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Preparing the NHS for the AI Era: Why Smarter Triage and Navigation Mean Better Health Care

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Executive Summary

Queueing is a fact of life in the NHS. But while nobody likes queuing at the best of times, it's particularly vexing when that time is wasted. Sadly, a good proportion of those waiting for NHS treatment are almost certainly in the wrong queue – only to be redirected when they get to the front and having to start the process all over again, like a gratuitous game of snakes and ladders.

Not only is this incredibly inconvenient and inefficient, but it is also potentially dangerous: long waits cost lives. In 2024, the Royal College of Emergency Medicine estimated that about 300 deaths per week were associated with long waits in A&E departments; other patients risk being batted between low-acuity settings when their problems are more serious.

The systems in place to shepherd patients safely to the right service first time are not working as well as they could. Mixed messages leave patients confused: public-health campaigns urge people to consult Pharmacy First alongside risk-averse 111 algorithms encouraging people to see their GP or go to A&E. The 8 o'clock scramble for an urgent GP appointment persists in many practices, while ambulances are routinely sent out to patients whose problems aren't critical enough to warrant one.

One of the biggest problems is how differently GPs, 111 and 999 approach the same problem. Each of these services uses a variety of tools across various entry points, providing incompatible and inconsistent assessments; this causes duplication, delays, increased workload for staff and poor patient experiences. They rely heavily on untrained receptionists and call handlers to assess patients, and where decision aids are used they are often inflexible, impersonal and difficult to change.

A lack of access to patient records in some settings means advice cannot be personalised. In addition, the range of services that patients can be directed to is often incomplete, with wider services such as community care and digital health-management tools not considered. And, of course, they all

struggle with demand. Some GP practices are so overwhelmed at times that they turn off their triaging functions and set them to divert, illustrating why these systems are difficult to scale: they are far too labour intensive.

None of these options is particularly empowering and none of them inspire much confidence or trust; indeed, patients are right to be sceptical. It is estimated that about one in six GP appointments are not needed while up to 40 per cent of patients in A&E could have been seen in primary care. It's no wonder that people often resort to the highest resource setting with the lowest barrier to entry: A&E. Patients might not know where to go when they're unwell – up to three-quarters do not know the appropriate level of care for their need but nor are they convinced that 111 does, so they default to a service they trust.

It does not have to be like this. Other health systems are streets ahead in terms of intelligent navigation: the use of artificial intelligence to support patients with decision-making around how to manage their health and where to go when they are unwell. Companies such as Ada, Abi Health, Healthily, Rapid Health, Infermedica, Klinik, Mediktor and Visiba are improving outcomes for patients by reducing unnecessary and inefficient care pathways across the world, and in various parts of the NHS.

Given the current state of affairs, the Tony Blair Institute for Global Change proposes that the government should commit to the development of an AI Navigation Assistant for every citizen. This would ensure a high-quality, integrated and consistent approach to triage and navigation across the whole of the UK.

Not only would an AI Navigation Assistant support people in accessing existing health services, but it would also put the infrastructure in place for them to navigate to future ones. A proliferation of consumer-facing apps, digital therapeutics and online services are emerging to help people manage their own health, such as Sleepio for insomnia, Flok for physiotherapy and DERM for skin diagnoses. It is perfectly possible to see how – for simple pathways at least – an AI Navigation Assistant could be the

first step on an entirely digital pathway of care, with citizens able to self-diagnose, self-refer, self-treat and self-discharge without ever coming into contact with a clinician.

If the UK gets this right, the benefits to patients and the service itself could be huge. TBI analysis shows that implementing AI across navigation services could free up 29 million GP appointments each year. It could also lead to productivity gains worth £340 million a year for non-clinical workers via GP and NHS 111 services; this is about one-fifth of the cost of NHS 111.

From our discussions with industry experts, the cost of procuring these AI capabilities is likely to be fairly low in comparison; estimates ranged from £10 million to £100 million to implement across the UK: not insignificant, but significantly less than the savings to be made from the projected productivity improvements. Intelligent navigation should be a priority for a government that wants to reduce waiting times and manage demand appropriately across NHS services, rather than simply propping up an outdated system with more staff.

TBI has the following recommendations to implement this new model of intelligent navigation in the NHS:

1. **Commit to an AI Navigation Assistant for every citizen**, automating the end-to-end navigation process and augmenting clinical decision-making via traditional navigation entry points.
2. **Establish a procurement plan** that balances impact with feasibility, by empowering regions to procure the AI Navigation Assistant and pilot it in integrated-care-system (ICS) areas.
3. **Create the right environment for innovation** by tasking the national government with priming the market for safe and effective deployment, facilitating infrastructure transformation, incentivising key actors and spreading best practice.
4. **Introduce an AI Navigation Task Force** to drive rapid reform, while leaving foundational changes – such as the introduction of the digital health record – to the Department of Health and Social Care.
5. **Put the right funding model in place**, considering innovative approaches such as an outcomes-based model or the sharing of intellectual property.

Navigating patients is a complex mix of citizen engagement and operational and decision-making flows; all must be improved to get to a navigation service that works. While an AI Navigation Assistant cannot replace the expertise and skill of clinicians, its implementation can help navigate patients in a safer, faster and more efficient way. This will enable clinicians to spend more time with patients and offer insights for system improvement. The tackling of unnecessary and inefficient care pathways would see waiting lists reduced and patient trust improved; expanding access to self-referral and digital health tools would help reimagine the model of care.

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The Case for Rethinking Navigation

Most people seeking care go down traditional navigation routes: 111, 999 and their GP. Indeed, demand for these services shows no signs of slowing: NHS 111 calls, for example, almost doubled between 2014 and 2022, rising from 12 to 22 million per year.[1,2]

However, these antiquated navigation services contribute towards problem pathways. Only half of 111 callers in London follow the advice they are given[3] and more than one in ten in England attend A&E even when they are advised to go to primary care or try self-care.[4] Recent polling by TBI showed that almost one in five users of 111 services had little or no confidence that it would get them to the right place.[5]

Unnecessary appointments result from these traditional entry points becoming bottlenecks rather than enabling care. One in six patients are given an unnecessary GP appointment when they actually require other kinds of support,[6] which delays access to services and narrows options for care. NHS data in 2023 showed that almost one in five patients attended at least four GP appointments before getting a referral.[7]

Many patients are bounced inefficiently between settings, which leads to poorer health outcomes.[8] Almost 40 per cent of people attending A&E could have been seen in primary care,[9] but many try shortcuts to perceived "gold standard" care rather than what they need, which puts more pressure on an overburdened workforce and contributes to growing waiting lists. Eighty per cent of patients who failed to get a GP referral end up going through alternative routes such as A&E.[10]

As a result of these problem pathways, there are longer queues and greater workloads for staff across the NHS. Between 2012 and 2023, patients who found it easy to get a GP appointment fell from 81 to 50 per cent.[11] In 2024, only 58 per cent of patients in A&E were seen within four hours.[12]

The public debate around hiring more doctors and nurses to meet growing demand focuses on the wrong issue, as the need for more clinical staff will be reduced if navigation is improved. In addition, the average health-care practitioner in the UK can take a costly eight years to train,[13] by which time the issue could have been solved more quickly and cheaply.

Instead, the focus should be on ensuring that patients get to the right place first time. This includes the digital pathways to care that are expanding access to services, supporting patients in managing their own health and reducing pressure on the traditional routes. There are an increasing number of them: DERM[14] automates access to cancer diagnostics; Flok Health[15] provides end-to-end support for musculoskeletal issues; and Sleepio[16] improves people's mental-health and wellbeing, for example.

Effective navigation of patients can prevent health complications and reduce deterioration in their condition, as well as increasing capacity and saving money.[17] In a recent survey by the Tony Blair Institute for Global Change, 60 per cent of people supported the idea of being able to choose where they were referred to for treatment.[18] Underpinning access to these transformed models of care should be advice on where patients need to go based on the nature and severity of their condition, given that up to three-quarters of patients do not know the appropriate level of care they need.[19] [20],

What Is Wrong With NHS Navigation Services?

The access points to navigation services in England can be separated into unassisted routes (through NHS 111 online) and assisted routes (via GP or 111/999 on the phone). Phone routes usually start with access to a call handler. Urgent care decisions via NHS 111 and 999 are usually made via NHS Pathways, a decision-tree model designed in 2005 that helps call handlers and clinicians to understand the caller's condition and the most appropriate care destination.

For a 999 call, a decision about whether it is an emergency can be made using the Advanced Medical Priority Dispatch System (AMPDS) and NHS Pathways. The former is a series of structured questions that was originally

designed in the 1970s[21] – a decade before the creation of the world wide web. Some general practices offer online consultation tools that allow patients to request clinical and administrative support and advice,[22] but many still use a traditional receptionist approach.

FIGURE 1

First contact with navigation services is through a variety of entry points

	General practice (online/phone/in person)	111 (phone)	999 (phone)	111 online
Primary contact	Receptionist, GP, nurse, advanced practitioner	Trained call handler, clinician	Trained call handler, clinician/specialist	Unassisted
Location	GP practice	Integrated Urgent Care (IUC) centre	Central emergency call centre, redirected to locally based central control room	N/A
Decision-making support tools	Practice guidelines, online consultation tools	NHS Pathways	Advanced Medical Priority Dispatch System (AMPDS) and NHS Pathways	NHS Pathways

Source: TBI

At the core of the issue is a navigation model that is of variable quality, inconsistent and fragmented. Here we examine some of the key problems.

GENERIC ADVICE, LABOUR-INTENSIVE PROCESSES AND A LACK OF RESPONSIVENESS

The quality of navigation services hinges on the ability to ask the right questions, process cases quickly and make rapid decisions. Yet citizens must go through laborious processes to have their information collected, which increases the time it takes to get to the right place. The advice provided, especially by call handlers or receptionists is often generic and risk-averse, as a result of the limited information being collected and the way these data are analysed. Where decision-tree support models are used, in

NHS 111 and 999, they are applied to all patients as they enter the system regardless of risk factors, background and/or their anxiety levels. This can lead to imperfect determinations of where to send them next.

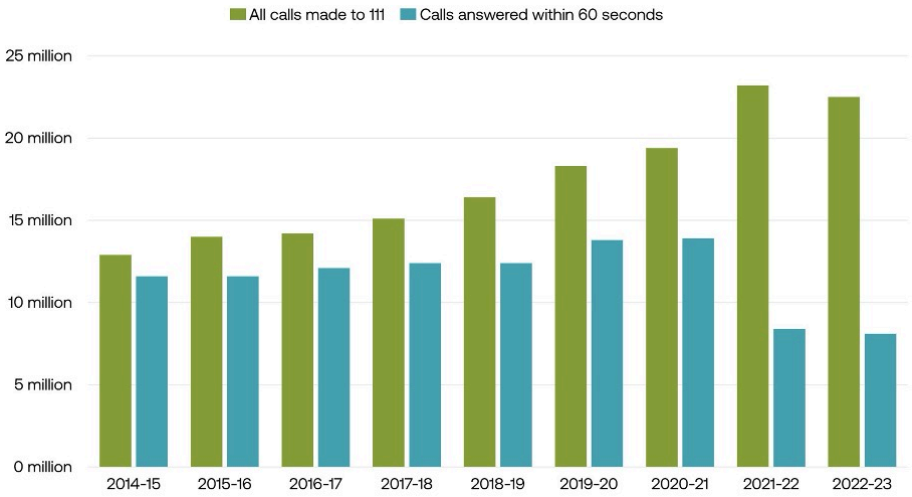
While most people access these services with one presenting complaint, the decisions that call handlers, receptionists and clinicians make are complicated by the increasing complexity of patients' medical histories[23] and the broadening landscape of care options. This requires intelligent navigation, which includes understanding the patient's prior risk stratification based on medical and/or travel history, their symptoms and signs, and their intent when accessing the service. Instead, most people are impersonally navigated to a service by people with no clinical experience. For instance, NHS 111 (via NHS Pathways) collects little information, sends patients down diagnostic routes early and misses significant history, including comorbidities.[24] As a result, many end up in services they don't need, including emergency services.[25,26]

Many navigation processes are also labour-intensive, which leads to backlogs and errors.[27] To meet growing demand,[28] more staff have been employed to support navigation services, including call handlers. This process is time-consuming and costly. In addition, the turnover of emergency-call takers and NHS 111 health-care advisors can be as high as 80 per cent per year.[29]

As a result of labour-intensive processes, the average waiting time for the NHS 111 service is more than three minutes, if callers are still on the line by that point: more than 200,000 calls are abandoned each month when people lose patience with having to wait for more than 30 seconds.[30] Many people struggle to get through to their GP on the phone during rush hour.[31] This leaves services unprepared for a crisis: for instance, during the Covid-19 pandemic, only half the calls made to NHS 111 were answered.[32] Patients who find it difficult to access navigation services often repeat calls or try other entry points in the system, such as the A&E department.

FIGURE 2

The proportion of NHS 111 calls answered within 60 seconds has decreased since 2021



Source: National Audit Office[33]

Untrained call handlers and receptionists can make errors – such as understanding whether a patient requires a clinical assessment – because of the pressure to make decisions quickly with limited tools. For calls to NHS 999, ambulances are automatically sent within a certain period of time. While there are limited data on this problem, A&E admission statistics show that 38 per cent of patients sent by ambulance were not admitted to hospital.[34]

Finally, the current navigation system is also reactive and difficult to change. A dedicated team tweaks the algorithm in the NHS Pathways decision-tree model, which takes time and can "break" other linked connections. Some GPs analyse demand data from online consultation tools to inform workforce management, but this practice is limited by their capacity to analyse the data, make decisions and act on them.

INCONSISTENT APPROACHES TO NAVIGATING PATIENTS

There are two systems operating in parallel: market-based procurement of navigation approaches for GPs, and a state-backed model of urgent care via NHS 111 and 999. This duality results in multiple tools and processes that navigate patients at different times of the day, resulting in incompatible and opaque assessments. This has severe consequences for patients and staff.

Patients are bounced around the system with limited tracking of their past encounters. Many face navigation dead ends if, for instance, online consultation forms are taken offline by GPs outside working hours (which some do to prevent a backlog of patient requests at the start of the next day).[35] Multiple approaches confuse patients and contribute to care-seeking behaviour by repeating engagement with different entry points.[36]

Different processes also result in a patient's experience being significantly influenced by the entry point they choose, including the investigations they have.

There can also be friction within and between navigation services, increasing workload. One study highlighted that the introduction of NHS 111 online had little impact on the number of calls, triaged and otherwise, to the 111 telephone service.[37] In addition, evidence from TBI's conversations with stakeholders highlights that decisions made by a navigation service, such as 111, are challenged by clinicians in the care setting, meaning patients are reassessed.

Inconsistent approaches also lead to low visibility of the data in the system. Currently a "black-box" system of tools, especially in primary care, prevents decision-makers at the system level from understanding what happens to patients: how many contact the advised destination or reappear in other parts of the system, for example. Data at the entry points to the navigation services can help inform patient interventions, the redesign of care pathways and wider system improvement.

FRAGMENTED DATA

Navigation processes are limited by fragmented patient and setting data, as well as siloed institutions. This creates little incentive to manage demand adequately.

Patient data are siloed across the NHS. This includes medical history, which can be used to segment the population and inform where patients are sent. Data on destinations, via the Directory of Services (DoS), are limited to a narrow number of often statutory services, limiting patient access to the right care.

In addition, organisational fragmentation across navigation services embeds incentives that prioritise the organisation rather than the patient. For instance, 999 and 111 services are commissioned differently. Anecdotally, this can encourage the shifting of pressure between the two services (pushing patients who are hard to deal with to 999 services from 111, for example).[38] Among other things, this fragmentation lowers patient trust in the process.

03

How Can AI Improve the Navigation Process?

A different approach to navigation is possible. In the private sector and some areas of the public sector, companies are already using technologies such as artificial intelligence to help reduce unnecessary and inefficient patient pathways. All of the examples below operate in pockets of innovation in the UK; many are better established in other countries.

- **Abi Global Health** uses a mix of natural language processing (NLP), machine learning and allocation algorithms to match patients to the right service. Rather than a default choice of face-to-face consultations, which are often unnecessary, Abi's technology integrates with existing user interfaces, such as SMS or native applications, and connects patients to an appropriate health-care professional, whether specialist or generalist, within 25 seconds. According to one study, 77 per cent of Abi-enabled consultations avoided an in person visit.[39]
- **Ada** enables patients to query their symptoms and uses probabilistic AI to suggest next steps. Results in the US have seen 40 per cent of patients directed to lower-acuity care and 47 per cent navigated away from same-day care, potentially reducing pressure on stretched emergency services.[40] One study found that integrating Ada's AI symptom checker with South Africa's MomConnect platform led to one-third of mothers changing their initial health-seeking plans and a 140 per cent increase in appropriate care-seeking.[41]
- **Healthily** uses patient free-text responses with a probability-based model to determine appropriate follow-up questions; the patient is then given the relevant best next steps. This has given rise to 98 per cent of care-setting recommendations being clinically appropriate. Healthily has recently completed a trial with a UK insurer that has resulted in 25 per cent fewer bookings for GPs and a 50 per cent shift to more appropriate service allocation.[42]
- **Infermedica** assesses patient symptoms by using a probability-based AI tool to understand the level of urgency and the type of care required. The tool is used by Healthdirect, Australia's national health-advice service. In

one study, 53 per cent of callers were redirected to lower-acuity settings.[43] Using this tool in one evaluation led to a one-third reduction in emergency-department recommendations to callers with flu symptoms.[44]

- **Klinik Healthcare Solutions** provides an AI-enabled solution to automate end-to-end GP engagement. The tool asks questions based on the patient's symptoms then directs them to the appropriate service, including self-care. One study in York found that integrating Klinik's technology with the workflow of a primary-care network (PCN) led to a 20 per cent reduction in tasks for reception staff, pharmacists and clinicians. Phone calls went from 99 to 30 per cent of all contact, resulting in £300,000 of capacity being released in the first year.[45]
- **Mediktor** is a health-care AI company based in Spain that uses NLP, machine learning and Bayesian networks to assess patients' symptoms and guide them to the best next step based on the urgency inferred from those symptoms. This has led to a 54 per cent reduction in doctor visits[46] and a 40 per cent decrease in non-urgent emergency-room visits.[47]
- **Rapid Health** tool Smart Triage is used by NHS GP practices to provide autonomous AI triage and patient navigation, improving access and efficiency. One study found that 91 per cent of appointments were allocated without staff intervention, patient waiting times fell from 11 to three days[48] and repeat appointments dropped by 70 per cent. Urgent same-day requests fell from 62 to 19 per cent[49] and peak-hour calls reduced by 47 per cent, enhancing patient access while reducing pressure on GPs.
- **Visiba** uses voice-recognition software to route patients in urgent care to automated triaging; they then receive an online link to enter symptoms. A probability-based AI tool, Red Robin, then assesses their condition and its acuity, which is shared with a clinician so that they can make the final decision. According to one study, Visiba had 38 per cent more cases resolved with no onward referral when compared with traditional approaches.[50] In another study, 55 per cent of cases using the tool were consulted and closed, compared to 25 per cent without it.[51]

AI can also help to reduce inconsistency by performing tasks at any time of day,[52] never getting tired and not creating bottlenecks in demand. It can also reduce fragmentation by streamlining the care options available to patients and helping to "clean" and transfer patient data. The upshot would be improved patient safety, reducing waiting lists across the health system and the burden on the workforce. In order to better understand AI's impact, it is helpful to break down the navigation process into its constituent parts.

- **Collect information**, including name, date of birth, comorbidities, relevant medical history and symptoms.
- **Filter requests** to separate admin from clinical tasks; red flag emergencies.
- **Assess health condition** and detect possible causes.
- **Prioritise for treatment**, guided by an understanding of condition severity.
- **Identify care service and outline recommended next steps safely**, including self-care advice.
- **Allocate resources**, including patient referral and self-referral, appointment booking, communication with the next stage of care and patient follow-ups.
- **Improving the health system**, using demand data to redesign care pathways, understand capacity requirements and conduct proactive population health management.

AI's utility as part of the navigation process is summarised below and expanded upon in the rest of the chapter. Many of the outlined tasks involve citizen engagement, as well as operational or decision-making flows. All can be automated using current AI technologies to improve access, quality and speed within the NHS system, as well as reducing the cost of navigation.

FIGURE 3

The management of tasks within the navigation process can be automated and improved by AI

Task	Current approach	AI type	Example AI capabilities	Example AI applications
Collect information	Receptionist, call handler (sometimes via online consultation forms)	Natural language processing (NLP), audio-to-text AI, computer vision, generative AI	• Extract and summarise free-text data • Translate patient speech to text • Analyse images	• Automatic data entry from patient responses • Real-time transcription of symptoms description • Multimodal analysis of photos and/or voice recordings
Filter requests	Receptionist, call handler (via NHS pathways in 111 or sometimes via online consultation forms in primary care)	NLP, robotic process automation (RPA), recommendation systems	• Identify administrative versus clinical needs • Route requests to appropriate services • Flag emergencies	• Automatically assign administrative requests to other settings such as pharmacies, and clinical issues to practitioners • Highlight urgent cases for immediate review
Assessment of health condition	Call handler/clinician (with NHS Pathways in 111)	Bayesian AI, statistical AI, time-series analysis systems	• Generate differential diagnoses • Identify patterns in historical and real-time health data	• Provide probabilistic condition suggestions
Prioritise for treatment	Call handler/clinician (with NHS Pathways in 111)	Predictive AI, sentiment analysis	• Assess acuity and urgency • Stratify patients based on severity	• Segment patients into risk groups • Automatically prioritise high-acuity cases for urgent care
Identify care service and outline recommended next steps	Call handler/clinician (with NHS Pathways and the Directory of Services in 111)	Recommendation systems, natural language understanding (NLU), text-to-text generative AI	• Provide self-care advice for low-risk conditions • Identify the correct route for the patient	• Suggest virtual care apps for self-management of low-risk conditions • Route patients to appropriate health-care providers
Allocate resources	Call handler/clinician	RPA, AI scheduling tools, generative AI	• Distribute workload among staff • Send messages • Write into electronic health records (EHRs) • Schedule check-in calls	• Allocate appointments • Direct patients to specialists or other health-care providers based on availability • Follow up with patients who are in self-care
Improving the health system	NHSE team via data analysis and manual feedback	Federated learning models, data analytics tools, machine learning for population health	• Identify patterns in symptoms, conditions and outcomes • Continuous optimisation of AI models	• Predict disease outbreaks using symptom data • Monitor and adjust triage pathways in response to real-world trends • Behaviour change

Source: TBI[53]

Collecting Information

On first contact with the navigation service, citizens are asked a series of questions about their identity, condition, acuity and intent. These data ensure that accurate and safe decisions can be made and that the patient is provided with the right advice, and/or directed to the most appropriate care.

However, in practice the NHS 111 Pathways model often asks questions unrelated to a patient's condition, which can take time and effort, frustrate patients and lead to undifferentiated advice. Many patients find themselves having to repeat information (including basic demographic data) from previous encounters when they take part in a GP consultation, for instance. Translation is another barrier to access for patients whose first language is not English.[54] And relying on labour-intensive approaches, via a receptionist or call handler, limits the data that can be collected and analysed in a short space of time.

AI can streamline this process by pre-filling information from linked records; it can also identify and request missing data from patients without staff involvement, ensuring better continuity of care and preventing delays.[55] Instead of a fixed set of questions, AI chatbots can dynamically adjust follow-up questions based on previous responses, making data collection more precise.

Speech-to-text translation capabilities improve access to and engagement with services, especially for non-English-speaking populations, and reduce time spent filling in information. AI also enables quick and accurate analysis of large amounts of data such as free text, which provides more opportunities for people to describe their conditions, rather than using pre-selected answers; this saves receptionists and call handlers significant amounts of time. Generative-AI tools can quickly analyse multi-modal inputs (such as images and voice), alongside powerful translation capabilities – although this data will need to be checked by humans.[56] [57] All of this can improve patient trust in the navigation service.

Filtering Requests

Once patient information has been collected, requests are filtered between administrative cases (such as a doctor's note or prescription, or checking on a test) and clinical cases. Flags can be raised at this stage if there is concerning information.

Filtering these requests adds labour-intensive steps, whether carried out by a clinician or administrative staff. Yet even basic online consultation tools allow patients to pre-select whether the request is administrative or clinical.

AI can automate this process. NLP (including more advanced large language models) highlights the keywords of a request and robotic process automation automatically directs them to the right place without human involvement. The NHS has trialled a mental-health bot that uses NLP to understand if there is suicidal ideation or emotion, in which case the request would need immediate service referral.[58]

Assessing Health Conditions

When a clinical need is identified, the best processes offer reassurance and quick, accurate advice, including an assessment of probable conditions and health factors that could influence where patients need to be seen. That said, in helping patients to get to the right place, identifying the specific condition (triaging the patient) matters significantly less than understanding where they need to go.

As it stands, initial decisions on probable conditions are made in three ways.

1. Self-direction, through online self-checkers such as NHS 111 online. These tools have been criticised for inaccurate symptom-checking because they only factor in linear sequences of questions along a decision-tree model.[59]

2. The judgement of non-clinicians aided by decision-tree models (an approach used for the NHS 111 telephone service) leads to a high prevalence of inaccurate triaging. These non-clinicians treat everyone equally at the start and fail to factor in a wide range of patient information to make a determination.
3. Clinicians (sometimes senior clinicians) make decisions in some models of navigation in general practice and for half of patients who ring 111, and can improve the accuracy of condition assessment. However, there is a risk, given time constraints, that information is disregarded, especially if free text is used.

AI can provide a more accurate, more consistent, safer and quicker assessment of conditions for the purpose of navigating to the right place at the right time. It can parse complex data feeds, including age, risk profile and the most recent medical literature, to determine likely conditions.

Both narrow-AI models[60] (using Bayesian statistics and pattern recognition) and generative-AI examples have shown accuracy of condition assessment that is comparable to or better than human doctors alone.[61] AI models can be pre-trained on common and rare cases that clinicians may encounter.

Transparency and explainability are important to ensure safe care. Most tools that use Bayesian networks, such as Visiba's Red Robin tool, provide reasoning for a decision and probability of accuracy. Many provide quicker determinations of condition. One UK trial showed that gastroenterology triage decisions could be reduced from five minutes per patient to a matter of seconds by using AI.[62]

Prioritising Patients

At the same time that a patient's condition is being assessed, its urgency and severity should be identified too. This impacts demand management because it allows more serious cases to be seen first, leading to a more efficient allocation of resources.

In general practice, this often involves receptionists who lack clinical judgement, resulting in ineffective prioritisation. One study showed that 73 per cent of booked same-day GP appointments could have been seen another time.[63]

With NHS 111 or 999, getting to an emergency or urgent-care response is lengthy because call handlers must first rule out life-threatening conditions by asking a structured set of questions via the AMPDS (for 999) and NHS Pathways (for 111 and 999). AI can segment patients into complex and high-impact cases that should be prioritised for clinical decision, and simple and low-impact cases that could be dealt with in a number of ways, including self-care.

One study that used a GPT-based model to determine the severity of a condition found that the GPT tool was slightly more accurate with its diagnosis than physicians alone.[64] The ability to ingest data from a range of sources encompasses a wider scope of data, such as social data (areas of deprivation, for example). As above, transparency and explainability about these decisions are important.

The John Hopkins Adjusted Clinical Group System developed a model of stratification for patients – Patient Need Groups – by segmenting them into five strands: healthy users, stable chronic, complex/unstable chronic, frail elderly and end-of life.[65] This segmentation approach could provide a framework to underpin the use of AI tools to understand the unique needs of different patient groups, tailoring recommendations and assistance to ensure patients receive the right level of care.

Critically, there is emerging evidence that AI can be used to assess whether a case is an emergency. For example, in one real-world study, when the Klinik tool was used in emergency settings, it did not miss any urgent cases.[66] In another study, Ada's tool achieved similar results to that of telephone and nurse triage for accuracy of emergency-department determinations.[67] And Australia's Healthdirect incorporates emergency determinations into its AI-powered decision-support tool.[68] This is promising, but more extensive research is needed.

Identifying Care Services and Recommending Next Steps

Understanding a patient's likely condition and its urgency is crucial when navigating patients to the right setting. There are numerous care options – including online consultation, face-to-face, self-care, primary care and appointments across community services – in addition to digital-health apps that can provide virtual support.

Broadly, there are two types of navigation information needed to get patients to the right destination. Central entry points, such as 111, need macro-level information, including location and opening times of the care setting they are sending patients to. However, they also need micro-level information to decide on the appropriate care. For instance, in general practice, there are up to 50 different professionals who can provide care, including those who offer their services through the Additional Roles Reimbursement Scheme.[69] It can also take some time to embed new guidance about where to send patients: for instance, how to incorporate new protocols around the recently introduced Pharmacy First scheme,[70] which allows patients with specific conditions to go directly to a pharmacy before consulting a GP.

The DoS database is at the centre of navigation decisions and is integrated into the 111 and 999 services via the NHS Pathways tool. It provides information on location and opening times, as well as some real-time capacity.

However, there is little evaluation of how the DoS is used or its effectiveness in navigating patients. From our stakeholder conversations, the DoS has several shortcomings: data can often be out of date; most data entries need to be manually updated; and the responsibility to update the DoS is left to regional NHS teams (and pharmacies through a self-service tool), with a specific lead responsible for updating information, which is an error-prone and time-consuming approach.

DoS data are also limited in scope and detail. For instance, about one in five patients who visit their GP requires non-medical services,[71] yet information on non-statutory services such as debt support and community services is lacking.[72] The DoS also has scant information on the burgeoning digital-health marketplace, which can provide self-care support, for example via Sleepio, which has been proven to improve sleep and wellbeing.[73] And while the DoS focuses on opening hours, it has a limited view of real-time capacity. In general practice, the complex array of services is not included in the DoS, which means patients often take a shortcut to a GP appointment.

In general practice, receptionists (and, in some cases, clinicians) make decisions on care destinations. The complexity of the available services, combined with labour-intensive processes and often-patchy patient-information collection, means that most patients are simply routed to a GP appointment.

AI can support the accuracy and granularity of the DoS and amplify its use in care recommendations. It can also automatically update databases and absorb more information to identify the best setting. As care navigation is a behavioural judgement as much as a clinical one, data such as patient preferences, intent and proximity to care setting are important to factor in at the beginning to reduce the risk of having to reconsult.[74] AI can absorb new guidance and update algorithms instantly.

Several studies have proven the accuracy of AI tools in directing patients to the next stage of care or to remotely close cases. For instance, Ada's care advice[75] has been shown to be safe in 97 per cent of interactions, Healthily has a safety rate for care recommendations of 98 per cent[76] and in a live NHS deployment, Visiba[77] had a near 96 per cent clinical agreement with the non-urgent classification of cases.

Patient trust in the recommendation can also be improved by using AI. As explored in our paper *Governing in the Age of AI: A New Model to Transform the State*, if the identified option is self-care, AI can streamline access to information, accurately selecting the most relevant sources from extensive literature. Recent generative-AI tools, such as GPT-4o, can converse easily with patients in multiple formats, and there is some evidence to show it is

perceived as “virtuous” and “trustworthy” because of its ability to mirror human language.[78] Better visibility of the system through real-time data allows for more informed conversations with patients.

Real-world evidence from Healthdirect in Australia, which uses Infermedica’s AI tool, highlights that 94 per cent of users followed its recommendations (with feedback from nurses).[79] This compares to around half of patients who use NHS 111 in London.[80]

Allocating Resources

Once a destination is identified, the information flows between the navigation service and next stage of care are vital. There is also growing recognition of the need to follow up with patients to check in or provide further advice.

Currently, significant time is spent typing up triage and navigation notes, whether in the patient record (which can be inaccessible for the clinician in a different setting) or in referral letters to the next stage of care. And once the patient has a disposition – self-care, for instance – there are limited ways in which to follow up with patients to check if they have followed advice or require additional support. Some research has shown that the accuracy of coding for acute conditions (important for informing follow-on care) can be as low as 50 per cent.[81]

AI can accurately summarise notes from conversations, identify key information for clinicians to use in consultations and auto-suggest responses to patients for editing and sending, at a fraction of the time that it would take clinicians alone. If full integration with the health record is achieved, these can be immediately uploaded to the patient’s notes whether the patient is entering urgent or emergency care. These AI-created notes are more likely to be “more readable and understandable” than human-generated notes because of the ability of AI to converse in simple language.[82] This could help to improve patient confidence in the navigation process and the advice being given.

AI can provide additional services that are not in the current labour-intensive model – follow-up calls for patients, for instance. A tool by Ufonia has automated post-operative clinical follow-ups, reducing the need for nurses to call back by 60 per cent.[83],[84] Hippocratic AI has developed an AI-powered virtual nurse to assist with non-diagnostic health-care tasks, such as patient education and additional support.[85]

Improving the Health System

Data on system demand, whether aggregated, segmented or individualised, could be used to continually update the navigation process, and to assist and improve other health-system functions. These data (including symptoms, preferences, diagnoses, referrals and notes) could be used to provide:

- **Proactive population health management:** Data on the true prevalence of disease or illness and symptom patterns across the country could enable better responses to emerging pandemics and population health management.
- **Navigation-service improvement:** Data on recommended actions could be matched with data on outcomes in patient records for evaluation purposes (the accuracy and safety of navigation services, as well as their impact on unnecessary and inefficient pathways) or to modify care pathways.
- **Workforce management:** Data on the prevalence of conditions and true demand at the entry points to the system could inform decision-makers regarding persistent issues with the supply of care in local areas (and inform neighbourhood-team plans), as well as encouraging better management of resources.
- **Research:** Access to demand data could also be made available for research.

Many of the data that could be used for system change are currently fragmented across multiple navigation processes. Data from NHS 111 are matched with admissions data in secondary care (where patients end up) to provide a partial analysis of the effectiveness of NHS 111, but not with admissions data in primary care.

The use of these data in decision-making requires manual intervention and is reactive. For instance, currently a team within NHS England (with approved by the National Clinical Governance Group and specialist committees for the relevant condition) tweaks algorithms in NHS 111 Pathways.[86]The process takes time and is temperamental: making a tweak can break different branches of the decision tree.

With AI implemented consistently across the system, data could be used to create a responsive learning system, with short and consistent feedback loops to improve the navigation process. Analysis of data collected across the country could provide actionable insights for system leaders and practitioners.

FIGURE 4

The use of AI will significantly improve the speed and quality of navigation services

The Size of the Prize

The introduction of AI can reduce the effort, friction and cost of engagement for patients and clinicians, while improving the quality of decision-making. In doing so it can reduce unnecessary and inefficient pathways, providing patients with quicker, cheaper access to the right care and reducing the burden on the workforce.

To quantify the benefits to patients, the workforce and the system, TBI has used a mixed methodology. This includes an analysis of the potential impact of AI on the tasks involved in the process (using TBI's internal database that assesses the effect of AI on 20,000 workplace tasks. It also includes real-world evidence of the impact of AI navigation systems.[87] Given the limited data available, our figures are conservative estimates of the potential benefit.

Our analysis found that AI could improve system performance in the following ways.

- **Enhancing patients' experience:** Greater integration of AI into patient navigation would improve patients' experience, primarily by reducing the time it takes to secure the right care and ensuring clinicians have enough time to see patients properly.
- **Increasing productivity at entry points:** The navigation tasks outlined earlier are conducted by a range of staff, including non-clinical staff. TBI estimates that using AI to automate or partially automate the navigation tasks of these two groups of staff could deliver a productivity boost worth up to £340 million per year, or 28 million hours of work time saved. This is equivalent to 22 per cent of the cost of NHS 111 (£1,551 million).[88] The estimated time savings are expected to be worth up to 41 per cent of working time for 111 call handlers and 30 per cent for GP receptionists.[89,90]
- **Reducing unnecessary pathways:** Currently just over 43 per cent of GP appointments are booked for urgent same-day review.[91] According to one study, just under 13 per cent of these cases could have been managed through self-care.[92] Improved navigation systems could better identify cases where self-care is a viable option. Preliminary results from

an AI-powered smart-triage trial in 111 call centres by Visiba support this potential: it found that call centres using smart systems directed 18 per cent fewer patients to primary care compared to traditional triage methods.[93] Additionally, 30 per cent more callers had their cases resolved over the phone or were guided towards self-care at home.

- **Reducing inefficient pathways:** Improving navigation at the GP or NHS 111 level could alleviate pressure on emergency services by reducing inefficient pathways to care. In 2023, 1.9 per cent of GP-registered patients aged 16 or over reported visiting A&E due to a lack of a GP appointment.[94] Results from Rapid Health's real-world trial of an AI navigation system in GP practices found that it enabled GPs to increase the time they spent with each patient by 50 per cent and allowed them to offer 8 per cent more appointments overall, without requiring additional staffing.[95] If surgeries nationally achieved similar increases, this could result in up to 29 million additional primary-care appointments every year in England alone.[96]
- **Delivering wider system benefits:** In addition to this conservative evaluation of the direct impact of the implementation of AI-based navigation systems at the entry points to the health service, there are likely to be substantially larger system-level effects, including reduced treatment costs for conditions identified at earlier stages, decreased workplace absences due to more efficient treatment and enhanced economic productivity resulting from a healthier workforce. These fall outside the scope of this analysis.
- **Providing value for money:** The cost of procuring these AI-based navigation systems is expected to be low compared to the benefits they could deliver. Exact costs will vary depending on the design of the systems and the structure of the contracting process.[97] Estimates drawn from industry partners suggest that procurement of AI capabilities would range from £7 million per year for an "off-the-shelf" subscription to £100 million annually for tailored, locally contracted services. (Additional upfront costs would likely include software customisation where necessary, system integration to ensure interoperability and ongoing updates.) Even in our conservative assessment, the productivity benefits outlined earlier would be more than three times greater than the annual costs of procuring the technology.

04

Recommendations

As shown earlier in this report, AI could reduce unnecessary and inefficient care pathways by making the navigation of patients faster, better and cheaper; it could get patients to the right place at the right time at a low cost. Given the potential size of the prize and the cost of doing nothing, inaction is not an option. The government must work with pace and purpose to harness the power of AI to navigate patients. A new, radical model of navigation, enabled and improved by AI, is needed.

Commit to an AI Navigation Assistant for Every Citizen

The Department of Health and Social Care (DHSC) should commit to the creation of an AI Navigation Assistant for every citizen in the UK. While there will be different implementation considerations between the devolved administrations, the benefits should be shared across the four nations.

What is the AI Navigation Assistant?

- The AI Navigation Assistant would collect relevant information from the patient, link this with existing patient data from their records, filter cases and determine where the patient needs to go; this would be based on an assessment of their health condition, the urgency of care required and

the suitability of the full range of care options available. It would be able to respond rapidly to clinical and patients' feedback and adjust its model to provide better interactions in the future.

- Given the potential to use AI across the entire navigation process, the AI Navigation Assistant could be used to augment clinical decision-making in services and automate access to navigation services for patients.
- The technology underpinning the AI Navigation Assistant could be provided by one or multiple companies (depending on the procurement plan), but the AI Navigation Assistant itself should be one tool used at all entry points into the health system within a given area. It should support clinicians, call handlers and receptionists in NHS 111, 999 and general practice to make navigation decisions.
- The AI Navigation Assistant could be accessed by telephone (using natural-language-processing technology), online or through the NHS App. All options could be implemented in a safe way and should be discussed in the implementation phase.

There are five principles that should underpin this model; they will improve the quality and speed of navigation, as well as minimising the fragmentation and inconsistency that exacerbate unnecessary and inefficient pathways. Each of these principles has important policy implications that will need to be considered when implementing the new model.

1. TRANSFORM THE END-TO-END NAVIGATION PROCESS

The entire navigation process – from information collection to system improvement – can be enhanced with the use of AI. Current digital triage processes – most of the online consultation tools used in primary care, for example – use technology (usually not AI) to improve information collection

and filtering. This is just the starting point in terms of potential improvements to productivity and the system itself, and still requires clinicians to spend significant time navigating rather than supporting patients.

If technology were to be only partially adopted as part of the navigation process it would lessen the trade-off between the time required to make decisions and the quality of those decisions, but this would still lead to backlogs and errors. On the other hand, the use of AI across the entire navigation process would augment and improve clinical decision-making, freeing up capacity within the navigation system. Using AI to augment call handlers and GP receptionists alone would result in productivity benefits of £340 million.

It would also enable fully automated routes through navigation services that patients could access independently, before they engage with the traditional entry points. This would allow patients to take control of their care journey and bypass bottlenecks in the system. This approach would align with the trend towards direct access to care using digital self-referral, community services or pharmacy-based pathways. The automated route would need to be implemented with caution to build both patient and clinical trust.

SPOTLIGHT

Key Factors in Implementing an Autonomous Navigation Service

- **Earned autonomy:** The earned-autonomy approach outlined in our paper *Governing in the Age of AI: A New Model to Transform the State* should be used to implement the tool, allowing it to be tested and improved before rollout. This involves the AI tool gradually earning increased autonomy – going from shadowing a worker to becoming a helper in decision-making and then serving as a co-worker – using continuous feedback loops.
- **Constant feedback:** Once the AI tool has gained full autonomy, feedback mechanisms using a clinician-near-the-loop approach can be introduced to review a sample of the decisions the tool has made, alongside patient feedback.
- **Regulatory approval:** The automated AI tool should be regulated as a Class IIa medical device, evaluated by the National Institute for Health and Care Excellence, and tested against NHS Pathways to confirm improvements in function and safety. Full automation of the tool will require Class III medical-device regulation and can follow the example of DERM, a tool that can now be used in the NHS to autonomously detect skin cancer.[98]
- **Patient empowerment:** Once the tool is operational, patients must be empowered to choose between two routes: AI automated or human augmented. If a patient decides to go down the AI-automated route, they must be able to transfer to a human at any stage of the process.

Using AI throughout the process would also enable more dynamic navigation. For instance, patients could change how they describe their symptoms part way through the process, or reopen navigation cases if their symptoms deteriorate. Rather than the patient having to start the process again, which is required when call handlers use decision-tree models, the AI tool could respond with an immediate decision. In the future, incorporating a varied set of collected and real-time data (via wearables, for instance) could help to inform these dynamic decisions.

SPOTLIGHT

Envisioning an AI-Automated Navigation Journey in 2030

- Patients log in via the NHS App and are geolocated, then prompted to prove their identity and access their records.
- Patients are asked a series of questions and can opt for free-text responses and speech inputs. Basic information is pre-filled from data in patients' records. Preferences for care are collected and saved, including information on patients' preferences for appointment format, location and who would treat them.
- Collected data and the patient's medical history are analysed by an AI model to assess the level of care needed, and to provide the patient with information on the possible health conditions they might be suffering from based on this assessment of stored and collected data.
- Sentiment analysis and NLP are used to understand the "intent" of requests. For instance, if someone has suicidal ideation, this can inform destinations.[99]
- Patients are segmented based on risk. Low-risk cases (where self-care is indicated, for instance) mean those patients receive advice or are asked to book an appointment online. Flags are raised for complex cases (such as when a patient has exacerbating comorbidities) and patients are sent to a clinician with a summary of the interaction and other relevant information.
- Patients are advised on the most appropriate care pathways based on a granular understanding of service availability provided by the AI tool (such as location, opening hours, equipment and real-time capacity). This could also lead to further diagnostics, such as the provision of home-testing kits.[100,101]

- Automated follow-up calls are scheduled with patients, especially those who were recommended self-care. These calls ascertain the patient's satisfaction with the service.
- At every stage patients can transfer their case to a human clinician.
- Summary information is automatically included in patients' records and can be accessed at the next stage of care. Patients and clinicians should be able to edit the collected information on symptoms and signs at any point, which would provide an updated recommendation.
- Data collected about the true demand at each entry point in the system are used to manage that demand more effectively and redesign care pathways, including proactive population health management in local areas.

2. OFFER A CONSISTENT, PERSONALISED JOURNEY

There should be only one AI Navigation Assistant within a geographic area. As highlighted earlier in this report, there are different tools and approaches used by urgent and emergency services (111 and 999) and primary care. This means that service providers engage patients differently, have different processes, make different decisions on similar information and rarely share data in a standardised way. Although some progress has been made on improving consistency, such as the "total-triage" model used in general practice, it is not coordinated across all entry points.[102],[103] The consequences for patients are limited care options or being bounced around the system and re-triaged at the next stage of care.

Today, patients of varying levels of need use all entry points; for instance, only 10 per cent of patients going through 999 have life-threatening conditions.[104] And AI capabilities are being safely used at all levels of

medical need, including emergencies[105] – although more research is needed. It therefore makes little sense to have different processes across 999, 111 and general practice. Some evidence suggests that having a consistent navigation process to support patients across an area could reduce health inequalities.[106]

Using one AI navigation tool within a given area would mean replacing NHS Pathways in 111 and layering over digital tools in general practice with a single AI Navigation Assistant. It would also mean integrating the AI Navigation Assistant into emergency services, replacing the AMPDS and NHS Pathways. This can be done over time and in a modular way. For instance, starting with low-risk AI applications such as transcription and summarisation can reduce the time it takes for serious cases to get to a clinician and determinations to be made. As further research is conducted on the safety and efficacy of the AI Navigation Assistant in terms of prioritising cases and deciding on the appropriate care advice, it can be rolled out more widely within the emergency service.

Implementing the AI tool across urgent and emergency functions could deliver better data visibility across the entire system. It would also prompt further system changes; for instance, there may not be a need for separate clinical assessment service teams in 111 and 999.

3. SEND PATIENTS TO THE RIGHT HEALTH-CARE PROFESSIONAL AT THE RIGHT TIME

Patients should be able to access the right health-care professional immediately or book for a future date, depending on their preference. Currently, the first option is limited by the complexity of patients' information and the availability of care settings being accounted for by navigation processes; the second option is limited by system fragmentation. GPs provide NHS 111 with a predetermined number of slots to book appointments, limiting the system's ability to accommodate demand. Some GPs who have control over their booking systems have chosen not to offer any appointment slots through the 111 service. The booking function of the DoS (via NHS Pathways) is not available for patients using 111 online or in general practice, harming trust in the system.[107]

AI is the only tool that can understand the complexity of patients' information and the wide variety of available care services to provide an accurate recommendation for either approach.

First, AI-based allocation engines could allow navigation systems to adopt a dynamic approach to matching supply with demand, including using real-time information on waiting times and capacity. Currently, due to navigation approaches that are of poor quality, fragmented and inconsistent, most destinations require the joining of another queue, often with little understanding of waiting times. For instance, the most common 111 outcome is to "contact" primary-care services.[108] Without a quick response from primary care, many patients reappear in ambulance, 111 and A&E services.[109]

The AI Navigation Assistant should take inspiration from Uber's model, in which people no longer book a taxi way ahead of time but instead request one minutes before needing one. Indeed, among disadvantaged patients in one integrated-care-system (ICS) region, short timelines to assessment and treatment were preferred over continuity of care.[110]

This approach would require better data on real-time capacity in the NHS and on more non-statutory, localised services. Examples would include those offered by local authorities (such as public-health programmes), the voluntary sector and/or new digital therapeutics such as Sleepio.[111] It would also require better information on patients, which can be achieved through the creation of a digital health record (see more on this in our paper *Preparing the NHS for the AI Era: A Digital Health Record for Every Citizen*).

Second, using AI should open more possibilities for patients to book an appointment. This could be particularly relevant for patients with complex conditions who prefer continuity of care over convenience. Indeed, TBI polling in December 2024 showed that 60 per cent of UK citizens would support being able to choose which GP or hospital they are referred to for treatment.[112]

The NHS Long Term Plan outlined the intention to allow patients to book a GP or Urgent Treatment Centre appointment via NHS 111 (through the DoS).[113] In addition, a Booking and Referral Standard is in development that would underpin the interoperability of booking and referral information between settings, enabling a booking function across the NHS.[114]

4. DESIGN A MODEL BASED ON DATA AND INSIGHTS

At every stage, the AI Navigation Assistant must be evaluated to show real-world impact, both in terms of outputs (operational and financial) and outcomes (quality, experience, equity and safety). Currently there is a lack of comprehensive data on patient outcomes for NHS Pathways (for instance, what happens to patients if they are recommended to go to primary care).

The evaluation of AI capabilities should be benchmarked against the systems that currently exist, which may require an understanding of the baseline, given limited evidence on the effectiveness of the current navigation systems. Evidence of outcomes will require better data integrations between organisations within the NHS.

5. CREATE AN OPEN-SOURCE SYSTEM

The AI Navigation Assistant would perform one function: identifying where patients need to go within the health-care system. But it needs to be future-proofed to prevent it from becoming isolated from emerging capabilities.

A range of tools and services enabled by AI that can perform new tasks previously unthinkable within the current labour-intensive navigation model are emerging. Companies such as Hippocratic AI[115] have automated non-clinical follow-ups for patients, which can be used to check on the patient's condition, understand if advice is being followed or request feedback on the service, boosting patients' safety and satisfaction. Companies such as Skin Analytics, with its DERM tool, are enabling access to fully automated diagnostic assessments. These tools could form a critical ecosystem to keep patients healthy while improving access to, and quality of, services.

Through intelligent design – including open application programming interfaces (APIs) – the AI Navigation Assistant should connect to these other tools. Using technology to connect these products can enable an ecosystem of tools that are able to communicate with each other and also underpin future technological developments, including emerging agentic-AI capabilities.

Establish a Procurement Plan

The government must act with pace and purpose to ensure that the model we have set out is implemented. The first consideration is whether to build or procure the AI capabilities that underpin the model. Given the need to implement it rapidly, the limited capabilities in government and the developed market for products in the private sector, it makes sense to procure rather than build the AI Navigation Assistant.

The second consideration – and a live debate – concerns whether the tool should be procured at a national, regional or local level. There will be a trade-off between impact ("Does it maximise quality while minimising inconsistency and fragmentation?") and feasibility ("Is it implementable?"). Using this matrix can help in establishing the right option.

Currently, there are two approaches for navigation services: a state-backed system for urgent care in NHS 111/999 and a market-driven system for primary care. As highlighted earlier, this has led to inconsistent and fragmented navigation services, exacerbating unnecessary and inefficient pathways. The market-driven approach in primary care is also costly and deters business engagement, as vendors must sell their products to thousands of customers. As a result of these barriers, only between 10 and 15 per cent of GP practices use modern access tools, including new triage approaches.[116]

Some areas have overcome these issues. For instance, Folkestone, Hythe and Rural PCN has brought together local GPs in an eHub[117] to offer a consistent navigation approach, the sharing of resources and the facilitation of private-sector engagement. However, these innovations are not widespread.

There are several procurement alternatives, all of which would reduce inconsistency and fragmentation. First, the Department of Health and Social Care could procure one vendor to provide AI navigation for the UK. There are compelling reasons to do this: it is quicker to procure one vendor and customise the product to each location. In addition, contestability of the contract – through performance-based renewal conditions or "challenge windows" for alternative vendors – alongside outcome-based payments can drive quality improvements. Modular procurement (sourcing different AI capabilities for each of the tasks outlined earlier) could be used to provide competition between vendors.

However, many system actors have struggled to implement top-down mandates,[118] including independent contractors such as GPs. In addition, given that AI capabilities are evolving rapidly, using a single provider may stifle continuous improvement by encouraging other vendors to leave the UK market altogether, increasing the cost of changing vendors.

Alternatively, procurement could be centred on ICSs. Integrated Care Boards (ICBs), which oversee ICS areas, are set to gain more control under recent government reforms.[119] ICBs already commission NHS 111 and out-of-hours services, update the DoS and, through the introduction of System Control Centres,[120] have visibility over real-time operational pressures and system risks. Some ICBs, such as NHS Cambridgeshire & Peterborough, have already put the consolidation of their navigation functions out to tender.[121]

Regional approaches to procurement could also work if the ICSs are willing and able to work together. Emergency services (NHS 999) are commissioned at a regional level, as are some urgent-care services – which would theoretically mean less fragmentation between urgent and emergency services. For instance, the London Ambulance Service commissions NHS 111 services.[122]

Both ICSs and regions are also large enough to make vendor engagement worthwhile, and numerous enough (42 and seven, respectively) to ensure vendor competition. However, any procurement of tools at this level risks fragmentation and inconsistency between systems – especially at an ICS level. For instance, if a patient living close to the border of one ICS engages with their local AI Navigation Assistant, they could find that they cannot access care settings in the neighbouring ICS area. A strong national-government role could resolve this by ensuring consistency across key infrastructure, such as the DoS, through clear national standards and expectations.

In addition, many ICSs have capability issues that limit their ability to procure well, which could be exacerbated by recent budget cuts[123] and will slow down implementation. And procuring through each area would cost more than procuring once, although the exact figures are not known. Again, a strong response from the centre of government, supporting procurement processes and ensuring price stability, would be critical to mitigate these downsides.

It is likely therefore that a regional approach – with a strong supporting role for the national government – would be the most impactful and feasible way to procure the AI Navigation Assistant. Each region can customise the tool to their own needs and specifications, and convene key actors. The piloting could be implemented at the ICS level and would involve:

1. Convening GPs, PCNs and other relevant bodies within an area to implement the AI Navigation Assistant.
2. Managing workforce changes (including shifts in clinical workflows) to make time for treating rather than triaging patients, and for training on using AI tools.
3. Supporting GPs in consolidating care pathways for destinations within individual general practices, and incorporating these practice-level pathways into the DoS.

Create the Right Environment for Innovation

While regions will play a key role in procuring and implementing the AI Navigation Assistant, some tasks need to be done only once – making them best suited for national-government implementation, given its scope and capabilities. For instance, the tool will require integration with national data infrastructure.

The national government should play the role of "ecosystem orchestrator", with the aim of facilitating procurement and rollout, maximising the functionality of the AI Navigation Assistant, and ensuring a working market for tools by making it easy to swap out one vendor for another if and when it becomes advantageous to do so. In other words, it should help to standardise and curate the environment to drive fast-paced innovation and scale AI capabilities.

There are four key functions to this role.

1. PRIME THE MARKET FOR SAFE AND EFFECTIVE DEPLOYMENT

Allowing each region to procure AI Navigation Assistants without guidance or support would lead to duplication of effort and additional cost. In addition, low reimbursement rates for companies developing tools from generic procurement frameworks – such as Digital First Online Consultation and Video Consultation[124] – allow static tools to compete with AI vendors for business on cost grounds rather than quality or impact. This means many AI vendors avoid the NHS and products remain in basic form, such as inbox curators.

To spur the development of AI tools and to support regional procurement, a specific framework for deploying AI navigation should be established. This would mean different regions' procurement plans would be signalled to the market by setting out service expectations (including those related to the expected tasks the AI Navigation Assistant should complete), minimum data standards, integration requirements with data systems, and cyber- and

information-governance protocols. All providers wishing to sell their products to regions would have to integrate their product with the NHS App to ensure that wherever patients are, they experience a consistent service.

There should also be nationally guaranteed pricing for AI navigation, which would be paid by the regions when procuring the tool (potential funding models are discussed later in this paper). This would be based on estimates of the long-term return on investment and include mechanisms to provide top-up payments to incentivise future investment.

Creating a specific framework for deploying AI navigation, with associated quality and pricing standards, could both spur the development of standalone products and enable existing online-consultation tools to upgrade their platforms with an AI layer. The latter approach would be beneficial given the volume of data collected by these tools, which could be used to train new AI models. (For instance, eConsult, which has recently announced a partnership with AI company Huma, has conducted more than 50 million consultations via the platform.)[125]

In addition, a strategy to change patients' behaviour is required at a national and local level for two reasons. First, to reassure people around the use of AI in the process, driving engagement with the tool and, second, to address how people engage with the AI Navigation Assistant. As highlighted earlier, patients may not adhere to advice and recommendations when engaging with existing services. AI is capable of understanding and adapting to the patient's intent to drive positive action, so designing services that are underpinned by AI to maximise positive behaviour change is critical to success.

Providing clear information on minimum quality and price expectations would make it easier for commissioners to take better, quicker procurement decisions, overcome risk aversion and prevent duplication of effort. Price negotiation at a national level incentivises providers to compete on quality (a "race to the top"), while top-ups provide incentives for vendors to improve the product offer.

2. FACILITATE INFRASTRUCTURE TRANSFORMATION

The adoption of the AI Navigation Assistant would require the retirement of NHS Pathways as a decision-support tool, although the data that NHS 111 holds on consultations could be used to train and fine-tune models.

There are also three key infrastructure blocks that need to be resolved in order to support the AI Navigation Assistant.

1. While good-quality personal data from existing databases are essential for conducting a variety of tasks,[126] many of these data do not flow to where they need to be, as highlighted in TBI's papers *A Digital Health Record for Every Citizen* and *A New Tool to Map Untapped Health Data*. Vendors' access to data systems takes a long time, data sharing across the NHS is limited and a lot of data are inaccessible.
2. Data in the DoS are often out of date, narrow and lack depth of information. In addition, care-pathway protocols vary between areas, which means navigation advice (such as when to send someone to a pharmacy, to optometry or to A&E) could differ across the country. All of this affects the quality of navigation decisions.
3. There is not an easy-to-access platform to collect relevant details from patients and provide a consistent approach to navigation.

On access to patient data, the priority should be to enable the integration of approved providers with the NHS Spine (a service that joins up data from more than 44,000 health-care IT systems in 26,000 organisations), which would give these providers access to a patient's demographic and prescription information. This would support the use of data to pre-fill patients' information, raise flags or inform acuity scores. In the medium term, two-way (read-write) integrations with the Electronic Patient Record and GP record should be enabled so that data on outcomes for the patient can be analysed and referrals made directly into records. These changes may require amendments to data-ownership laws, which TBI has previously proposed in *A Digital Health Record for Every Citizen*.

In the long-term, a digital health record (a single source of truth on the patient) should be created to inform a holistic assessment of a patient's prior risk. Data gaps identified while implementing the AI Navigation Assistant (such as wearable or social-care data) could feed into this larger project.

On data related to care settings, the DoS should move from a manual-entry model to an automated-entry model, incorporating live operational data on capacity from the Federated Data Platform (FDP) and patient-flow technologies in which the NHS is currently investing.[127],[128] AI tools that can identify gaps or errors in the DoS should be rapidly developed. The DoS should also be expanded to incorporate the healthtech marketplace (as long as these tools are properly regulated) and local services such as nursing and social care. Each DoS should have open APIs that allow different navigation assistants to use them if, for instance, patients are on the border between two areas.

The rules related to care pathways should be standardised nationally to inform decisions around next steps, in conjunction with the Academy of Medical Royal Colleges. These should focus on broad parameters (for instance, the specific clinical domain the patient is in, the conditions associated with that domain and the associated treatment), with local areas customising the destination via the DoS.

As the main host platform for AI assistants, the NHS App must be built out to accommodate the ecosystem – including geolocation capabilities and integration with individual health data via a digital health record.

Staged integration with data infrastructure will ensure AI capabilities are gradually upgraded over time, supporting better decision-making and more personalised, efficient care pathways. The decisions made by the AI models will be underpinned by the updated national care pathways and DoS, ensuring that navigation advice is consistent and evidence-based, reducing regional variation and improving the reliability of the navigation process. A revamped NHS App will also ensure consistency of service.

3. INCENTIVISE KEY ACTORS

Because there is no mandate to implement the AI Navigation Assistant, incentives need to drive adoption. Yet current incentives can limit the adoption of AI, especially in primary care. GPs are worried about indemnity[129] for wrong decisions. Many ICSs and GPs lack the resources required for workflow or organisational changes that may result from the adoption of the AI Navigation Assistant. In addition, the functioning of navigation systems is hampered by payment mechanisms such as block contracts[130] that incentivise sending hard-to-deal-with patients elsewhere or booking appointments for patients who may not need a full consultation. Rebalancing these incentives towards the system and patient, and away from the provider, is essential to promoting change.

To combat concern around clinical risk, accountability for AI decisions should be clarified in guidance at a national level, with the NHS working with the Information Commissioner's Office (which is responsible for data protection) and relevant bodies including the Academy of Medical Royal Colleges. Clear liability agreements and risk-sharing mechanisms must be established; some AI companies have their own indemnity for recommendations made.

To overcome unexpected transformation costs – for instance, around training or capacity redeployment – a time-limited fund should be introduced. Funding should be linked to performance metrics to ensure accountability and track return on investment. Piloting the tool rapidly and iteratively would make these costs more transparent.

GPs can also be incentivised to adopt these tools using changes to financial incentives, such as the Commissioning for Quality and Innovation scheme (a payment framework used in the NHS to encourage health-care providers to improve the quality of care). Wholesale changes to the funding model are another option, including gainshare agreements that distribute money for the value of measured outcomes, such as reduced admissions to hospital from primary care.

Modifications to the GP contract may also help to incentivise action. From October 2025, the new GP contract will require GPs to keep their online-consultation tool open for the duration of core hours.[131] This could be enhanced by changing the requirements to "always keeping the navigation tool online", which would make AI tools – which can manage demand 24/7 – the default approach and improve consistency of access. Equally, real-world evidence has shown that GPs, once exposed to the benefits of AI tools such as Rapid Health, keep the tool on 24/7.[132]

The changes we have set out would accelerate the adoption of the AI Navigation Assistant, with incentives aligning stakeholders' interests with the needs of the system and ensuring early momentum. Improved governance would build trust in the system, while shared financial risk would promote broader engagement and ensure sustained adoption.

4. SPREAD BEST PRACTICE

Although evidence shows that AI can positively transform the navigation of patients, there has been little evidence on the effectiveness of these tools within the NHS system to date, which can increase risk aversion. In addition, previous large-scale projects have collapsed because of a lack of meaningful engagement with the public.[133] About three-quarters of NHS staff have little experience with AI,[134] yet direct contact with AI triage has been associated with higher preference for it.

To ensure accountability, drive adoption and combat concerns around a lack of evidence, a test-and-learn approach should be adopted to rapidly assess outcomes and adapt practice, including testing the AI Navigation Assistant in parallel with NHS Pathways.

During implementation, continuous feedback loops with clinicians and patients should help to improve the underlying model, by allowing vendors to tweak the referral criteria or rules in the triage algorithm. Written guidance should be created to highlight best practice and overcome common obstacles, such as on modified workflows, and train staff to use the tools well. A network of system leaders to share expertise and insight could also be created.

Alongside this constant improvement, a study with clear success metrics should be conducted to demonstrate the impact of the tool on patients, the workforce and the health system – and this should be in terms of outputs (reductions in unnecessary and inefficient pathways and the financial impact) and outcomes (quality, experience, equity and safety). This should include research on the use of the AI Navigation Assistant in emergency services, to build this evidence base ahead of rollout within 999.

Given current gaps in output and outcome data, this may require a benchmarking exercise with current navigation tools, such as NHS Pathways. Early data should be shared to correct course and build support. The result of these interventions would be to cascade best practice and drive momentum towards adoption through exposure to these tools and their impact.

Introduce an AI Navigation Task Force

The government should be strategic about the body responsible for supervising the deployment of the AI Navigation Assistant. While foundational changes that are connected to other areas of policy, including the creation of a digital health record or amending the GP contract, should remain with the DHSC, most of the tasks we have set out can be performed independently of the bureaucratic processes and the constraints of large departmental organisations.

In the past, task forces have been used to deliver contained projects with focus and agility, free from the encumbrances of departmental rivalries or vested interests and empowered to foster collaboration, ensuring quicker delivery and better outcomes.

SPOTLIGHT

Learnings From the Vaccine and Elective Recovery Taskforces

- The Vaccine Taskforce played a central role in coordinating the UK's response to the pandemic. Key among its successes was that it had well-defined objectives, was time-limited and had the strong leadership of Dame Kate Bingham. The task force streamlined vaccine development and procurement centrally, and ensured effective communication between government, scientists and industry. By leveraging expertise from multiple sectors, the task force accelerated the rollout of life-saving vaccines.
- The Elective Recovery Taskforce, led by Sir Jim Mackey, was launched in December 2022 to reduce the elective-care backlog. This task force brought together policymakers, health-care providers and industry leaders to identify bottlenecks and implement innovative solutions. In 2023, the task force published its Implementation Plan, which helped to increase the volume of patients receiving treatment.

Source: gov.uk [135], [136]

Like these task forces, implementing the AI Navigation Assistant involves a clear mission, the need to work in a rapid, agile way given the urgency of the situation and a degree of uncertainty (in this case, in relation to AI capabilities). The mission's success also relies on cross-governmental and cross-sectoral collaboration, including the involvement of the private sector, which will play a leading role in the production and development of the tool.

The task force would need a strong chair committed to the task, well-defined and time-limited key performance indicators (for example, 100 per cent of the country covered by 2030), a small, agile back-office team and clear powers to act.

The task force should have a steering board with representatives from DHSC, Genomics England, the Royal College of General Practitioners and industry experts.[137] It should also establish technical teams to perform its role, including integration, evaluation and procurement challenges.

Given its centrality to supporting the key government mission to "build an NHS fit for the future" and preventing this ambition being watered down, it should report directly to the Number 10 Delivery Unit. This accountability mechanism would provide it with the visibility and authority needed to deliver this transformative initiative.

Put the Right Funding Model in Place

The AI Navigation Assistant also needs to be affordable, especially in terms of the initial up-front cost of procurement From our discussions with industry experts, the cost of the AI Navigation Assistant could be in the region of £10 million to £100 million. However, the NHS does not have to pay the full amount: there are two innovative options that it could consider.

First, an outcomes-based payment model could be used for providers. Most AI models can adapt to use cases, starting with easy-to-automate tasks (collecting information) and building up to more difficult ones (identifying care services, which requires an updated DoS). As speed and the quality of decisions are improved, the efficiency gains and patient outcomes can be measured and paid for. In this way, companies share the financial risk and are incentivised to deliver tangible benefits before receiving full compensation.

Second, the NHS could encourage vendors to work with NHS Pathways data (in which there are millions of data points) to fine tune the algorithms in their AI models, improving the accuracy and quality of their service. The NHS

could offer access to this clinical data in return for shared intellectual property of the fine-tuned model, allowing providers to sell these models internationally, with a reduced charge for services provided in England.

05

Conclusion

Patients rarely get to the right place at the right time. They are given appointments they do not need, miss out on new digital pathways to care or are bounced around the health-care system. All of this contributes to a greater workload for staff and growing waiting times for patients.

The AI Navigation Assistant is a new model that can transform how patients are navigated through the NHS, overcoming poor-quality, inconsistent and fragmented processes. It does this by automating existing tasks and improving staff productivity, expanding the scope of performed tasks and carrying out new ones that were previously unthinkable in labour-intensive processes. It can also analyse data for continuous improvement to provide a faster and better service.

Getting patients the right care at the right time should be a priority for a government that wants to reduce the burden on the NHS but avoid raising taxes to pay for increased capacity. As a result the NHS should not, and cannot, wait to transform its model of navigation.

06

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