Microsoft

A tech-enabled approach for...

Effective ICS population health management

Applying Microsoft's Five 'I's framework for data-led health and care services.

Become a network of joined-up, data-led services

In July 2022, NHS England created 42 new integrated care systems (ICSs) and set them four strategic priorities – to improve population health and healthcare, tackle unequal outcomes and access, enhance productivity and value for money, and help the NHS to support broader social and economic development.

So, how does a partnership of previously disparate local organisations come together to improve the health of its population? The answer lies in connecting technology, data and people. But how do you do that?

By applying a rigorous five-stage framework to population health management, ICSs can establish a logical, joined-up, data-centric approach and deliver on the promise of better health outcomes for your population.

At Microsoft, we call this framework the Five 'I's approach – and your ICS can discover more about the power of this health methodology across each section of this paper.

Click a section to find out more

INFRASTRUCTURE

Establish the fundamentals for smarter population health

Before any population health management system is conceived and delivered, an ICS needs to establish how it intends to deploy it. This is the **mission statement.** Within the mission statement, details on **governance arrangements** will be required – these should be the starting point for every population health management project.

A mission, for example, might include extending healthy life expectancy of the population, improving adherence to evidence-based guidelines, or reducing health inequalities. **Governance** includes the decision-making arrangements for the population health management systems, **information governance** and **cybersecurity**, technical processes as well as the clinical and ethical oversight arrangements through which the mission will be delivered. It is essential for these arrangements to be in place from the very outset of the plans to introduce a population health management system.

Delivering a population health management system often involves multiple elements – each of which is likely to require data about individuals across a population, linked over time, and across multiple datasets. This linkage is made possible using unique identifiers such as the NHS number and the unique property reference number.

Ideally, a population health management system should draw on multiple datasets, all linked at the individual level, including:

DATA SOURCES FOR POPULATION HEALTH MANAGEMENT

- Hospital utilisation
- GP data
- Costs of data including patient-level costing data
- Imaging data
- Patient-reported outcomes
- Social care data
- Data about the wider determinants of health
- Indices of multiple deprivation data
- Data streaming from patient devices like smartwatches and other wearables

HISTORIC DATA COVERING MULTIPLE YEARS IS REQUIRED FOR MODELLING

All these datasets will need to be connected before they can start delivering rich insights. Typical **systems architecture and data platform** considerations are likely to include ingestion, linking, cleaning, standardisation and security.

Importantly, there will be a need to present both a stable modelling dataset and a "live" dataset for intervention as well as privacy-by-design, and an ability to re-identify previously anonymised data for clinical intervention.

? How Dorset ICS established a data-sharing and best practice service

A fundamental element of the integrated care approach is information sharing. To that end, Dorset ICS established the Dorset Intelligence & Insight Service (DiiS) to help practitioners gain access to secured pseudonymised data on their populations, enabling them to better define, design and monitor health and wellbeing services. The solution means practitioners can gain insights into care and its impact on citizens that weren't available previously. It also enables staff to make informed decisions on where to best focus resources to improve care quality and quality of life for patients.
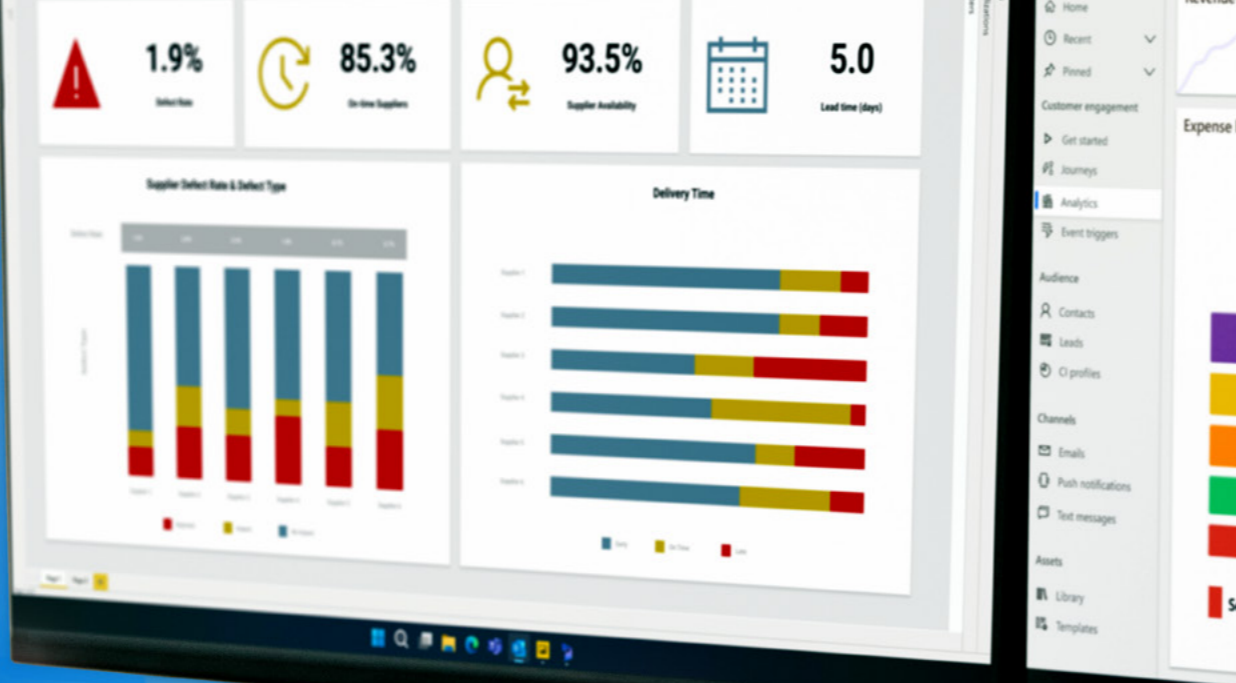
DiiS established a data analysis Centre of Excellence and encourages existing and potential partners to link more and new datasets to provide a more complete view of population health, both at the cohort and total county population level.

Find out about Azure for Healthcare

INSIGHTS

Know where and when to intervene

Once the governance, secure data environment, datasets and infrastructure are in place, an ICS can initiate the analyses needed to understand the needs of its population and the opportunities to achieve better health outcomes by showing where intervention will be most effective.

Similar to a **joint strategic needs assessment**, an **opportunity analysis** will help identify unwarranted health and care variations within and across health systems – and do so in multiple areas, such as infant mortality, care quality, efficiency, and patient experience.

The aim of opportunity analysis is to identify:

Triple Fail events

Low quality, high cost, poor experiences like unplanned admission or unnecessary medical end-of-life care.

Gaps in care

Deviations between the patient care that should be expected and the patient care actually recorded.

Once an opportunity has been identified, **algorithms can be developed** to target interventions that deliver on the goals of your mission. These algorithms may include:

- **Predictive risk models** that assign scores to each person in a population to understand the likelihood of a Triple Fail event in a given time period. For example, the likelihood of readmission in the next two weeks or the risk of a fall in the next six months
- **Impactability models** that predict which preventive care intervention will be most successful for a particular person

- **Identification and prioritisation** of gaps-in-care that may relate to preventive care, investigations, and treatments
- **Business logic rules** to determine which intervention(s) should be offered – and their sequence – when a person is eligible for multiple interventions
- **Workflow models** to optimise the impact of interventions on the health system – such as a new screening uptake programme leading to a surge in demand for diagnostics and treatment

? How Northumbria Healthcare NHS Foundation Trust uses machine learning to inform surgery decision-making
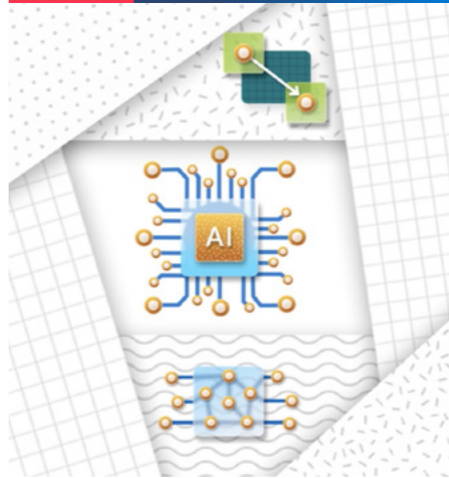
By applying data science and machine learning to historical data on surgical outcomes, the Northumbria Healthcare NHS Foundation Trust produces individualised patient-risk profiles.

Using Azure Machine Learning and the Responsible AI dashboard, the OpenPredictor team helps patients make informed decisions on surgery and places surgical candidates at appropriate facilities based on their unique risk factors.

Find out more about Northumbria's use of Responsible AI

INSPECTION

Determine the likely ROI from planned interventions

With a mission agreed, the infrastructure in place, and data-driven interventions in the offing, an ICS will need to undertake a series of checks before launching the proposed intervention to ensure it's both cost-effective and ethical. Budget spent on predictive care is money not available for spending on ill people, so there is a profound responsibility on ICSs to undertake this step methodically. This is the Inspection stage, and it should include:

Economic analysis to determine the business case for the proposed intervention. This can be calculated using the following four variables: the cost of the Triple Fail event to be prevented, the cost of the proposed preventive care intervention, the positive predictive value (accuracy) of the risk stratification tool, and the efficacy (success rate) of the proposed intervention.

Ethical analysis to ensure the predictive algorithms used by an ICS are unbiased and that proposed interventions adhere to World Health Organisation criteria.

The **Responsible AI toolkit** to ensure any artificial intelligence being used will not perpetuate biases in data.

? How Frimley Health NHS Foundation Trust understands intervention success

The AI Working Group at Frimley Health Foundation Trust established a series of checklists to assess both its proposed AI infrastructure and its value-focused AI implementations. Rather than developing AI tools, work is centred instead on integrating AI within clinical pathways and ensuring the technology represents good value for money.

Much of its work to date has been focused on analysing chest x-rays to exclude lung cancer. Using a value-based healthcare approach, the AI Working Group at Frimley will determine whether the technology has helped save lives, speeded up diagnosis, and worked equally well for people of different ethnicities, ages, as well as across different x-ray equipment.

INTERVENTION

## Deliver for individuals in your population

What sets population health management apart from traditional public health is its ability to directly benefit individuals. Once an ICS has established its infrastructure, gleaned insights, and undertaken the necessary economic and ethical checks, it's time to deliver its programme.

Potential population health interventions to prevent Triple Fail events or gaps in care must be evidence-based. These can range from:

- **High intensity interventions** – such as enriched case management or admission to a predict-and-prevent virtual ward
- **Medium intensity interventions** – like a medication review, hybrid virtual/in-person disease-management and coaching programmes, and peer-support networks
- **Low intensity interventions** – such as text message services, pop-up alerts for clinicians, online disease-management, and digital wellness portals

How South London and Maudsley NHS Foundation Trust manages psychosis population health
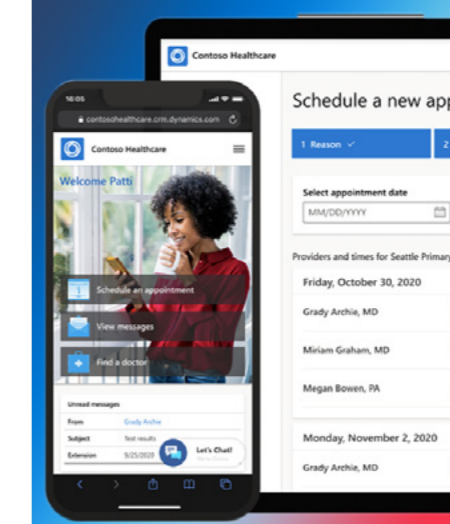
Psychosis is associated with a mortality gap of around 20 years, making care management important. In collaboration with other medical and educational institutions, South London and Maudsley NHS Foundation Trust uses a platform of structured and other data that is analysed using Natural Language Processing to plan services and direct care.

Via a dashboard gathering multiple datasets of all psychosis patients, teams can manage caseloads, conduct tertiary prevention, and plan secondary and primary care interventions by moving from individual patient records through to a view of the entire patient cohort, and by filtering with numerous datapoints on topics such as co-morbidities, location, or dependencies.

Find out about Microsoft Cloud for Healthcare

IMPACT

## Evaluate for efficacy, efficiency and equity

Once a programme is underway, an ongoing evaluation of every intervention is needed to determine success and to ensure there are no unintended consequences. Smart data collection will help automate this evaluation and inform feedback loops designed to improve the accuracy of predictive and impactability models, and the efficacy of the interventions offered.

Key questions to ask of a programme during an impact assessment could include:

- What proportion of Triple Fail events were prevented?
- How many gaps in care were closed?
- What was the benefit to individuals and what were the net savings to the health and social care systems?
- What was the impact on the health inequalities of socially excluded groups like homeless people, people with learning disabilities, and ex-offenders?

? How ICSs can draw on benchmark and assessment examples to understand the impact of their population health programmes
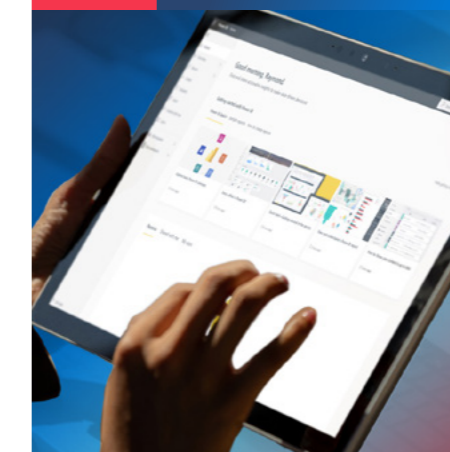
Centene Corporation is a US health solution provider. Working with Microsoft, it wanted to reduce health inequalities and promote equity in its communities.

The Centene Community ATLAS was built with Power BI to visualise demographic, social, and clinical data, and create social and clinical performance benchmarks against which outcome quality could be assessed. The ATLAS provides the foundation to build a community-focused population health ecosystem.

Find out about Power BI

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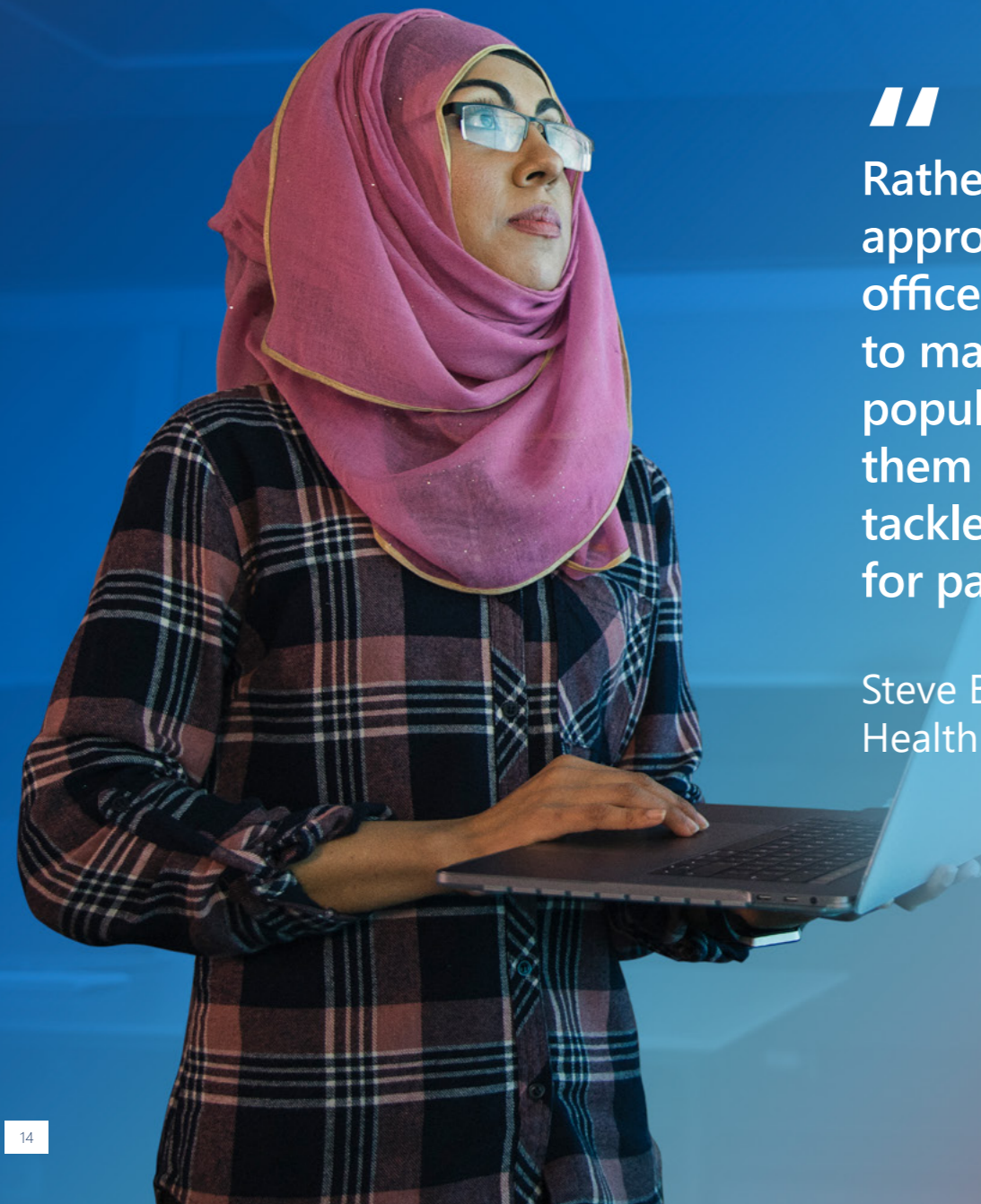
Rather than a one-size-fits-all approach dictated from a ministerial office, local leaders are best placed to make decisions about their local populations and I want to empower them to find innovative solutions to tackle problems and improve care for patients."

Steve Barclay,
Health and Social Care Secretary

Start your data-led healthcare journey today by contacting your account team.

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