Better insights, better decisions, better outcomes

Using analytics in healthcare

pwc

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Introduction

The NHS is facing ever-rising costs through ageing populations and increased demand. At the same time budgets are constrained and systems are transforming. Across the healthcare sector organisations are looking for new and more effective ways to deliver services. Data analytics is key to this. Findings can be used to both design and implement transformation to improve patient outcomes and reduce overall costs.

The opportunity to use analytics is enormous. Change is complex and involves a myriad of stakeholders and partners. Analytics can make sure the complexities of change can be unpacked and decisions can be made with trusted insights. From increasing patient safety, to ensuring greater financial stability through cost management, efficiency and improving the management and quality of care, the use of analytics is a vital component. Data analytics is ensuring health leaders can make the decisions that most benefit their patients and the populations they serve.

We have a nationwide team of experts who are at the forefront of delivering innovation and transformation through the use of the most up to date analytics tools and solutions.

Using the latest technology platforms and solutions we have the ability to develop strategy, design and implement processes and analyse results with a view to development of next steps. We operationalise end-to-end solutions that maximise the insights gained from data analytics. Every approach we take is bespoke to the people we work with. We are already working with key providers and commissioners and across health and social care systems to bring real and tangible benefits to organisations and to patients.

We'd be delighted to discuss your issues with you and work out how we can apply our learnings from across the sector to your institution.

Dr Oliver Bernath
Analytics leader

Why analytics matters

Analytics solutions can drive improvements in productivity, clinical effectiveness, patient experience and outcomes

Using analytics effectively means:

- Avoiding following misleading information
- Taking the fastest route
- Sharing the same information across a system
- Effective monitoring and quick identification of issues
- Empowered leaders

Using analytics means you can find out:

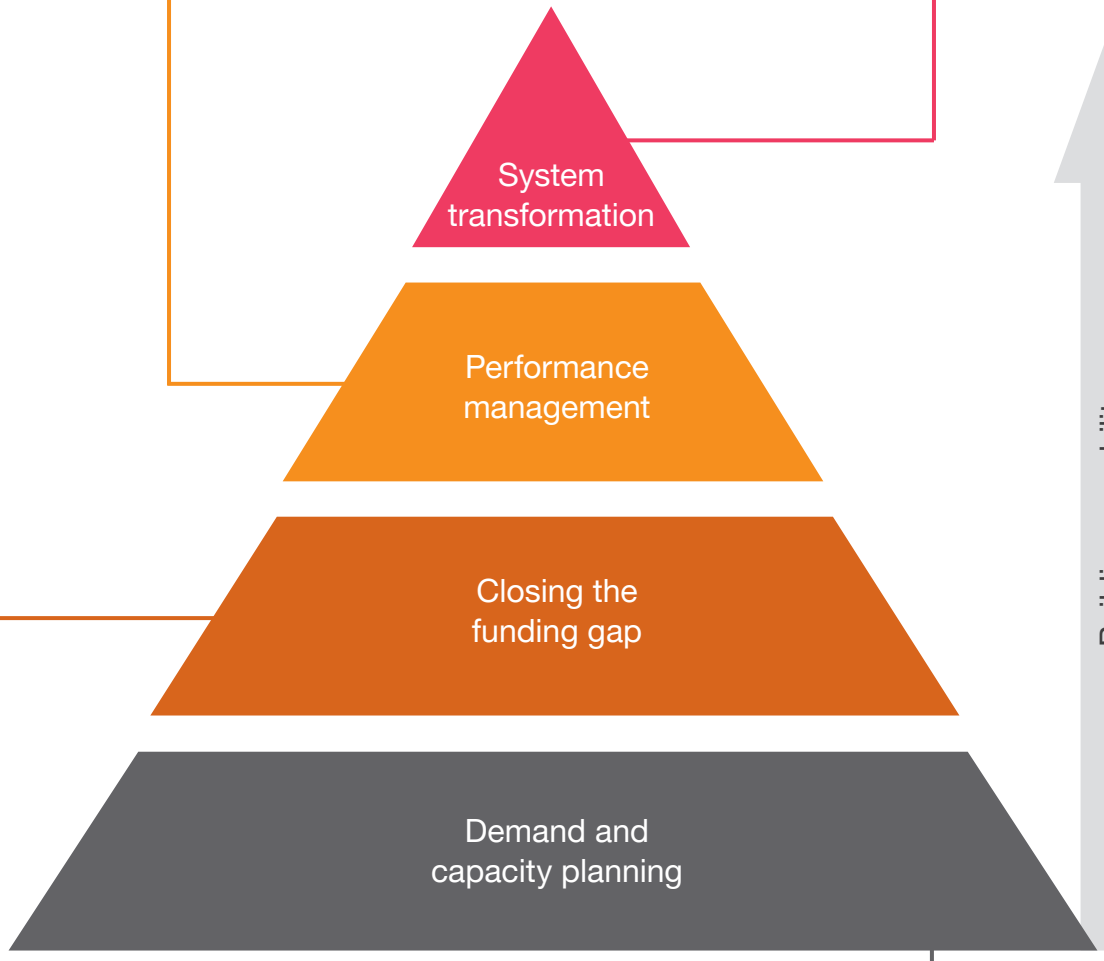
1. Who are your patients and why did they come?
2. How many patients are likely to come this time next year?
3. What can you do to change the pattern?

For example, analytics can give you a better understanding of who and why people are visiting A&E, how many will come in future years and what you can do to support some of these patients in the community instead.

Analytics can address financial, operational, clinical and performance management challenges

Machine learning to improve patient management and outcomes, and benchmarking to understand what you do and how effectively you do it.

System-wide financial control total and assurance dashboards enable user friendly, system-wide planning and collation of data from several organisations to provide a single version of the truth.



Our coding tool helps trusts to improve their coding for financial and quality reporting; the A&E simulation tool can be used to run scenarios to understand best options to reduce costs and improve activity management.

Demand and capacity modelling and actuarial forecasting to understand future demand. Design effective long-term solutions. Scenario modelling of new pathways, including simulation of changes in patient activity, quality metrics and staffing requirements.

Responding to your needs

We bring together activity and cost datasets, including the Healthcare Evaluation Data tool, population data such as ONS data, and geospatial data, to build enriched datasets that can yield unique insights into a local healthcare system.

We use the latest technologies and analytical techniques, such as artificial intelligence, machine learning, predictive analytics, financial forecasting, statistical analysis, visualisation, simulation and scenario modelling, to provide organisations with the most meaningful understanding of data.

And we accelerate insights via our data and analytics tools and apps, which can be customised for each individual organisation. We always propose the solution that is most beneficial, never prescribing a ‘one size fits all’ approach.

Demand and capacity planning

How we can help

We can give you insights into the flow in key aspects of your system enabling you to model different strategies and assess which will have the most impact in delivering improvements in patient care, performance and resourcing

How we do it

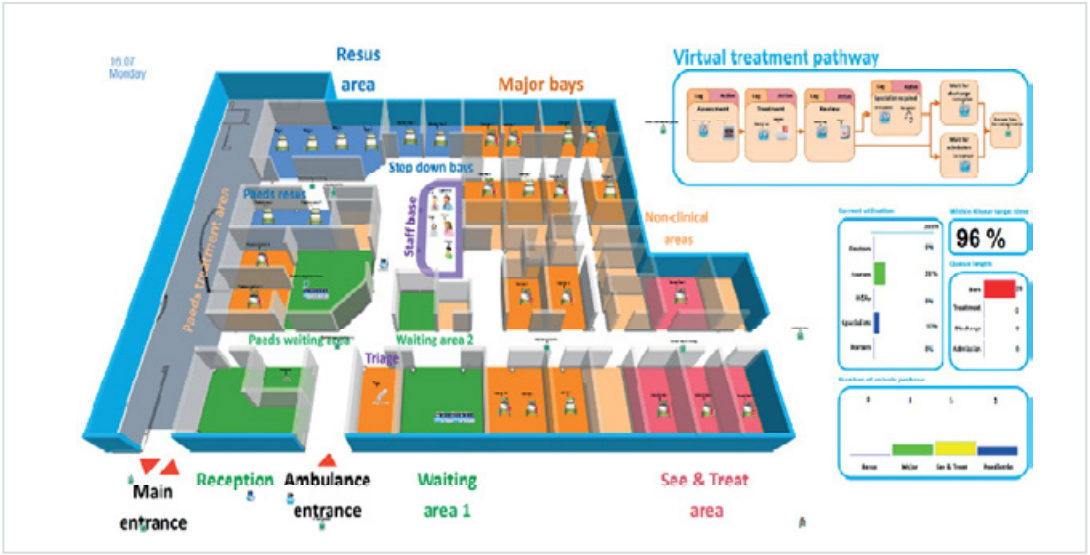
- A hospital simulator tool which analyses historical data trends and applies dynamic simulation modelling to help you understand patient flow and capacity and visualise performance against key metrics – this can be used in A&E, for bed management or across a whole health economy
- patient flow analytics to help understand the potential impact of possible changes to urgent and emergency care
- stochastic modelling to test strategies for improving performance and prioritising staffing and resources
- acute reconfiguration scenario modelling, including patient travel time analysis
- workforce and facilities planning tool

Where we've done it

We have worked with a number of trusts to understand their baseline bed usage and benchmark them against comparable other trusts through using bed capacity demand models.

Our robust quantitative analysis on existing patient flows, cancelled treatment and bed occupancy provides new insights to senior management and clinical teams.

The simulation model we developed meant they could identify and address instances of suboptimal care, manage day-case patients efficiently, and plan for high demand. We trained internal teams to run the tool so that they can continue to use it to make better bed capacity decisions.



Closing the funding gap

How we can help

We can work with you to understand how to drive down costs and achieve financial efficiencies, whilst also identifying opportunities to increase your revenue.
We benchmark you against the national average and peer trusts so that you can see how you are comparing.

How we do it

- Identify the specific areas where you can improve your clinical coding to provide an accurate basis for future planning, drive performance outcomes and increase revenue
- Use an automated clinical coding model to classify patient diagnoses and procedures from free-text input and other recorded hospital metrics
- Calculate the funding gap now and in the future, through baselining and forecasting costs in the system across multiple organisations
- Highlight which specialties cost more than those of their peers and indicate where costs can be reduced
- Connect the analysis to targeted recommendations for implementation

Where we've done it

We have worked with a number of trusts around the country to bring analytical insight into acute coding outcomes for the organisations within a local health economy. Coupled with targeted and actionable recommendations to help trusts increase coding accuracy this has improved the activity and financial data informing the baseline. We also maintain a consistent focus on engaging with clinicians to ensure the coded data truly reflects the complexity of the care they are delivering.

Our outputs have enabled local health economies to deliver real in-year improvements in the accuracy of acute activity coding and the associated tariff values, as well as sustained improvements for future years.

Performance management

How we can help

We can help you maintain a grip on service delivery, and drive quality and productivity. We have worked with a number of providers to offer insights into operational changes that achieve safe, effective, compassionate, high-quality care and that meet national performance indicators.

How we do it

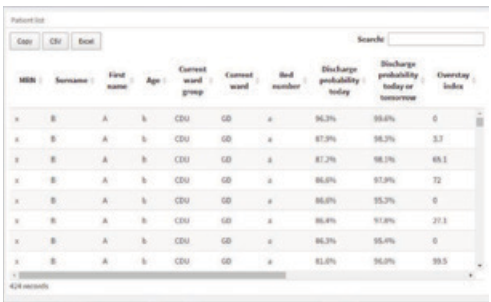
- Data analytics and visualisation dashboards, including theatres and outpatients for example, to quickly identify which quality indicators are performing well and which require further investigation, thus enabling you to act before issues escalate
- Benchmarking analysis against suitable comparators/peers
- Clinical variation analysis and dashboards
- Patient length of stay and Estimated Discharge Dates (EDD) analysis
- Emergency Department (ED) breach analysis tool
- Risk-based and proportionate approach which ensures that safety and quality is upheld

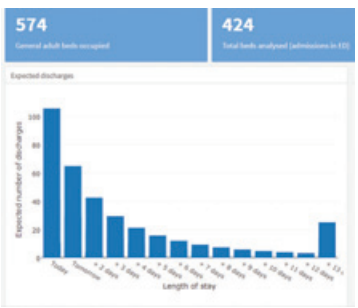
Where we've done it

Working with various clients we have developed a 'Machine Learning' mechanism to predict EDDs for individual patients based on large but routinely recorded data sets.

Through the tool we are able to predict, with a good level of accuracy, whether a patient will be admitted, whether they will stay overnight, and how long they will stay in hospital for.

This has meant that at moments of high bed pressure, the tool helps focus escalation procedures, for example patient-by-patient reviews on those areas and those patients where it matters most.





System transformation

How we can help

We have extensive expertise in developing system transformation towards population-based, outcomes focused, integrated organisations which empower patients. We have worked with providers, commissioners and national bodies across the country to be at the forefront of the development of innovative contracting and payment approaches within the NHS and Social Care.

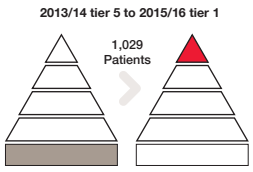
How we do it

- Predictive analytics and risk stratification to model future activity, demand and funding across the local health economy for the short, medium or long term
- Redesigning models of care or interventions and modelling their local operational and financial impacts
- Testing the feasibility of a capitation-based funding mechanism to align incentives and promote integration, including identifying and quantifying system-wide risks
- Developing sophisticated payment mechanisms and gain/loss share mechanisms to manage risks across the lifespan of a multi-year contract
- Model multiple scenarios

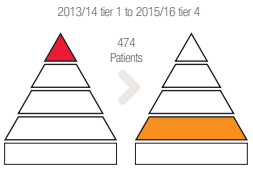
Where we've done it

We were engaged to develop a five year Strategic Plan for the Greater Manchester Devolution Deal. We conducted analysis to understand the local health and care system in the area. Our modelling focused on the financials of all related organisations in the locality and population health analytics giving insight into the system cost drivers, the patient structure and activity anomalies.

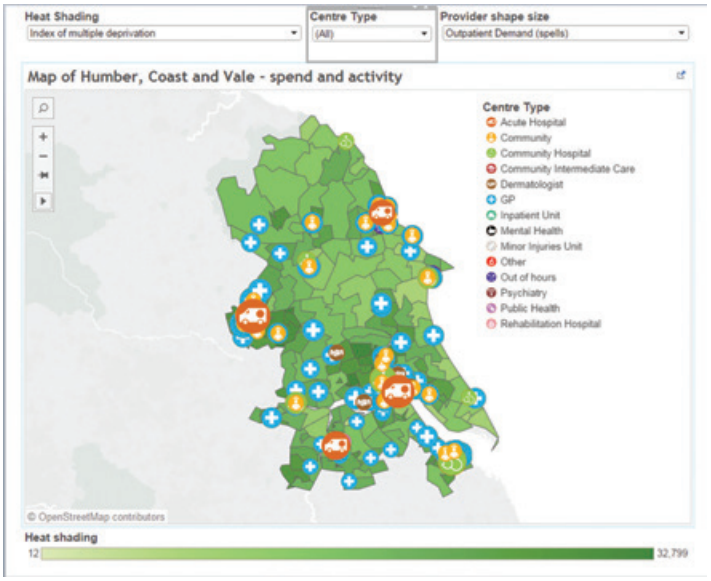
We were able to identify what influenced a move between being a high cost/need or low cost/need patient and the specific trigger points. The team also used the analysis to uncover patterns within the data and define cohorts of patients with similar characteristics.



Long term conditions	Count
Additional LTCs	1.9
Condition	**Activity driver (0–1)**
Coronary Heart Disease (CHD)	0.25
Cancer	0.32
Atrial Fibrillation (AF)	0.14
Chronic Obstructive Pulmonary Disease (COPD)	0.13
Diabetes Mellitus	0.18
Hypertension	0.36
Activity	**Count**
Additional A&E attendances per year	1.9
Additional outpatient attendances per year	4.3
Additional impatient attendances per year	5



Long term conditions	Count
Average LTCs	-1.51
Activity	**Count**
Average decrease of A&E attendances per year	-1.67
Average decrease of outpatient attendances per year	-5.21
Average decrease of inpatient attendances per year	-4.96
Condition	**Activity driver (0–1)**
Hypertension	-0.31
Atrial Fibrillation (AF)	-0.11
Cancer	-0.11
Chronic Obstructive Pulmonary Disease (COPD)	-0.07
Coronary Heart Disease (CHD)	-0.30
Diabetes Mellitus	-0.15



Building capability

How we can help

Data is the lifeblood of the NHS and health organisations globally - it is fundamental for the correct reimbursement of hospitals, for organisations to have a good understanding of which patient cohorts are driving their activity and cost, and for health organisations to have accurate and representative quality metrics.

How we do it

- The current process of clinical coding within hospitals is often manual, relying on teams of coders using traditional data-input methods meaning there is little opportunity to challenge/validate the recording of care which, in turn, leads to inconsistencies or gaps in records and inaccurate financial reimbursement. Additionally, clinical coders are becoming increasingly more difficult to recruit, train and retain putting further pressure on NHS Trusts
- We have developed a suite of tools to automate aspects of the coding process, reducing the impact of human error and improving the efficiency of the process. By combining big data with the application of logic based rules and machine learning, the accuracy and consistency of coding can be improved over time. This should lead to quality, financial and efficiency gains for individual trusts, as well as the NHS as a whole

Codify
Automated clinical coding

Codify uses big data techniques and machine learning algorithms to fully code inpatient attendances on a speciality specific basis. Benefits include:

- Releasing capacity and therefore improving quality as coding teams are consistently under pressure to reach tight deadlines
- Processing data within hours enabling faster and more insightful analysis and decision-making, breaking the monthly cycles of hospital data capture
- More focus on the complex patient cases with high value or risk and enhanced information capture, as large volume, low coding depth cases are automated leaving clinical coders to focus on the more challenging cases

Verify
Coding review service

Verify acts a clinical coding safety net comparing what has been coded with what is documented in patient notes and identifying where any codes may have been missed. This results in a financial uplift and can positively impact upon mortality metrics. Benefits include:

- Additional income for NHS trusts (dependent on the size of trust this can be up to £1m per year)
- More scrutiny around clinical coding decisions and challenging whether certain local policies are or could be appropriate
- Greater accuracy in recording ensuring commissioners and providers can make strategic decisions driven by clinical data
- Improved quality of care and mortality indicators to better reflect the complexity of patients
- Better patient records across the NHS aiding the overall delivery of quality care
- Highlights areas for improvement around certain codes or specialties, thus improving the performance of the internal coding team

Identify
Data quality and mortality review service

Identify aims to eliminate data quality issues so that any Summary Hospital-level Mortality Indicator (SHMI) challenges can be accurately diagnosed as clinical and hence be appropriately investigated. Benefits include:

- Supporting the current coding process, highlighting irregularities for investigation, resulting in a better representation of their 'expected deaths' metric and hence improving their SHMI
- Engagement with clinicians and clinical coders in a consultancy capacity to improve the understanding of NHS mortality indicators, and to help optimise the capture of clinical data
- Monthly flash reports that give an indication as to trusts' latest SHMI values - this improves the timelines for Trusts who otherwise must wait four-five months to learn their SHMI score

Stratify
Population insights

The NHS Long Term Plan's ambition is to provide a higher proportion of care outside of hospitals by improving prevention and reducing costs across the wider community. To improve out of hospital care trusts need to understand the current and future health demands of the population.

The Stratify toolkit segments the population through different analytical lenses to provide a view of healthcare demand, need and activity patterns at a local level. It has a suite of predictive models that can pinpoint likely outcomes and allow Trusts to identify opportunities to reduce the occurrence of undesirable outcomes. Benefits include:

- Improved quality of care and the optimisation of patient pathways
- Greater effectiveness of provision with targeted interventions in the right places
- Increased ability to measure the impact of implemented interventions
- Avoidance of certain outcomes such as emergency admissions and non-elective care

Health Industries

Tomorrow's healthcare today

Healthcare matters to us and it matters to our clients. We all want better healthcare, sooner and the potential is there to make it happen. New technology, new breakthroughs, new ideas. But while there are opportunities, there are challenges too: constrained budgets, an ageing population and an increase in chronic conditions. At PwC we're working with clients to steer a course to success in this new health economy so we help improve healthcare for all. We're working with the NHS, nationally and locally, as well as the private sector and the pharmaceutical and life sciences sector to deliver real, workable solutions to today's challenges. We're delivering transformation and integration projects with patient outcomes at their heart. And we're supporting organisations through testing financial times, often developing bespoke operational and digital systems. We give strategic support to organisations across healthcare and pride ourselves on convening different parts of the system to solve problems. We also bring insight and expertise to healthcare as well as engaging in the public policy debate.

For more information, sign up for our Health Matters blog at: www.pwc.blogs.com/health_matters

Contact us to find out more

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