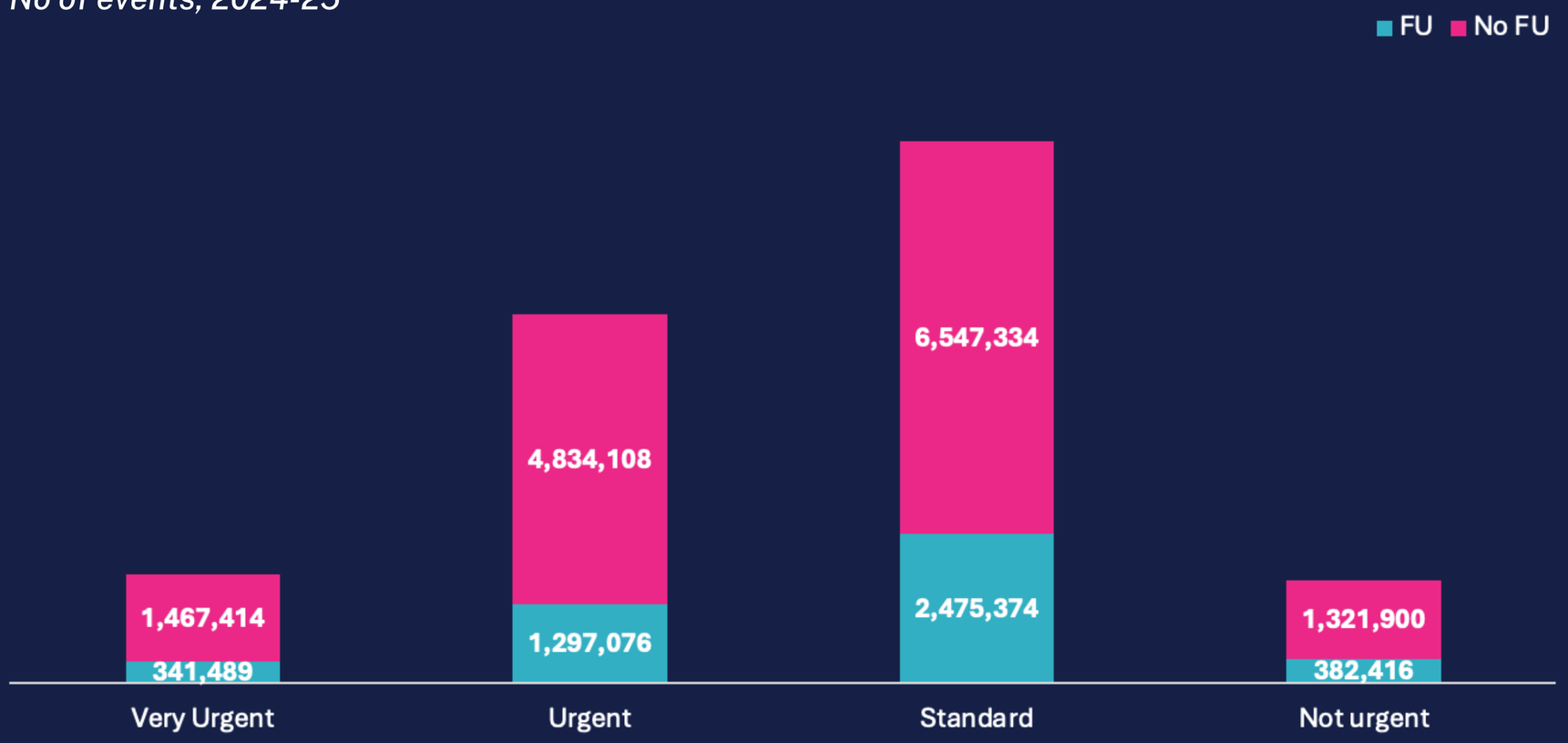
A CF clinical research panel assessed the potential impact of data digital and AI across different settings of care:

- 43-66% of ambulatory hospital contacts.
- 18-25% of hospital admissions.
- 47-73% of primary care contacts.
- 61% of ambulatory mental health contacts.

Illustration: majority of A&E attendances are not urgent and 68% need no follow up

Accident and Emergency attendances by acuity and follow-up status

No of events, 2024-25



- An analysis of HES data to analyse the urgency and follow up of A&E attendances reveals that 57% of attendances were not urgent and the 68% of all presentations had no follow up.
- This supports the conclusion of doctors who believe a large proportion of A&E visits could be resolved through digital channels.

Example impact 3:

Ambient natural language processing and GenAI search offer substantial savings in clinical time which create productivity gains

"Generative AI can improve a highly skilled worker's performance by nearly 40% compared with workers who don't use it[2]."

Value of freeing time from clinical documentation
Hours per week

Time and economic value	Hours	£ Week	£ Month	£ Year
Doctor (Consultant)	12.1	869	3,331	**39,974**
Doctor (non-Consultant)	15.1	629	2,411	**28,934**
Consultant Nurse or Nurse Practitioner	16.5	962	3,688	**44,261**
Nurse/Midwife	14.4	322	1,234	**14,811**
Allied Health Professional	12.9	289	1,107	**13,283**
Overall weighted average	**13.5**	**557**	**2,137**	**25,639**

Value of faster search results
Minutes per day

Time and economic value	Mins	£ Day	£ Month	£ Year
Doctor (Consultant)	61.8	74	1,414	**16,974**
Doctor (non-Consultant)	57.5	40	766	**9,198**
Consultant Nurse or Nurse Practitioner	63.6	62	1,182	**14,178**
Nurse/Midwife	66.0	25	475	**5,697**
Allied Health Professional	46.0	17	328	**3,935**
Overall weighted average	**62.0**	**44**	**845**	**10,143**

Successful utilisation and scale of integrated data, digital therapeutics and AI across the NHS will transform the way people engage with their health

	Universal data	Targets
Enable better engaged patient and population	• A digital first approach to population and patient engagement with NHS will bring the NHS to standard enjoyed in consumer, retail, banking, etc. • Improved engagement in first contact, booking, routine follow-up etc. leveraging universal patient/clinical messaging, and validated AI bots and agents. • More engaged population creates more targeted prevention/intervention	• 95% registration in NHS App1 • >50% of interactions with primary care to be through NHS App[2]
Enable triage and resolution with digital	• Improved accuracy and specificity of digital biomarkers • Wider availability and use of digital therapeutics enabling a greater scope of services that are covered digitally given enhance clinical evidence • Specification of digital follow up as a validated referral route • Elimination of routine appointments that no value in this context	• 50% resolution of outpatients via digital[2] • 90% of patients with chronic conditions supported with software-based interventions[3] • 90% of Trusts to offer leading-edge AI-driven therapeutics[4]
Shift in intervention point	• Routine use of **integrated holistic data** (all NHS data plus wearable) will allow use of risk prediction to identify prevention/early intervention in named individuals • **Earlier intervention in long-term conditions**, cancer, dementia etc. • **Integration of non-clinical data to support behavioural change** with nudges in line with evidence	• 90-98% accuracy of predictive algorithms[5] • 20-40% reduction in HCRU[5] • At least 20% increase in stage I and II cancer detection[6]
Enhanced workforce productivity	• **Pervasive integrated data** including from digital used with GenAI across providers & systems • **GenAI** enabling more efficient knowledge workers **(30 min per knowledge worker per day)** • **Ambient NLP** used to capture clinical interactions, improving accuracy, coverage productivity • Improving patient triage & optimising staff time through automation & machine learning. Reducing DNAs and last-minute cancellations through understanding patient engagement and developing personalised reminder schedules for patients	• 75% of workforce using AI to augment process[8] • Up to 1/3 of clinical time saved by ambient NLP • 100% of discharge summaries to be drafted by AI integrated into EHRs[10] • Labour productivity increases of 0.5-3.4% p.a.[11]
Optimised spend	• **Using data and digital and Gen AI to understand and optimise resource** use including staffing deployment, use of expensive assets (theatres, diagnostics, rooms, beds), procurement • **Advanced predictive analytics** to forecast demand patterns across services, enabling dynamic resource allocation and reduced waste in staffing, equipment, and consumables	• 10% reduction in staffing costs through optimised scheduling and resource allocation[12]

Call to action

To enable this vision to be realised there are three foundational principles and three enablers that can be leveraged to deliver technological innovation in the UK

Foundation principles

Integrated data and digital transformation	• Improved data integration and interoperability, part of this will be mandated standardisation formats for healthcare data allowing seamless integration • Create a process to anonymise patient data for research and AI development • Clear patient consent mechanism should be in place to ensure transparency about how the data is used
Digital applications	• Drive the adoption of NHS App as a totemic front door to NHS • Develop real-world evidence infrastructure that captures outcomes from digital therapeutics • Create consent management frameworks that facilitate appropriate data sharing while maintaining patient control
AI integration and virtual care expansion	• Better clinical data standardisation across NHS trusts, to allow the creation of datasets that can be used to train AI models • As part of this patient identifiers that maintain anonymity whilst allowing tracking of outcomes across care settings • Integrate data from wearables and home monitoring devices into wider NHS datasets

Enablers

Regulatory and policy framework	• Align AI frameworks with growth objectives with adaptable frameworks that address the differing characteristics of varying AI technologies • Maintain security and privacy, human oversight of AI systems is for ensuring safeguarding, efficacy and ethical standards
Commissioning and procurement	• Value-based procurement models must be developed with data infrastructure that tracks long-term outcomes of technologies and interventions, not just accounting for initial costs • Standardised outcomes frameworks that capture consistent metrics across providers, enabling AI-powered comparative analyses
AI integration and virtual care expansion	• Medical training should incorporate AI and training into education, including practical use and limitations, additionally continuous professional development programmes should be created for the current workforce • Providers should designate “AI champions” responsible for driving adoption within their system, to ensure smooth transition of new technologies into daily operations

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About CF

CF is a leading consultancy dedicated to making an enduring impact on health and healthcare. We work with leaders and frontline teams to improve health, transform healthcare, embed life science innovation and boost growth through investment. With unmatched access to UK healthcare data and award-winning data science expertise, our team are a driving force for delivering positive and meaningful change.

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