aws

# Population Health Management on Amazon Web Services

Empowering NHS organisations to deliver data-driven, patient-centered care through scalable, secure, and innovative cloud solutions

## AWS in healthcare

The Amazon Web Services (AWS) healthcare mission is to enable access and delivery of person-centred care in order to improve outcomes and lower costs by accelerating the digitisation and utilisation of healthcare data. Our aim is to help the National Health Service (NHS) and its partners develop cloud strategies to achieve more with less, modernise technology, and digitally transform back office and clinical services.

## Population Health Management in the NHS

Historically, NHS health and care services have been predominantly focused on reacting to patient needs as they arise. Increasingly, the NHS is aiming to get upstream of care – focusing on proactive, preventative care – in order to deliver better outcomes and more efficient care.

Consistent with this aim, population health management (PHM) is a data-driven approach that aims to improve the health outcomes of a defined population by identifying and addressing their specific health risks and needs early. By analysing data from various sources, including electronic health records, social determinants of health, and patient-reported outcomes, healthcare organisations can gain a more comprehensive understanding of the health status and risk factors of their patient population and target care more effectively.

In recent years, the NHS has launched several initiatives to promote population health management, including the "Data Saves Lives" strategy. "Data Saves Lives" outlines the critical role Integrated Care Systems play orchestrating care between NHS organisations, local authorities, social care providers and other stakeholders to improve population health outcomes within a defined geographic area. By breaking down silos and integrating care across different settings, ICSs can better address the complex health and social needs of their populations.
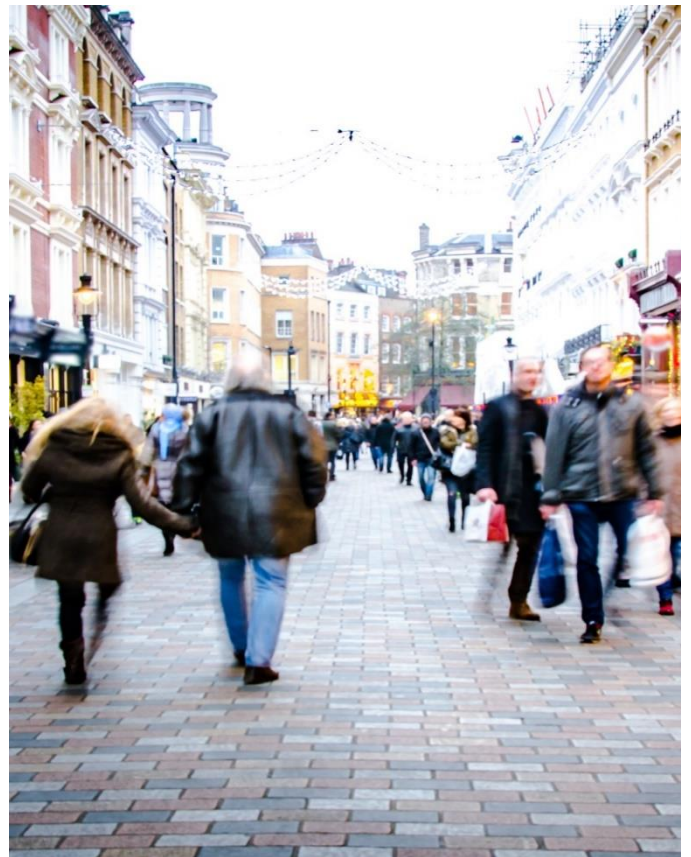
The evolution of data analytic tools and technologies, like Gen AI, make it easier for ICSs to work at a system and local level to translate population health insights into action. Using advanced analytics, ICSs can identify high-risk patient populations, such as those with chronic conditions or multiple comorbidities, and develop targeted interventions to prevent or manage these conditions more effectively. This may include implementing  care management programs, deploying community health workers, or leveraging telehealth solutions to improve access to care. In addition to improving patient outcomes, population health management can also help the NHS achieve greater efficiency and cost savings. By identifying and addressing the root causes of health disparities and inefficiencies in care delivery, ICSs can reduce unnecessary hospital admissions, emergency department visits, and other avoidable healthcare utilisation.

# Advancing Population Health Management in the NHS

Globally, most systems deploying population health management have strategies in pace to address three core PHM components:

1. **Data Interoperability**
2. **Advanced Analytics**
3. **Targeted Interventions**

By focusing on these areas, healthcare organisations can develop a comprehensive, data-driven PHM approach that addresses the complex and diverse needs of their communities.

**Data Interoperability: connecting the dots to create a unified patient view.** The foundation of effective population health management lies in the ability to integrate and analyse data from multiple sources, including clinical, financial, and operational systems, as well as data related to behavioural health and social determinants of health (SDOH). Data interoperability enables integration, allowing healthcare organisations to transform disparate data sets into a unified view of patients within their community. By breaking down data silos and establishing seamless data flows, healthcare organisations can gain a more comprehensive understanding of the factors that influence health outcomes, such as access to care, socioeconomic status, and environmental conditions. This holistic view of patients enables providers to identify high-risk populations, target interventions more effectively, and monitor progress over time.

**Advanced Analytics: translating data to insights, creating proactive learning systems.** With a solid foundation of interoperable data, healthcare organisations can apply advanced analytics tools to extract valuable insights and inform decision-making. Advanced analytics encompasses a range of capabilities, including population segmentation and risk stratification, quality measurement and cost analysis, helping systems use existing data to predict future trends and needs. Population health analytics can be used to identify quality improvement, optimise care delivery processes, and reduce cost drivers. Predictive analytics can also help anticipate future health risks, identify gaps in care and intervene early to prevent or mitigate adverse outcomes.

**Targeted Interventions:  enhancing citizen engagement, prevention, and personalisation.** The ultimate goal of population health management is to improve health outcomes and advance health equity for all members of a community. Targeted interventions focus on the strategies and tools that healthcare organisations use to engage patients, deliver proactive care and target interventions appropriately based on a 360 view of individual needs. Citizen engagement tools, such as patient portals and digital health apps can help individuals become more active participants in their own health and well-being – engaging them how they want, when they want, after well-being. Virtual care solutions, including telehealth and remote monitoring, can expand access to care, support prevention initiatives and enable providers to deliver timely, personalised interventions.

## Case study:
## Healthier Lancashire and South Cumbria Cumbria

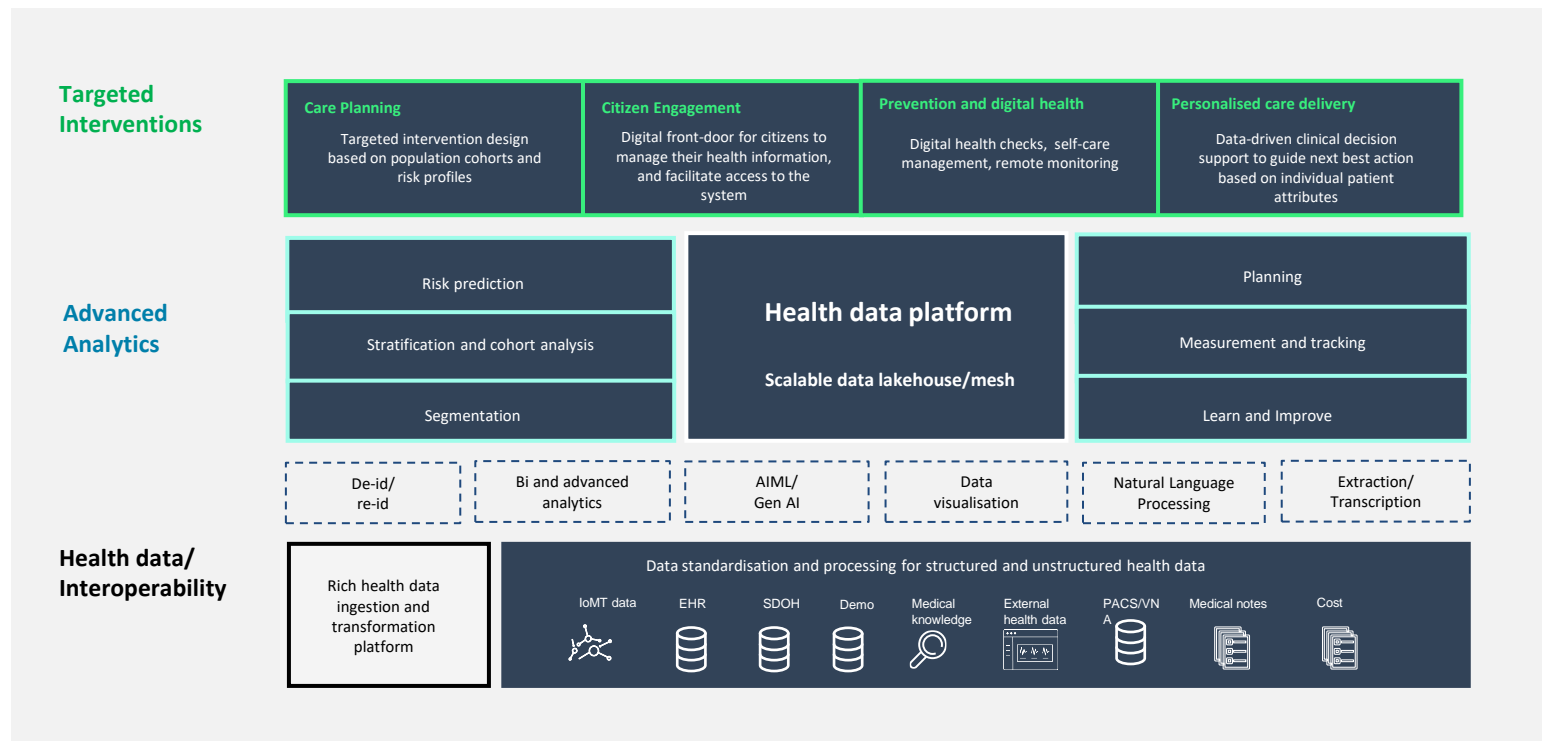**Lancashire and South Cumbria**
**Health and Care Partnership**

Healthier Lancashire and South Cumbria Integrated Care System (ICS) quickly scaled a platform on Amazon Web Services (AWS) to support the 1.8 million people in their region with Nexus Intelligence, an interactive health intelligence application. Nexus Intelligence contains a suite of predictive models for various measures of health needs and outcomes, as well as applications like Outbreak Mapping, Population Health Intelligence, and Virtual Ward Console, which supported the ICS in delivering population health initiatives.

*"You need to adopt technology in digital solutions for the public and the patients, so that they can better manage their health and well-being and to enable them for things they have to do."*

# Building a population health platform on AWS

AWS provides a range of capabilities and services to help customers deliver population health management . These services standardise and process structured and unstructured health data from various sources, enabling advanced analytics and targeted interventions to improve population health outcomes. For data standardisation and processing, AWS provides services like AWS Glue for data extraction, transformation, and loading (ETL), allowing seamless integration of data from IoMT devices, EHRs, SDOH sources, medical knowledge databases, and more. Amazon S3 storage service can serve as a scalable, secure data lake for storing this standardised data.

## Targeted Interventions

| Care Planning | Citizen Engagement | Prevention and digital health | Personalised care delivery |
|---|---|---|---|
| Targeted intervention design based on population cohorts and risk profiles | Digital front-door for citizens to manage their health information, and facilitate access to the system | Digital health checks, self-care management, remote monitoring | Data-driven clinical decision support to guide next best action based on individual patient attributes |

## Advanced Analytics

| | Health data platform | |
|---|---|---|
| Risk prediction | | Planning |
| Stratification and cohort analysis | **Scalable data lakehouse/mesh** | Measurement and tracking |
| Segmentation | | Learn and Improve |

| De-id/ re-id | Bi and advanced analytics | AIML/ Gen AI | Data visualisation | Natural Language Processing | Extraction/ Transcription |
|---|---|---|---|---|---|

## Health data/ Interoperability

Rich health data ingestion and transformation platform

Data standardisation and processing for structured and unstructured health data

IoMT data | EHR | SDOH | Demo | Medical knowledge | External health data | PACS/VN A | Medical notes | Cost

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The health data platform can be built using AWS services such as Amazon Redshift, Athena, and AWS Lake Formation, enabling the creation of a scalable, secure, and cost-effective data mesh architecture. The AWS Marketplace also offers a wide range of third-party solutions that can be easily integrated into the platform, accelerating the development process and reducing time-to-market.

AWS's analytics capabilities, including Amazon SageMaker for machine learning and Amazon QuickSight for data visualisation, support advanced analytics like risk prediction, stratification, cohort analysis, and segmentation. To support citizen and patient engagement, AWS Marketplace provides additional analytics and visualization tools that can be seamlessly integrated, enhancing the platform's capabilities.

aws partner network

Palantir

databricks

salesforce

splunk>

Dedalus

snowflake

# Getting started with population health on AWS

As NHS organisations look to leverage these powerful technologies for population health management, a strategic approach is necessary to ensure effective implementation and positive outcomes. We recommend a four-step discovery process of Learn, Engage, Create, and Productionise.

## Population Heath Management Discovery

**Learn** — AWS will conduct sessions to provide some context around population health, discuss the art of the possible, review AWS and partner offerings, and learn more about your short- and long- term needs

**Engage** — AWS will help by conducting workshops to discuss your use cases, share how others are leveraging population health management and enabling their science teams, and develop an experimentation plan

**Try** — AWS and AWS Partners will conduct a proof of concept to showcase the power and expanse of population Health services on AWS using customer data against a targeted use case and present the results to your key stakeholders

**Productionise** — AWS and AWS Partners will create an Execution Roadmap to facilitate you to develop and deploy your population health use cases in production, including considerations for scale & responsible use

Using this tested approach, NHS organisations can tap into the promise of Population Health in a staged and iterative way, focusing resources on the highest value applications.

# AWS Professional Services for Healthcare

AWS Professional Services can provide invaluable assistance to NHS organisations implementing population health management solutions. With their deep expertise in AWS technologies and healthcare industry knowledge, AWS Professional Services can guide NHS organisations through the process of designing, architecting, and deploying robust population health platforms. From assessing an organisation's current infrastructure and data landscape to recommending the most suitable AWS services and solutions, AWS Professional Services can help NHS organisations navigate the complexities of building a scalable and secure population health platform. They can assist in integrating disparate data sources, implementing advanced analytics and machine learning models, and enabling compliance with healthcare regulations.

AWS Professional Services can provide training and knowledge transfer to NHS staff, enabling them to effectively manage and utilise the population health platform. By partnering with AWS Professional Services, NHS organisations can accelerate their adoption of population health management solutions and drive better health outcomes for their communities.

# Get started

To get started contact your AWS account team  to learn more on how we can:

- Support your Population Health Management Discovery

- Build your AWS Cloud business case

- Identify the best procurement route for your NHS Organisation

- Identify quick wins and opportunities

# AWS resources

- Guidance for NHS Trusts Adopting AWS Cloud Services

- AWS for Health

- Healthcare Solutions

- AWS Marketplace – Population Health

# Get in touch

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