# How data becomes the care organiser

# It will be data that becomes the health care controller

Health systems are highly fragmented, operating in distinct silos with their own administrative and information systems.

Each part of system (primary, secondary, community care) keeps its own patient records.

There has been practically no interoperability in NHS systems until the arrival of programmes like the Shared Care Record. How extensively is this used by clinicians?

Locally, there have been initiatives, but do they enable the integration/processing of data?

The goal of healthcare interoperability is to allow multiple systems to share patient data, and make it accessible to the providers, patients and those who need to view it.

In the future, the big win is that machines will be able to collate and manipulate the data.

They will have a huge impact on care pathway planning and decision support.

They will operate in real time, alert staff and schedule treatment.

They will change the patient's risk score and prompt interventions and care escalation.

They will monitor interruptions to pathway adherence and collect patient feedback.

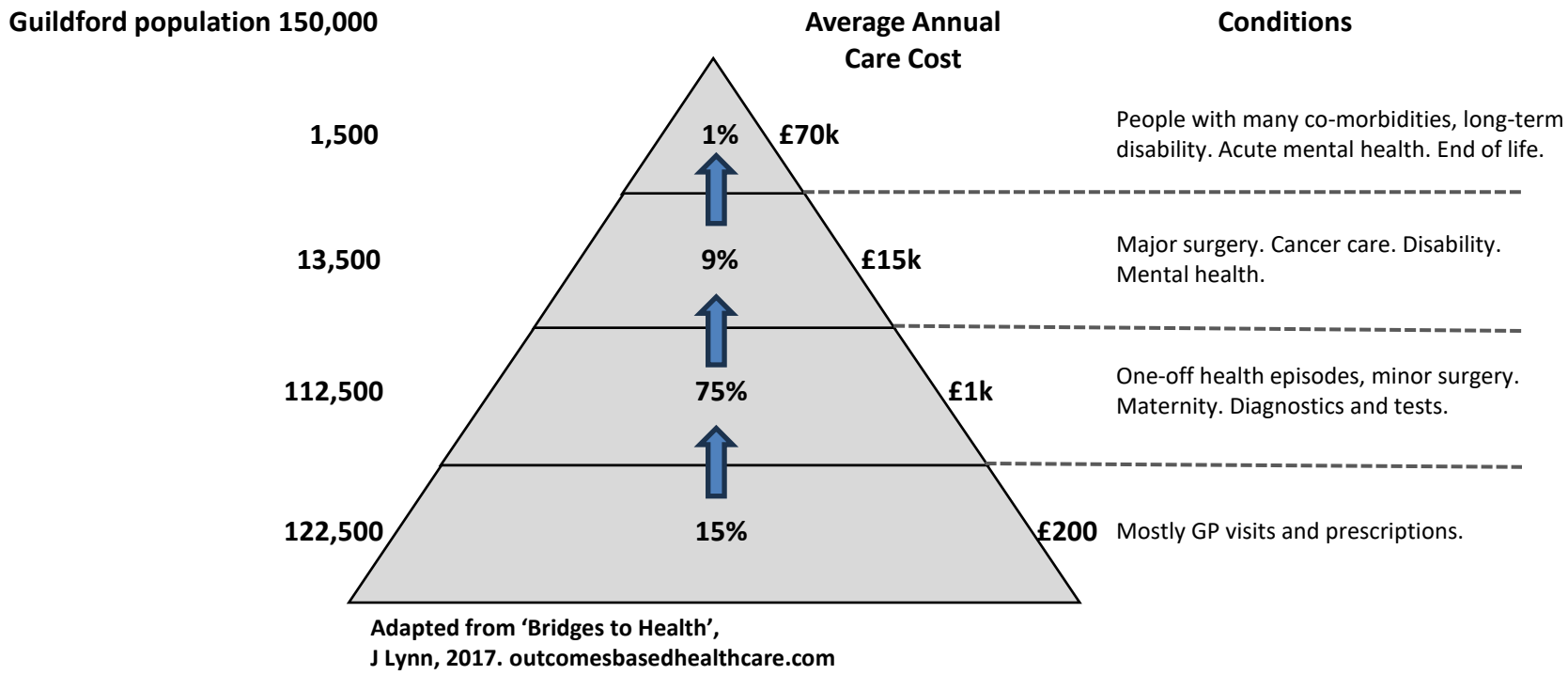
Each interaction will be costed, building a picture of system efficiency and value for money.

A lot of short-cuts become available if all data is copied into the GP record.

After all, the whole population is registered with a GP practice.

# Controlling the upward movement in patient morbidity is any system's major challenge, including Guildford's

Over their lifetimes, most people will inevitably move upwards through this care hierarchy.




The clear objective of health systems is to reduce this upward movement, to improve population health, slow the rate of morbidity and to lower costs.

This is how Guildford's £500m health budget is distributed.

# The patient risk can be re-calculated with the input of new data

‘EMIS, a widely used electronic patient record system (40+ plus of GPs), facilitates risk scoring and stratification of patients using tools like the electronic frailty index and by integrating with external systems like QRISK for cardiovascular risk assessment, enabling GPs to focus on preventative care.

EMIS Web integrates with other systems to identify vulnerable patients at all ages, including risk stratification tools that can identify the top 2% of at-risk patients.

EMIS Web includes an electronic frailty index that scores patients aged 60 or over against specific criteria for moderate or severe frailty, automatically alerting clinicians if patients meet these criteria.

Information is collected from various sources, including NHS Trusts and the GP practice, and analysed to determine a risk score.

Risk stratification enables GPs to focus on preventing ill health and not just treating sickness, potentially offering additional services to patients at higher risk’. **EMIS website.**

# We believe that technology will unify and integrate services

There is real potential for technological developments to support and change how community services deliver care – for example, greater use of remote monitoring of people's health in their own home through wearable devices, or at-home diagnostics and the use of virtual consultations.

Technology can also play a role in facilitating better collaboration between community health services and other partners in the health and care system. For example, more accessible shared care plans and virtual multi-disciplinary team meetings can mean better information flow and communication across organisations, people and places, bringing benefits for both patients and staff (such as fewer tests, saving both patients and staff time).

However, the state of technology in primary and community health and care services is often underdeveloped, reflecting a lack of investment in hardware and software.

Investment will be needed to ensure that the basic infrastructure is in place while giving community health services the opportunity to make the most of technological developments.

**King's Fund**

# Designing care around the person

# Managing the patient, rather than the condition, would transform care delivery

‘Overall, patients with no chronic (long term) LTC conditions contributed to 23.3% of the total secondary care costs, patients with one chronic condition to 21.4% of the total costs, patients with multi-morbidities,  55.3% of the total costs.

Hypertension was the most prevalent morbidity recorded in over a quarter of patients (26.5%). Diabetes (11.6%), chronic kidney disease (10.3%), and asthma (9.5%) were next most common.

In terms of costs, patients with hypertension contributed to 41.3% of total costs of secondary care, followed by chronic kidney disease (24.3%), both higher than the total contribution of those with no conditions.’

**Multimorbidity combinations, costs of hospital care and potentially preventable emergency admissions in England: A cohort study, Jan 2021.**

Managing patients with LTCs in the community will reduce hospitals’ costs.

Treating them in the GP practice would be covered by capitation costs and would disrupt the practice business model.

A new remuneration model will be necessary to ensure that care providers are appropriately compensated.

# All the people at the top of the pyramid will have multiple co-morbidities

About one in four adults has a long-term condition

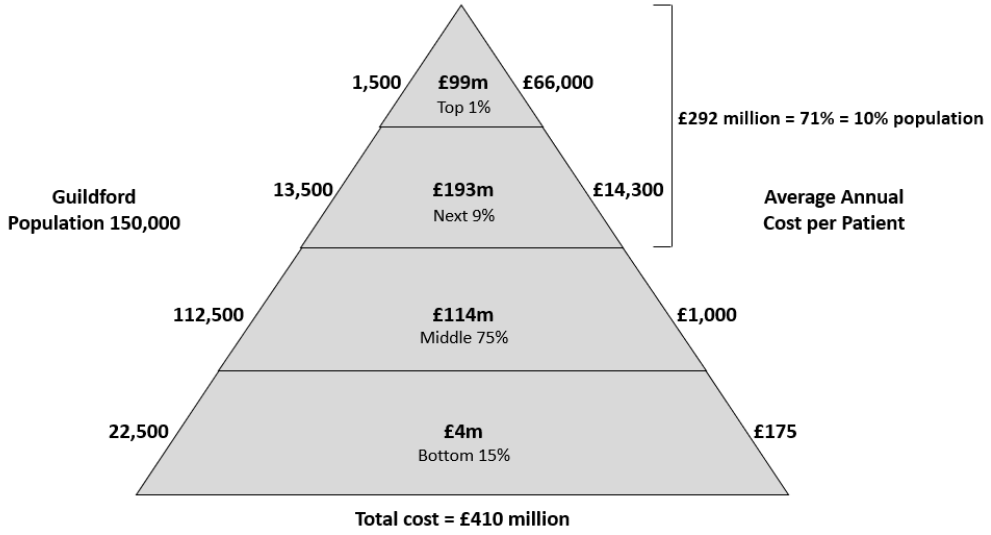
For over 60s , it doubles to 50%

It's two thirds by the age of 75.

For people with co-morbidities, one third have both a physical and mental health condition.

This proportion increases substantially with greater socio-economic deprivation.

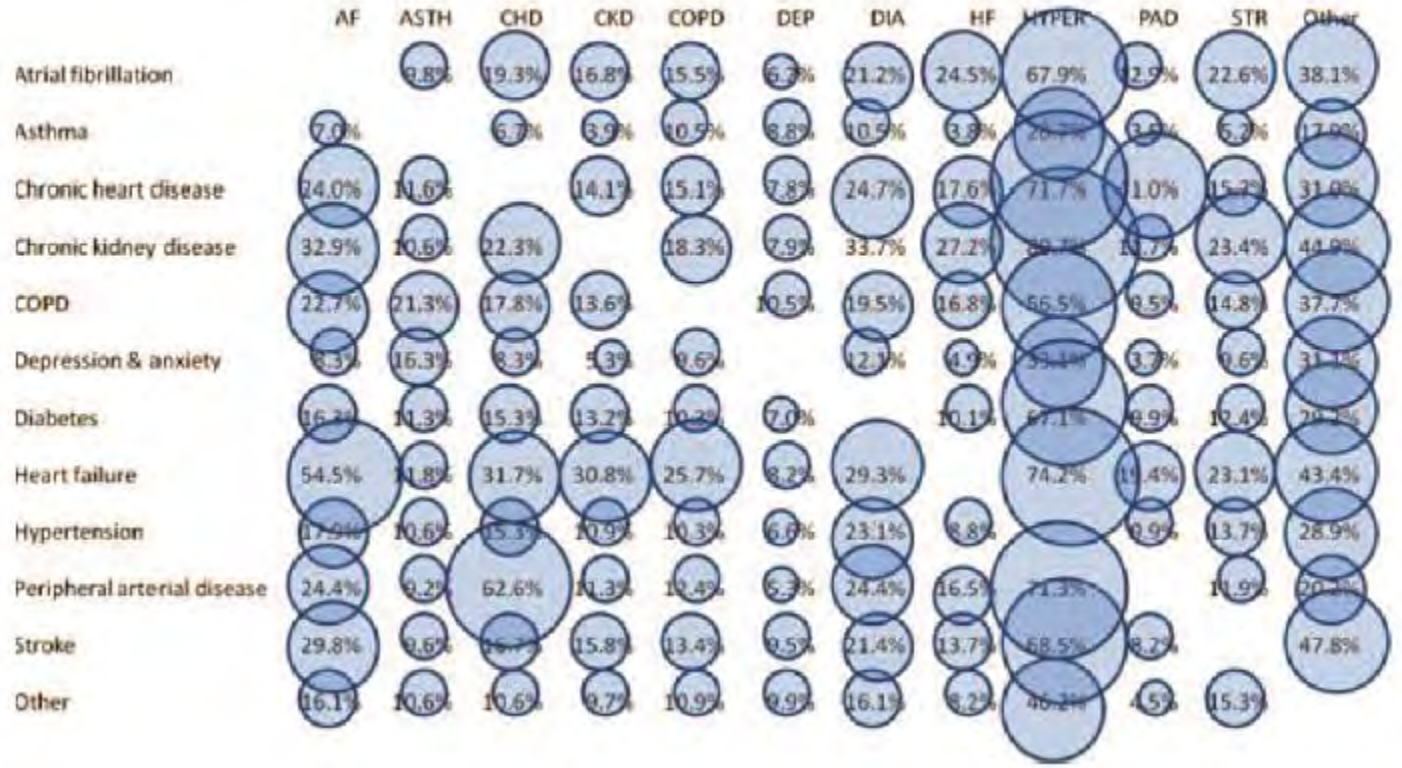
## It is a common factor across all health economies that 70% of budgets are consumed by 10% of the population




15 million people out of 57 million in England, more than one in four, have at least one long-term health condition.

# The incidence of multiple co-morbidities complicates care management co-ordination

*Figure 3 - The percentage of people with a specific LTC (left-hand of figure) who also have another specific LTCs* *(selected LTCs only - those where patients demonstrate the greatest multimorbidity)*



# Multi-morbidity is increasing and will do so as life expectancy becomes more extended

‘In 2015, 54.0% of people aged over 65 had two or more conditions (multi-morbidity). By 2035 this is predicted to have risen to 67.8%. By age group, the prevalence of multi-morbidity was predicted at 52.8% for people aged 65-74, 75.9% for those aged 75-84, and 90.5% for those above the age of 85.

By 2035, there will be double the number of people aged over 65 living with four or more conditions: 17.0% compared with 9.8% in 2015. People aged over 75 contribute most to this number.

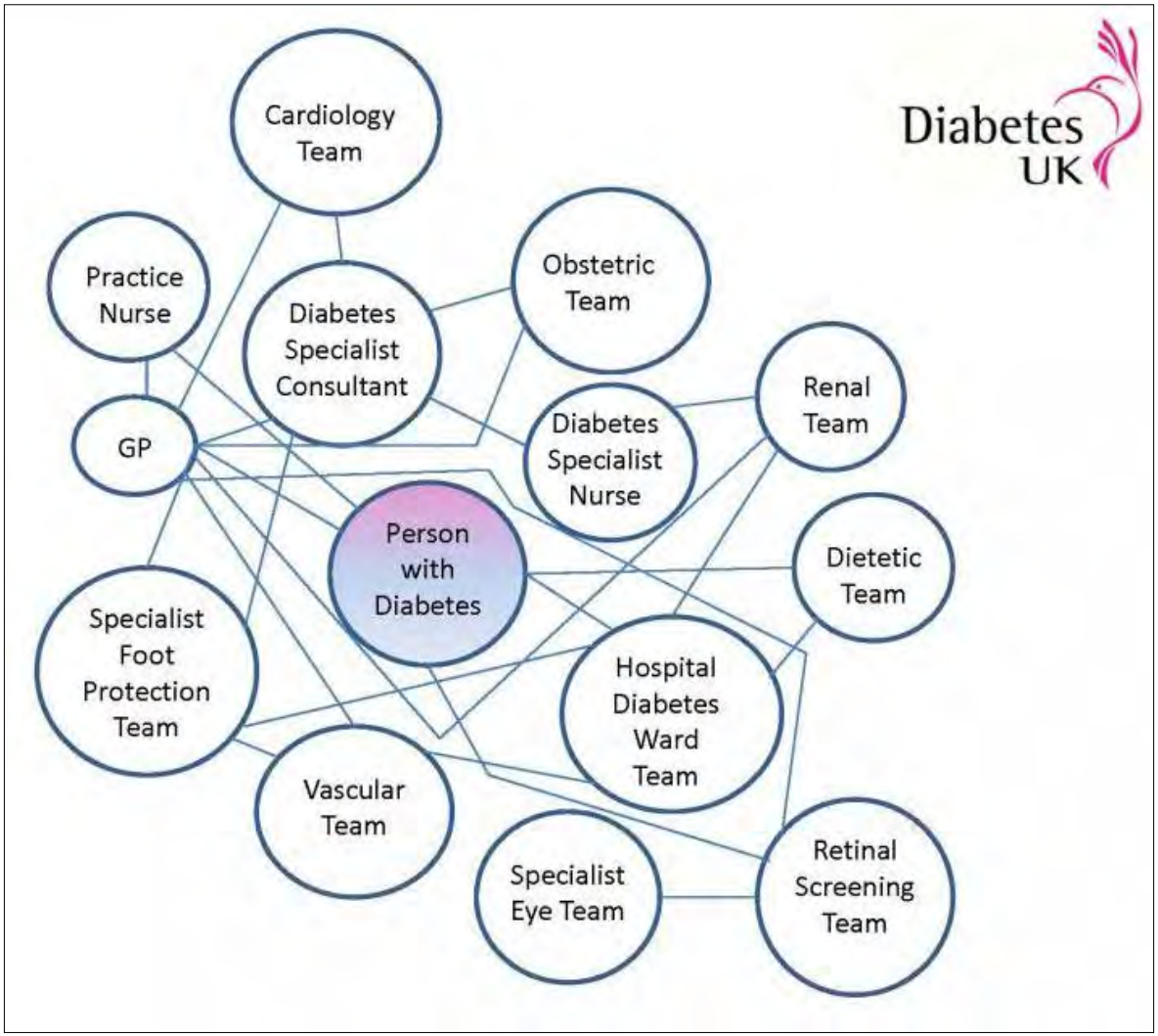
By disease, most people over 65 will be affected by arthritis (62.6%), followed by high blood pressure (55.9%), respiratory disease (24.4%), cancer (23.7%) and diabetes (21.6%). The greatest prevalence increase was for cancer which had doubled from 12.6% in 2015.

The contribution of mental illness (depression, dementia or cognitive impairment) to overall multi-morbidity increases with the number of diseases or impairments. In 2015, 4.1% of people with two or more conditions had mental ill-health, to 34.1% of people with four or more conditions. This pattern is expected to change little by 2035.

Life expectancy is predicted to increase by 3.6 years for men and 2.9 years for women by 2035. This extra life comprises a reduction in years lived with no or only one health condition and an increase in years lived with multi-morbidity’.

**Multimorbidity: clinical assessment and management, NICE.**

# Where there is a focus on condition, rather than the person, there is the chance of discontinuity in care issues, particularly in patient hand-offs



# Chris Whitty says ‘stop shunting patients’. Assign an MDT member prime responsibility for the care of an individual?

‘Doctors and NHS services are becoming too specialised to meet the needs of a rapidly ageing population, the chief medical officer (CMO) has warned in his annual report.

Much of the medical profession is organised around single diseases or organ systems ‘in a way that is ill-suited to a future of increasing multimorbidity’ where people accumulate chronic conditions, Professor Chris Whitty said.

It is essential that doctors maintain generalist skills in order to best care for older populations. NHS services and research bodies also need to adapt to the rise of multiple conditions, he added.

Currently older people are ‘shunted around multiple unrelated clinics often with great difficulty to them and their families’, he said, which is ‘bad medicine and bad organisation’.’

**NHS England**

# The GW Alliance will be able to pinpoint local patients who are at risk for unscheduled hospital admission.

They should start with a test area.

Stoughton, Stoke and Westborough are amongst the most deprived wards in Surrey: life expectancy is significantly lower for men and for women compared with other wards in Guildford.

'Life expectancy at birth for men ranges from 76.6 years in Stoke to 87.6 years in Godalming Holloway, a difference of almost 10 years. LE at birth for women ranges from 78.8 years (Stoke) to 90.7 years (Blackheath and Wonersh), a difference of 11.9 years'.

The Park Barn and Royal Surrey neighbourhood has the highest level of overall deprivation - with 35.4% of households suffering some type of deprivation.

The next most deprived neighbourhoods were Woodbridge Hill (35.2%) and Bellfields, Slyfield and Weyfield (35.1%)'. **ONS, Surrey, Guildford data.**

These are localities which, prima facie, present the largest risk of emergency admissions.

HES and hospital EHR data would provide the validation.

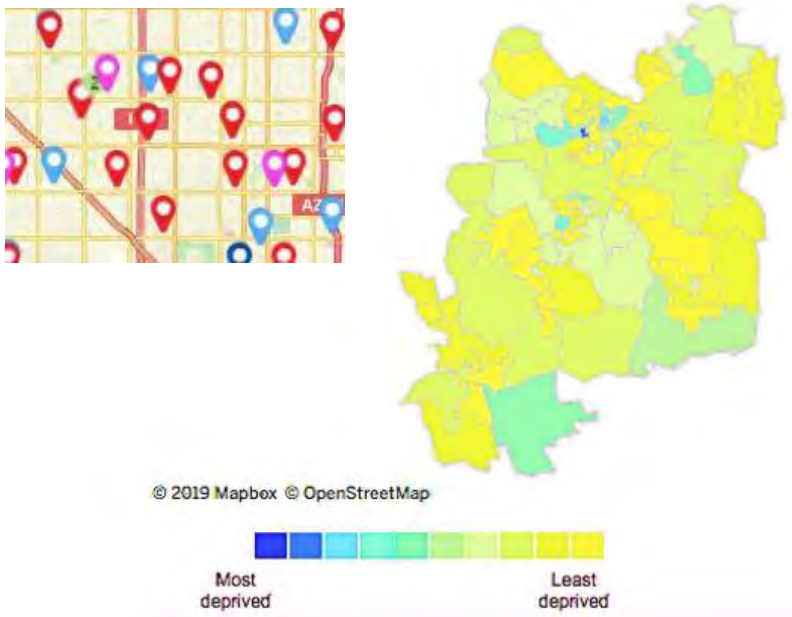
# This means that every patient has his or her own health record with this degree of data granularity

This means that probably the best way of looking for those whose health is linked with deprivation is to search at the individual patient level.

This is entirely possible by reviewing hospital and GP data (HES, SUS, ICD-10, SNOMED-CT) are all available to help build a picture of sickness prevalence at the postcode level.

It is quite straightforward to literally ‘Pin’ these individuals.

*Figure 6. NHS Guildford and Waverley Index of Multiple Deprivation.*



# Risk stratification down to a single patient is the target. The data will keep on coming - from a variety of sources

Risk stratification is a method of assessing the potential scale of future adverse events among patients at high, medium, and low risk. By identifying these groups, health planning may be adapted to meet their needs by providing interventions to avoid these adverse events happening.

There are three main approaches to risk stratification. The first two methods of clinical judgement and threshold modelling, are known to have limited effectiveness, this guide focuses on the use of predictive modelling.

Novel concepts for disease-mechanism based patient stratification will address the needs for stratified or personalised therapeutic interventions.

Future analyses will integrate multidimensional and longitudinal data and harness the power of -omics, including pharmacogenomics, systems biomedicine approaches, network analysis and of computational modelling.

# Outpatients

# Everyone is an outpatient until they are an inpatient

If there are 150,000 NHS beds, then every night, 99.5%+ of the population are not in hospital.

It's the same every day, 365 days a year

Some people are unfortunate that their health condition is such that they either visit or stay in hospitals a lot.

A lot of this happens at the end of life.

'Over half (53%) of public spending in the final year of life is spent on health care (£11.7bn) – or £18,020 per person who died.

Hospital care represents the largest share of health care spending, accounting for 81% of total health care spend (£9.6bn). More than half of this health care spend (56%) goes on emergency hospital care (£6.6 billion).

Put another way, for every £5 of health care spend, £4 was spent in hospital, with £2.80 spent on emergency hospital care'. **Nuffield Trust, 2025**

# Beneficial change for the NHS will only occur if long-established conventions are challenged

Progress towards systems redesign can only occur if we move on from old health care conventions.

The care of 'outpatients' is one of these.

Patients, across their lives, are the GP's patients both before and after hospital treatment.

Another way of looking at it is that patients are always outpatients, except when they are in hospital, ie, where they are inpatients.

Many outpatients continue to receive regular hospital appointments even though their care plan could often be delivered in the community.

'The 2019 NHS Long Term Plan highlighted the dramatic rise in outpatient appointments, and pledged to save £1bn a year by stemming the growth in hospital visits. Key to this was a commitment to allow patients to choose virtual appointments, with a five-year ambition to avoid up to 30 million outpatient visits a year.' **The King's Fund.**

NHS England is continuously reframing outpatient care policy, mostly through tightening reimbursement rules. **https://www.england.nhs.uk/outpatient-transformation-programme/**

# Outpatient attendances: doing the maths

‘In 2023-24, there were 104.6 million outpatient attendances.

This is an increase of 9.1% from the published figure for the previous year, and an 8.5% increase from the level seen before the coronavirus (COVID-19) pandemic (there were 96.4 million attendances in 2019-20).

Please note that the published number of attendances for 2022-23 are estimated to have been 1.0 million records less than the actual level of activity, as one provider was unable to submit data between June 2022 and March 2023.’ **NHS Digital.**

**‘First outpatient attendances.**

Where the outpatient attendance has a published unit price, this will form the basis for valuing the activity. Where an attendance does not have a published unit price, a weighted average of attendances with a price is used.

Outpatient follow-up activity is outside the scope of the ERF and forms part of provider fixed payments.’

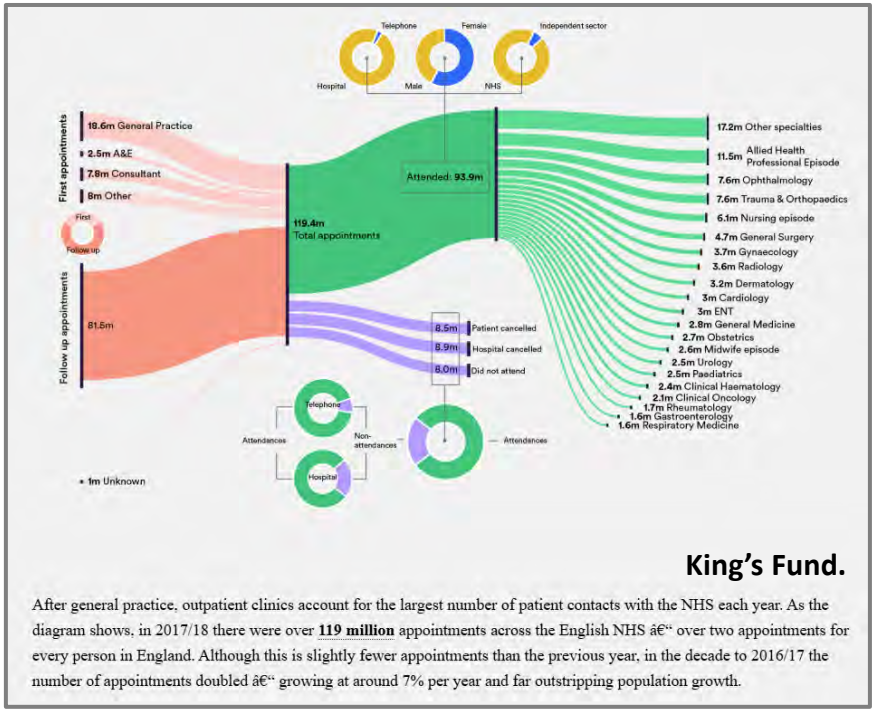
**Elective Recovery Fund technical guidance 2024/25.**

# The transfer of outpatients into community care is impacting the acute hospital business model and funding

‘Each provider and system have been asked to reduce outpatient follow-up appointments by a minimum of 25% by March 2023 compared to 2019/20 baseline activity and go further where possible and re-allocate time, prioritising activities to support elective recovery’.
**‘Principles and approach to deliver a personalised outpatient model’, NHS England, 17 May 2022.**

The number of hospital outpatient attendances has continued to grow year-on-year. In 2023-4, it was 104.6m compared with 95.9m for the prior year. [NB: Strike action by hospital doctors would have affected numbers].

This a typical view of their care pathways. Where will be patients’ next destinations?




**King’s Fund.**

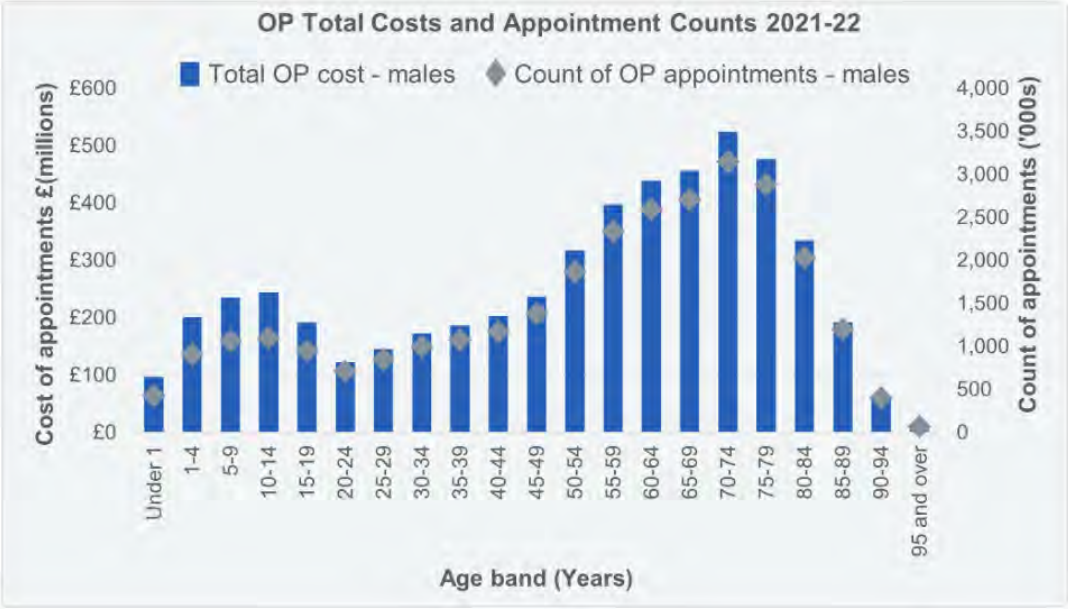
After general practice, outpatient clinics account for the largest number of patient contacts with the NHS each year. As the diagram shows, in 2017/18 there were over **119 million** appointments across the English NHS â€“ over two appointments for every person in England. Although this is slightly fewer appointments than the previous year, in the decade to 2016/17 the number of appointments doubled â€“ growing at around 7% per year and far outstripping population growth.

# Over £15bn is spent annually on outpatient care

## Outpatients (OP)

A total cost of £14 billion was reported for OP activity. This is summarised by the sex and age value of the HES linked appointment. £1.4 billion (10.4%) of the total cost of OP activity did not link to a HES appointment and is not included in this analysis. Sex or age was unknown or not specified on the linked HES appointment for £2.5 million (less than 0.1%) of reported cost.

The total cost and count of appointments are markedly higher for females in the age groups from 15 to 64 compared to males in the same age groups. Part of this difference is likely to reflect maternity related appointments.



# (Fixed) Outpatient numbers are well off plan at RSCH

## Total activity is 20% higher than plan, with Fixed 22% higher, for which there is no reimbursement

NHS Royal Surrey NHS Foundation Trust | All Activity | Trust-Wide | SBU: All | February | 07/03/2025 12:18:10

Activity

| ERF_Type | IM Target | IM Activity | Variance to Target | % IM Variance to Target | YTD Target | YTD Activity | Variance to YTD Target | % YTD Variance to Target |
|---|---|---|---|---|---|---|---|---|
| **ERF Variable** | **16,291** | **18,578** | **2,287** | **14%** | **189,788** | **191,199** | **1,411** | **1%** |
| Outpatient Procedures | 4,786 | 7,303 | 2,517 | 53% | 55,758 | 59,225 | 3,467 | 6% |
| Outpatient | 7,652 | 7,318 | (334) | (4%) | 89,148 | 85,363 | (3,785) | (4%) |
| Other | 441 | 603 | 162 | 37% | 5,143 | 6,963 | 1,820 | 35% |
| Elective Day case | 2,807 | 2,941 | 134 | 5% | 32,699 | 34,379 | 1,680 | 5% |
| Elective | 604 | 413 | (191) | (32%) | 7,040 | 5,269 | (1,771) | (25%) |
| **Non-ERF Variable** | **10,538** | **11,659** | **1,121** | **11%** | **122,763** | **129,093** | **6,330** | **5%** |
| Other | 8,483 | 9,677 | 1,194 | 14% | 98,823 | 106,519 | 7,696 | 8% |
| Direct Access | 2,055 | 1,982 | (73) | (4%) | 23,940 | 22,574 | (1,366) | (6%) |
| **Fixed** | **154,595** | **188,031** | **33,436** | **22%** | **1,801,028** | **2,199,875** | **398,847** | **22%** |
| Outpatient Procedures | 4,151 | 3,874 | (277) | (7%) | 48,362 | 44,859 | (3,503) | (7%) |
| Outpatient | 12,771 | 20,895 | 8,124 | 64% | 148,779 | 237,743 | 88,964 | 60% |
| Other | 9,110 | 10,133 | 1,023 | 11% | 106,132 | 108,373 | 2,241 | 2% |
| Non Elective | 3,690 | 5,230 | 1,540 | 42% | 42,994 | 58,082 | 15,088 | 35% |
| Elective Day case | 46 | 61 | 15 | 33% | 536 | 535 | (1) | (0%) |
| Elective | 11 | 4 | (7) | (63%) | 125 | 77 | (48) | (38%) |
| Drugs | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Direct Access | 117,925 | 139,172 | 21,247 | 18% | 1,373,824 | 1,648,500 | 274,676 | 20% |
| Devices | 9 | 14 | 5 | 65% | 99 | 117 | 18 | 18% |
| Critical Care | 788 | 760 | (28) | (4%) | 9,177 | 8,146 | (1,031) | (11%) |
| AandE | 6,094 | 7,888 | 1,794 | 29% | 71,000 | 93,443 | 22,443 | 32% |
| **Total** | **181,423** | **218,268** | **36,845** | **20%** | **2,113,579** | **2,520,167** | **406,588** | **19%** |

WORLD CLASS CARE FOR OUR COMMUNITY

The above shows activity numbers by type of activity

12

# What is the explanation for the difference between Target and Actual? We have none.

**RSCH outpatient attendances 2024-25**

| | YTD 28.02.2025 | | Full Year Forecast |
|---|---|---|---|
| | **Target** | **Actual** | |
| **ERF Variable** | | | |
| Outpatient | 89,148 | 85,363 | 93,123 |
| **Fixed** | | | |
| Outpatient | 148,779 | 237,743 | 259,356 |
| **Total** | **237,927** | **323,106** | **352,479** |

**RSCH Board Report, March 2025. Our forecast for full year.**

# Hospitals are being pressured to lower outpatient attendance

‘The financial framework has been set for 2022/23 to support elective recovery and specifically ambitions around personalised outpatients.

Each provider and system have been asked to reduce outpatient follow-up appointments by a minimum of 25% by March 2023 compared to 2019/20 baseline activity and go further where possible and re-allocate time, prioritising activities to support elective recovery’.

Achieving sustained outpatient follow-up reductions will require providers to have in place core operational good practices as a foundation for wider change.

Providers, working across system, should consider patient-initiated follow-up (PIFU), more effective discharge processes and specialist advice where these are clinically appropriate.

In doing so, a personalised outpatient model can offer patients care that is better tailored to individual need and circumstance, delivered through traditional means, when required, but also empowering self-management, remote-monitoring and other alternatives where clinically appropriate’. **NHS England**

# To reduce the load on hospitals, patients are being asked to take responsibility for scheduling appointments at RSCH.

‘**Transforming outpatient services for patients**

The NHS is changing how we deliver outpatient services so that patients can be seen more quickly and can access and interact with our services in a way that better suits their lives.

This means giving patients and their carers more control and greater choice over how and when they access care.

We are empowering patients to book their own follow-up care as and when they need it, providing the option of telephone or video consultations where appropriate, and working with GPs to enable access to earlier expert advice’.

Patient initiated follow-up (PIFU) is key to personalising outpatient care, and by enabling patients to have more control over when they receive care, can reduce unnecessary follow-up appointments and make the best use of clinical time’. **RSCH.**

PIFU personalises care, enabling patients to access support when they need it, but not attend routine follow-up appointments when they are well’. **NHS England**

# What is a patient initiated follow up PIFU?

**'What is patient initiated follow up?**
Patient initiated follow up (PIFU) appointments can help reduce unnecessary visits to hospital, reduce patient waiting times and allow healthcare professionals to see more patients in a timely manner. PIFU means you can arrange an appointment for yourself based on your individual symptoms, and receive guidance when you need it. This is an alternative to a routine follow-up appointment, which can be a source of stress and expense, and which you may not always find helpful unless you have a specific concern you wish to discuss withy our healthcare professional.

**How does it work?**
If PIFU is suitable for you, your healthcare professional will discuss your condition with you and offer you a PIFU. This means instead of being given a routine follow-up clinic appointment, you will be able to arrange a follow-up appointment if you feel you need it. Your healthcare professional will advise on any symptoms you need to watch out for, or the circumstances for which you should make an appointment. This will be documented in the letter you are sent after your appointment, along with how long your PIFU will last.

**There are two types of PIFU:**

1. PIFU with Clinical Review
   This type of PIFU is suitable for patients who cannot be discharged. It gives you the choice of booking an appointment within the specified period and if you do not need to see the doctor or nurse about your condition during that time, an appointment will be booked for you by the hospital at the end of the specified period.
2. PIFU with Non-clinical Review (Discharge)
   With this type of PIFU, if you do not need to see the doctor or nurse about your condition within the specified period, you will be discharged back to your GP who will re-refer you if you need to be seen again in the future'.

**NHS Surrey and Sussex Health.**

# Nobody seems to be tracking PIFU patients. How many revert to hospital? Or pick up with their GP?

There are, of course, significant financial implications for hospitals if they lose their reimbursement for outpatient care.

Also, the extra load on practices means that it shouldn't reasonably be included within GPs' capitation, should it?

Hospitals often say that there is likely to be a loss of system productivity by moving specialists into the community for out-patient consultations.

But there is an evidence base showing there are better options than sending everyone to hospital for outpatient appointments.

The RSCH website says 'We are empowering patients to book their own follow-up care as and when they need it, providing the option of telephone or video consultations where appropriate, and working with GPs to enable access to earlier expert advice'.

How well is the programme working? Are there any metrics?

# There is probably a fine line between patients discharged into Virtual Wards and those in PIFU programmes

Out-of-hospital patient management might then become something of a lottery.

Who owns the patient – the hospital, the GP or the community care provider?

It was always intended that 'the [Virtual] ward [would] be overseen by a consultant, working with therapists, nursing staff and pharmacists'. **RSCH.**

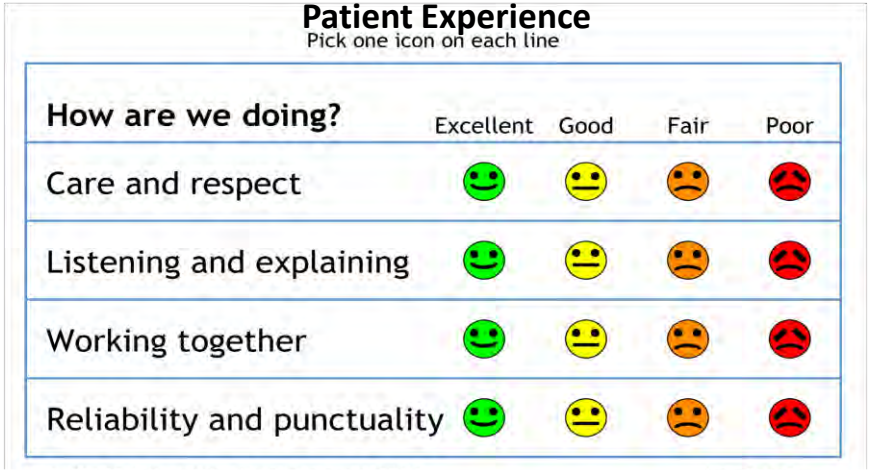
There are also operational issues which need resolution.

Is there one shared patient record? Are updates shared between providers?

Should the application of the RSCH Doccla software be extended and come under the management of out-of-hospital providers, even MDTs working in the AARS programme?

Maybe PIFU patients' expreriences should be remotely monitored by the NHS App.

A junior version of Virtual Ward?

# The decanting of hospital outpatients to community care should be managed gradually

Hospital outpatients will be repatriated to community care one by one.

Not all of them are suited to self-monitoring., ie working in PIFU mode.

A proportion of them will be patients with long-term conditions.

Could staff recruited under the AARS programme pick up the most suitable candidates for ongoing out-of-hospital care?

Which patients would they be? What would be the selection criteria?

There is probably already something of a precedent in place with patients who are in the Virtual Ward programme.

In which case, how would practices be remunerated? Would they need to be on a special contract?

# The most important driver of change will be technology

# Technology will be the resource which changes health care forever. This will challenge a technophobic NHS.

It's technology which will have the biggest bearing on health care transformation.

[By 2030], 'we'll see widespread adoption of genomics, proteomics, lifestyle data collection and psychological data collection. Intelligent algorithms will be used to enable truly personalised health care and medicines, delivered by clinicians and patients themselves, significantly improving outcomes for conditions such as cancer, CVD and diabetes, as well as underpinning improved psychological and physical wellbeing.

Connected technology will play a pivotal role with home-based devices such as movement sensors, accelerometers, bluetooth inhalers and pill packs, pulse oximeters and intelligent toilets. Data collated from these devices will be used to identify and predict changes in the behaviour of patients at home. This will underpin early interventions by family or healthcare services. This will help improve the outcomes and care experience for patients and families, and reduce avoidable hospital admissions.'

**EMIS Health, UK's leading provider of GP desktop systems.**

# For care to be moved to the community, the NHS information technology strategy must deliver there, too

Darzi says in his recent review that there needs to be a 'Tilt towards technology'.

'While there are many excellent examples of technology having an important impact in the NHS—from virtual wards to remote dermatology consultations—it has not radically reshaped services. The NHS remains in the foothills of digital transformation'.

The extraordinary richness of NHS datasets is largely untapped either in clinical care, service planning, or research.

'There must be a major tilt towards technology to unlock productivity. In particular, the hundreds of thousands of NHS staff working outside hospitals urgently need the benefits of digital systems.

There are many possible technologies that would support more efficient, higher quality, safer care in the community. But they are largely absent. Given the shift in the disease burden towards long-term conditions, there is a greater need for information systems that work across different settings'. **NHS England**

Local NHS IT organisations are required to develop interfaces between community and primary care and ensure operability with acute and mental health trusts.

Procare does provide some back office support, but is this essentially maintenance?

Meanwhile, the NHS is about to spend hundreds of millions more on hospitals' IT, building its Federated Data platform to which both the ICB and RSCH seemed to have signed up.

# According to the RSCH website, it is already a user of the NHS FDP

**‘Federated Data Platform (FDP)**

Every day, NHS staff and clinicians are delivering care in new and innovative ways, achieving better outcomes for patients, and driving efficiency. Scaling and sharing these innovations across the health and care system in England is a key challenge for the NHS.

Harnessing the power of digital, data and technology is the key to recovering from the pandemic, addressing longer-term challenges, and delivering services in new and more sustainable ways.

The Federated Data Platform (FDP) is a software ‘data platform’ which will enable NHS organisations to bring together data – currently stored in separate systems – to support staff to access the information they need in one safe and secure environment so that they are better able to coordinate, plan and deliver high quality care.

A ‘federated’ data platform means that every hospital Trust and integrated care board (ICB) (on behalf of the integrated care system (ICS)) will have their own platform which can connect and collaborate with other data platforms as a “federation” making it easier for health and care organisations to work together.’

The Data Platform Contractor, Palantir Technologies UK, LTD is a processor for this Product. RCSH website.

There is no reference to its installation in the 2023/4 RSCH Annual Report which includes a review of ‘Digital developments’ by the CEO.

What benefits is it bringing? What’s the plan to coordinate with primary and community care?

# Are all local organisations intent on working off the same data platform? Can it deliver?

What benefits will the FDP bring for primary and community care?

The ICS also has a data strategy, last details of which were published in 2022.

(Why is the SH website never updated. It could become a governance issue?)

Is the reference in the panel (right) about the same programme?

Or is this a much wider data strategy for the ICS?

Does it remain 'a vision'?

The ICS must have an articulated IT and analytics plan which sets out in detail how the various stakeholders connect, together with measurement points.

A move of patients out of hospital will be hampered if the systems to monitor and support them are not in place.

Is this just another example of imbalance in investment between sectors which needs to be addressed in the budgeting process?

## Data

Our work to make Surrey a more integrated system has revealed high levels of duplication and difficulty sharing data, which hinders our ability to deliver more integrated services.

Often, individuals need to provide the same information to multiple agencies, increasing the risk of duplication and errors. Collaborative data sharing and analytics presents a unique opportunity to harness the breadth and depth of data which each organisation in Surrey holds, to ensure that the work we do, both individually and collaboratively, to support our residents, patients and communities is integrated.

The Surrey-wide data strategy sets out a vision to support the sharing of data across different systems and partner organisations in Surrey that will help deliver better care/services to local people now and in the future.

We will develop:

- **A system-wide integrated data and digital platform** – this will initially focus on developing a population health-based approach to health and wellbeing, underpinned by integrated finance modelling, and a shared data security and governance framework enabling data sharing agreements and responsibilities between partners.
- **A system intelligence function** (i.e. the data operating model) – this will enable analytical communities to be better connected to provide the integrated insight and analytical capabilities required for the system. The operating model will create Place/Neighbourhood teams, supported by a centralised hub, to work together in an integrated way to share skills, knowledge and experience, as well as helping each other to perform joint insights and analytics for the local populations they serve.

These teams will support a population health management approach. This intelligence function is a framework which any system partner (including the voluntary, community and social enterprise sector) will be able to participate in.

- **A population health hub** – this will enable the wider system to promote, sustain and spread successful interventions and innovations.

# There will be no shortage of data

‘Data integration, principally GP records, Hospital EHR systems and social services records will be fed by already available and continuously developed systems .

NHS England’s Palantir Foundry software includes the Improving Elective Care Coordination for Patients Programme (IECCPP) and the Optimised Patient Tracking and Intelligent Choices Application (OPTICA) pilot’.

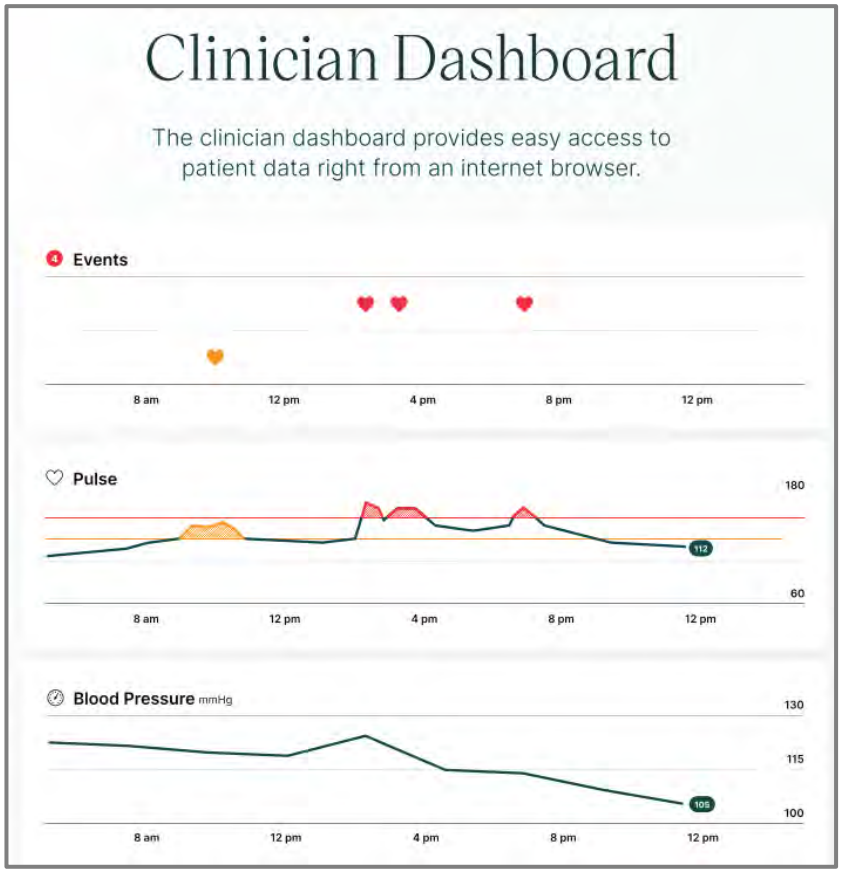
Doccla’s Virtual Ward system is already being used by RSCH.

‘Clinical dashboards that enhance caseload management through holistic views of patient cohorts and visualisations of patient data trends will develop over time.

Integration with electronic patient records to enable flow of coded data from the Doccla dashboard Access to multi-disciplinary clinicians with specialist training in remote monitoring.

New capability is being added continuously.

**Doccla website**



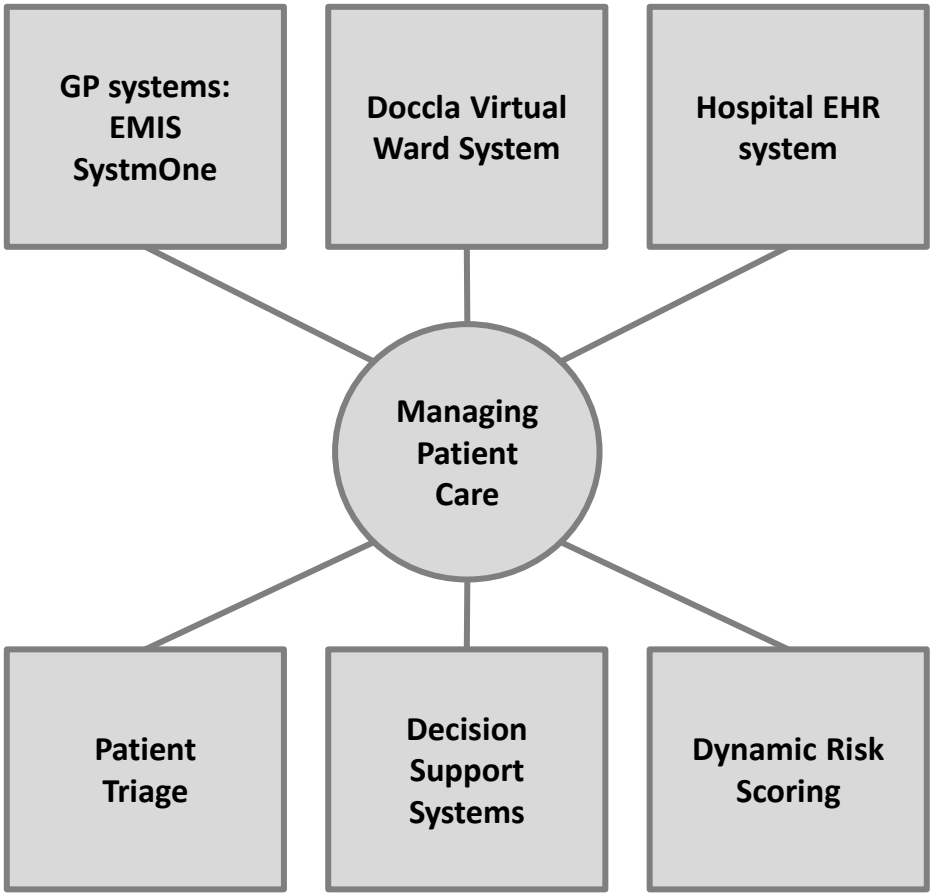

**Doccla website.**

# Much could be achieved by combining the best features of existing locally deployed systems

Patient management is now supported by a range of digital systems. Locally there are multiple data points in multiple systems:

- GP patient EHR systems - EMIS and TTP SystmOne - also have many downstream applications to identify at risk patients
- RSCH operates the Oracle EHR system.
- Some hospital discharged patients are being managed by the RSCH Virtual Ward Doccla system.
- A GP triage system is deployed by the Guildowns practice.
- An expanded primary care back-office capability, linked to a SPA, and operated by a health navigation service, could create a single point of supervision for community-based patients.

Putting these together will make a real, game-changing difference to patient monitoring.



# Technology will monitor health status of patients assigned to MDTs and update risk scores

**‘NHS artificial intelligence (AI) giving patients better care and support**

The NHS is using AI to predict patients who are at risk of becoming frequent users of emergency services so staff can get them more appropriate care at an earlier stage.

The intervention will ensure that thousands of people get the support they need earlier, while also reducing demand on pressured A&Es.

Over 360,000 patients attend A&E more than five times every year, but now, using data-powered initiatives to identify them, NHS teams are proactively reaching out with support before they walk through the front door of an emergency room.

High Intensity Use (HIU) services use the latest data to find the most regular attendees in their area to identify and resolve the reasons patients are coming forward for care so regularly – often associated with poverty and social isolation.

The NHS has rolled out HIU services to support more than 125 emergency departments across England so far, providing patients with one-to-one coaching support in their own homes to tackle the root cause of why they are visiting A&E.’

**NHS England 2024.**

# People can have their own personal health strategies

Health records will be collated, scanned and analysed to create individual risk profiles.

Those at the top of the pyramid will be managed intensively, usually by MDTs.

Those lower down monitored to identify emergent risks.

Systems will send signals to GPs to contact patients.

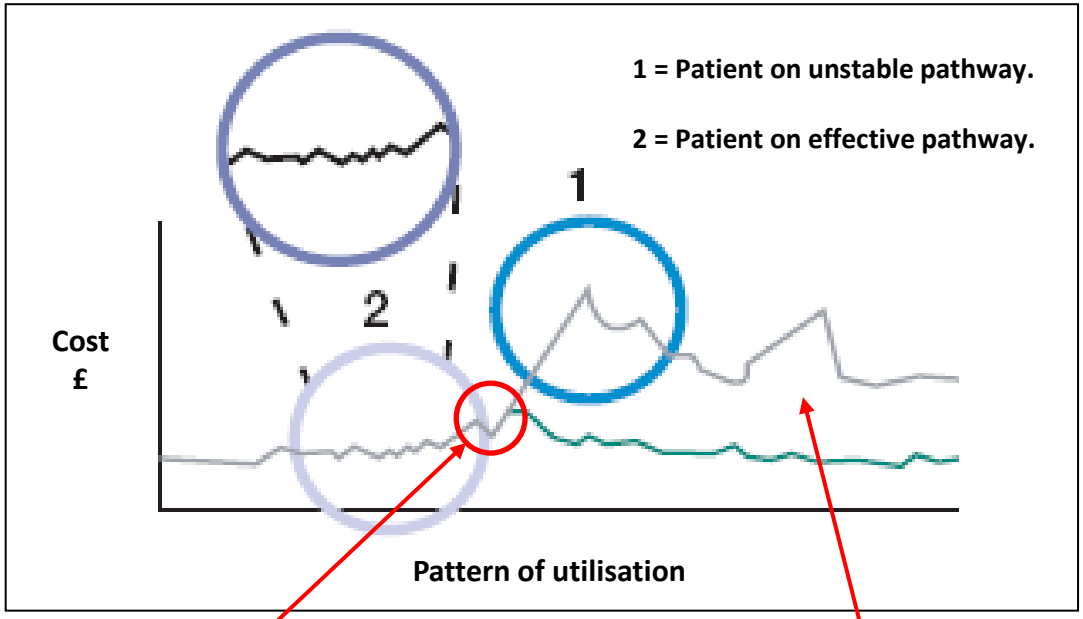
Patients missing appointments or not renewing prescription will be identified to enable care pathway adherence.

## GUILDOWNS GROUP PRACTICE

THE OAKS, APPLEGARTH AVENUE, GUILDFORD

| | Area | Prevalence | Centile |
|---|---|---|---|
| 2023 | Coronary Heart Disease | 1.7% | 7 |
| | Asthma | 5.0% | 23 |
| 2022 | Cancer | 1.0% | 21 |
| | Chronic obstructive Pulmonary Disease | 1.1% | 25 |
| | Hypertension | 7.8% | 5 |
| 2021 | Stroke and Transient Ischaemic Attacks | 1.1% | 16 |
| | Hypothyroidism | 2.0% | 13 |
| 2020 | Heart Failure | 0.2% | 4 |
| | Diabetes | 2.7% | 5 |
| 2019 | Epilepsy | 0.4% | 15 |
| | Mental Health | 0.6% | 25 |
| 2018 | Dementia | 0.5% | 57 |
| | Chronic Kidney Disease | 2.8% | 42 |
| 2017 | Atrial Fibrillation | 1.0% | 24 |
| | Obesity | 5.5% | 13 |
| | Learning Disabilities | 0.2% | 30 |
| 2016 | Depression Screening | 3.9% | 7 |
| | Depression ever | 8.9% | 60 |
| 2015 | Smoking | 18.4% | 52 |
| | Depression Incidence | 0.3% | 21 |
| 2014 | CHD Prevention | 0.5% | 8 |

**NHS England QOF database.**




**How do we prevent this inflection point in the patient condition?**

**Cost opportunity**
**Also, outcomes will be improved.**

# Identifying these patients is not difficult. The data is there

Harnessing temporal patterns in administrative patient data to predict risk of emergency hospital admission. **Post et al.**

Unplanned hospital admissions are associated with worse patient outcomes and cause strain on health systems worldwide. Primary care electronic health records (EHRs) have successfully been used to create prediction models for emergency hospitalisation, but these approaches require a broad range of diagnostic, physiological, and laboratory values. In this study, we aimed to capture temporal patterns of patient activity from EHR data and evaluate their effectiveness in predicting emergency hospital admissions compared with conventional methods.

Findings Six distinct temporal cluster patterns of primary care EHR activity were identified, associated with varying risks of future emergency hospital admission risk. These patterns were visually interpretable, repeatable at a population-level, and clinically plausible.

# For the neediest patients, our vision is for data to be collected and analysed at every point on the care pathway

Patients will be tracked in real time.  Each encounter will go into a series of databases which will be read according to need.

Our scheme would factor in previous history from the patient EPR; make an adjusted risk score and begin the aggregation of longitudinal PLICS data.

Patient experience data would also be collected to help understand care outcomes.

This would be additional to the SH data platform and would enable commissioners and providers to make more informed decisions about the effectiveness of the care being delivered at that moment at that care location.

A full clinical decision capability would be incorporated.

'A clinical decision support system (CDSS) is a health information technology that provides clinicians, staff, patients, and other individuals with knowledge and person-specific information to help health and health care. CDSS encompasses a variety of tools to enhance decision-making in the clinical workflow. These tools include computerised alerts and reminders to care providers and patients, clinical guidelines, condition-specific order sets, focused patient data reports and summaries, documentation templates, diagnostic support, and contextually relevant reference information, among other tools. CDSSs constitute a major topic in artificial intelligence in medicine' **Wikipedia**

# These models will only get better

‘In this paper, we harness the data-time labels of EHR administrative data, which are automated, low-cost, reliable, ubiquitous, and require minimal data preprocessing.

We aimed to determine the usefulness of the datatime labels using a purpose developed machine learning pipeline (figure 1A) to analyse patient trajectories as manifested in EHRs and read their temporal activity (figure 1B) and show it can enrich the performance of emergency hospital admission prediction compared with a conventional approach.’

Each of these patient interactions produces multiple data points, often collected by different systems.

The win is in their collation, combining Hospital and GP data which is do-able.

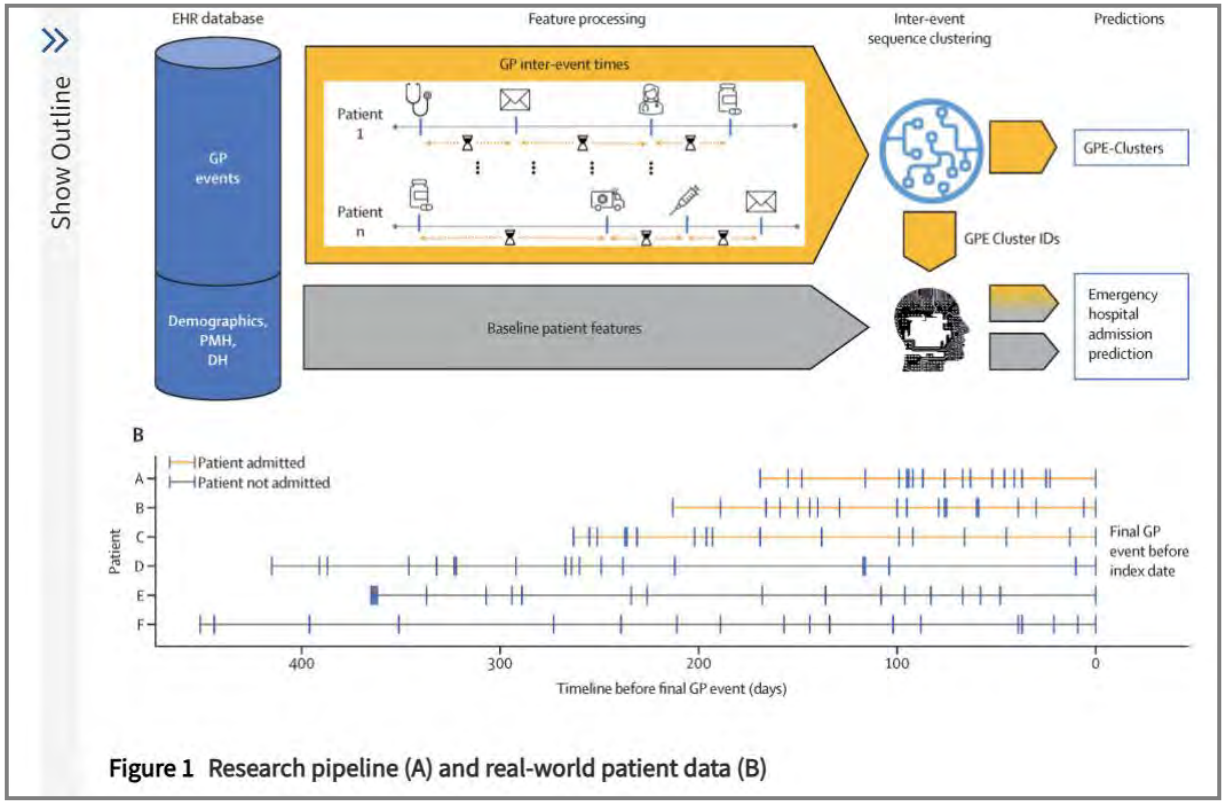



**Figure 1** Research pipeline (A) and real-world patient data (B)

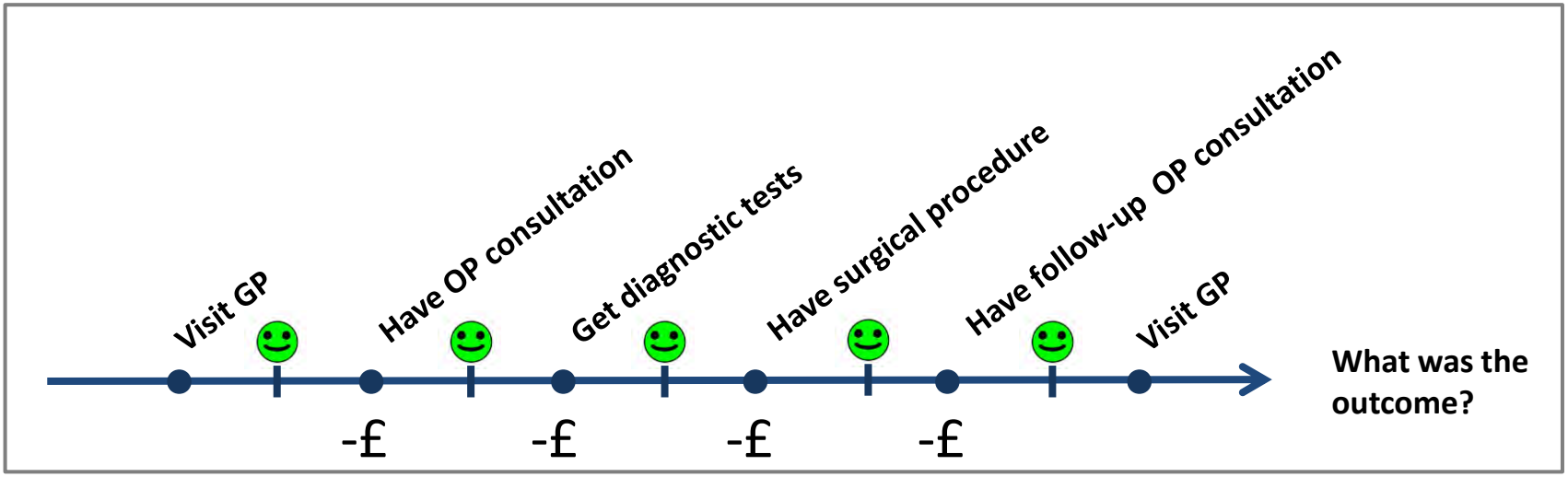
**https://www.thelancet.com/action/showPdf?pii=S2589-7500(24)00254-1**

# This is a simplification of the previous slide. All encounters are recorded in granular detail

Considerably more data is available, also enabling quality and cost information for each episode of care.

As soon as the care episode is recorded this can update the health record, providing input to a decision support system

Care staff can then determine the timing of the next scheduled intervention.



# Once you record episodes of care it is relatively easy to attach cost details and begin to find real value

- Greater engagement of clinicians in costing and financial decision processes, which empowers them to make decisions in the best interests of patients, being fully aware of the cost implications.
- Improved data quality, in all data feeds, helping national submissions and local commissioning datasets to capture procedures more fully.
- Better understanding of the service area's information, to allow better resource and business planning.
- Better quality data for use in negotiation of local tariffs and variations, or to support business cases for commissioner agreement.

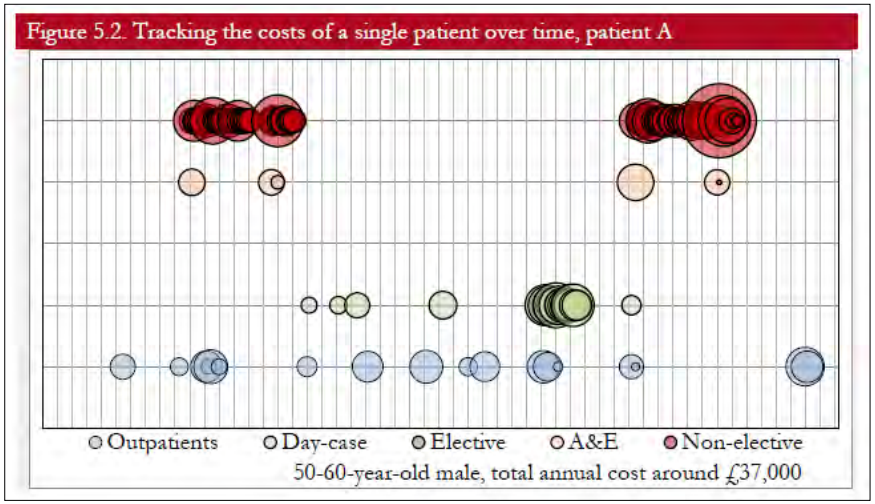
**'Patient-level costing: case for change', NHS Improvement, April 2016.**

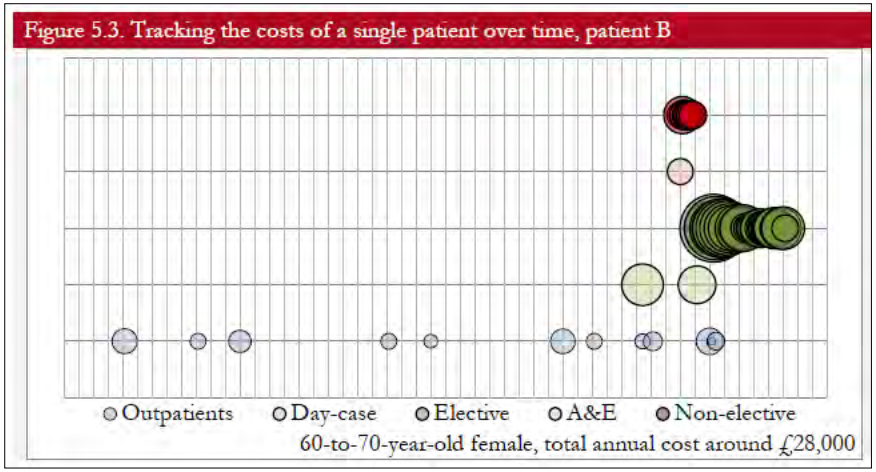
PLICS has been used in community services settings. Technology has been developed that can allocate costs from the individual patient's electronic health record to build a financial history.

For all community activity, the trust's clinicians use the same system to record patient contacts and interventions. To log on, everyone uses a 'smartcard', so that every entry on the system can be tagged with the clinician's 'done by' details (first name and surname).

A reference table can then be used to map each 'done by' to an ESR assignment number. This assignment number can in turn be used to create cost pools from the payroll transactions in the general ledger.

**Lincolnshire Community Health services NHS Trust.**
**'Improving the quality of source information for costing in acute and community services', HFMA, February 2016.**



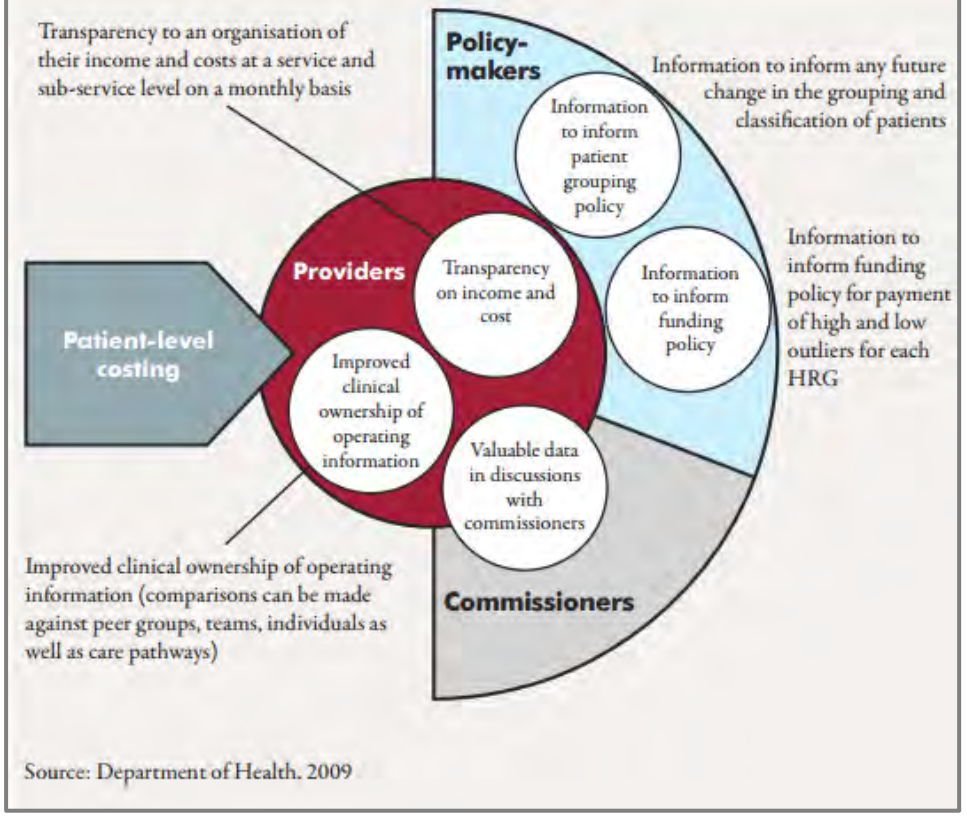
# PLICS can provide real insights into individual pathway costs and enable re-design

- PLICS (patient-level information costing **system**) is a system to derive costs at the patient level. It is IT software (and sometimes infrastructure) locally installed and supported by the provider or the provider's preferred supplier.
- Patient-level **costs** (PLC) are an output of the PLICS system.
- Patient-level cost **recording** is the act of providers inputting data into the PLICS system.
- Patient-level cost **collection** is the process of providers submitting data to NHS Improvement on a national basis (taking over from the Department of Health (DH) in 2019).

**'Costing transformation programme. Patient-level costing: case for change', NHS Improvement, April 2016**

'PLICS allows organisations to identify variation against standardised bundles or pathways of care, between clinical teams, or between different groups of patients. When PLICS is analysed alongside other performance and quality information it becomes even more powerful in understanding the delivery and performance of services.' **NHS England.**

Figure 8: The potential benefits of PLICS, as set out by the Department of Health, showing the main potential beneficiaries




**'Patient-level costing: can it yield efficiency savings?', Nuffield Trust, September 2012.**

# PROMS (Patient Reported Outcomes Measures) should be part of the monitoring system, beginning with high risk patients

'*The national Patient Reported Outcome Measures (PROMs) programme, begun in 2009, collects information from patients about how well the health service is treating them.*

*PROMs allows NHS organisations and clinicians to understand the difference that health care interventions make to people's quality of life.*

*The national PROMs data can enable provider trusts to identify specific areas in which patients feel they struggle/excel during their recovery. This can help trusts to review their care pathway, e.g. to better inform what after-care programmes they might consider introducing.*

*In choosing to participate in the national PROMs programme, patients complete questionnaires asking about their quality of life before and after surgery*'. **NHS England 2015.**

*'PROMs provide information of particular salience for quality and performance measurement across five categories: health-related quality of life, functional status, symptoms and symptom burden, health behaviours, and the patient's health care experience.*

*Many PROMs are intended for use in populations with chronic illnesses. There are a considerable number of PROMs in relation to physical, mental, and social health, particularly for long-term conditions.*

*Another type of PROM measures functional status, a patient's ability to perform both basic and more advanced (instrumental) activities of daily life. Some may address a very specific type of function (e.g., Upper Limb Functional Index) or be developed for use in a specific disease population (e.g., patients with multiple sclerosis), whereas others may be appropriate for use across chronic conditions'.* **National Library of Medicine (US), 2015**

# The initiatives we have outlined will need to be validated. There are third party suppliers who can do this.

New health delivery programmes are often treated with suspicion. There is a strong tendency to maintain the status quo.

Change will only be introduced successfully if it is evidence-based.

A progression to service line delivery will need to measure costs and outcomes.

There are established suppliers of these services (other solutions are available).


## My Clinical Outcomes

My Clinical Outcomes (MCO) is a patient and clinician-facing web-platform that automates the collection and analysis of Patient Reported Outcomes Measures (PROMs) and Patient Reported Experience Measures (PREMs) in routine clinical practice. The video below gives an overview of what we do.

MCO bring over a decade of experience and expertise to support flexible implementation around existing clinical workflows and ensure ongoing success and high value from launch.

# The availability of this information *at scale* will enable users to interrogate databases for their own needs

The micromanagement of the patient becomes possible as more and more data is assembled.

Millions of patients, particularly those with challenging conditions, are today under continuous observation.

The data will provide extraordinary insights to the care provided and its variation.

We will better understand the cost of care for individual patients and cohorts of patients, assisting population health management.

It will address instances of unwarranted variation in care provision, estimated to cost the NHS £billions annually.

All of this is only possible if patients have a combined record of changes in health status, diagnoses and care administered.

# Medical practice will be impacted profoundly by the ability of machines to read health information and AI to assist diagnosis

Clinical decision support will be promoted as soon as there is a single coding system in place covering the entire patient health care experience.

Health systems across the world are already seeing how clinical decision support is improved by the machine reading of electronic health data.

This data is being used to modify clinical guidelines and impact pathway design.

The information can be used either as physician support or as an aid for patients whereby the latest information received can be analysed, interpreted and turned into alerts, reminders or follow-ups.

# How AI will be applied to health care datasets - an introduction

*'The use of Artificial Intelligence can provide unique solutions for health care providers and commissioners.*

*The process extracts the data available from health service records relevant to the task specified by the requesting health care provider. The output will be a dataset that is used to train a Neural Network.*

*The health care provider supplies the initial input to the workflow in the form of a specified programme and any pre-defined patient cohort parameters. The specification includes the conditions that are to be screened, along with a definition of the set of patients to be considered. Patient cohort parameters include limitations to be imposed upon the system - such as number of patients or balance of patients within the cohort.*

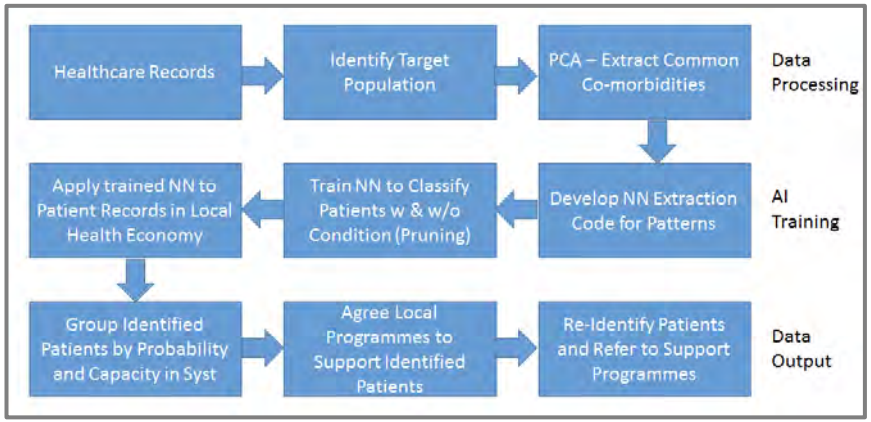
*The trained Neural Network then processes the data to provide a business solution for the requester.*

*Health care records are analysed using the requirements, identifying a target population. Primary Component Analysis is applied to the target population to define the input data set for the neural network.*

*The workflow diagram shown on the next page covers the stages in producing a patient cohort for screening - from the full patient data set through to provision of a patient cohort to the health care provider.'* **i5health**

# This is how the AI work flow happens

The workflow diagram shown below covers the stages in producing a patient cohort for screening from the full patient data set through to provision of a patient cohort to the Healthcare provider.



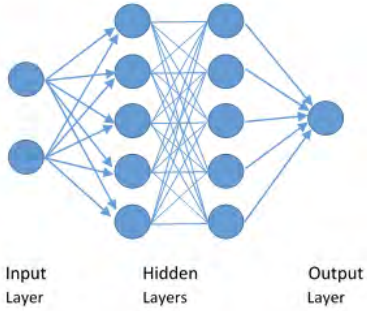

'A neural network is a machine learning programme, or model, makes decisions by using processes that mimic the way biological neurons work together to identify phenomena, weigh options and arrive at conclusions.

Every neural network consists of layers of nodes, or artificial neurons—an input layer, one or more hidden layers, and an output layer. Each node connects to others, and has its own associated weight and threshold. If the output of any individual node is above the specified threshold value, that node is activated, sending data to the next layer of the network. Otherwise, no data is passed along to the next layer of the network.

Neural networks rely on training data to learn and improve their accuracy over time. Once they are fine-tuned for accuracy, they are powerful tools allowing us to classify and cluster data at a high velocity'. **IBM**

## Network

The network needed is multi-layered and uses a back propagation algorithm often called a Multilayer Perceptron (MLP).




The training data set is applied to the network. As the training continues, the generalisation data set is used to check the progress of the network training. The stopping criteria is set as the point at which the generalisation error is minimised.

Following training, the network to can be analysed to ensure optimisation. Nodes within the network that do not contribute to the output may be pruned.

The trained network and can then be used to analyse the data for all patients in the target cohort as defined by the healthcare provider.

Our AI is based on **Deep Neural Networks** and is trained and tested on **millions of medical records** and used for screening programmes, hospital optimisation, reducing complications and health and well-being programmes.

**i5health**

# Decision support systems will work off the data fed into patient record systems

**Intelligent:** CDS systems need to be evidence based and address real-world clinical decisions that would benefit from best practice support. Self-generated data can be used to guide iterative improvement.

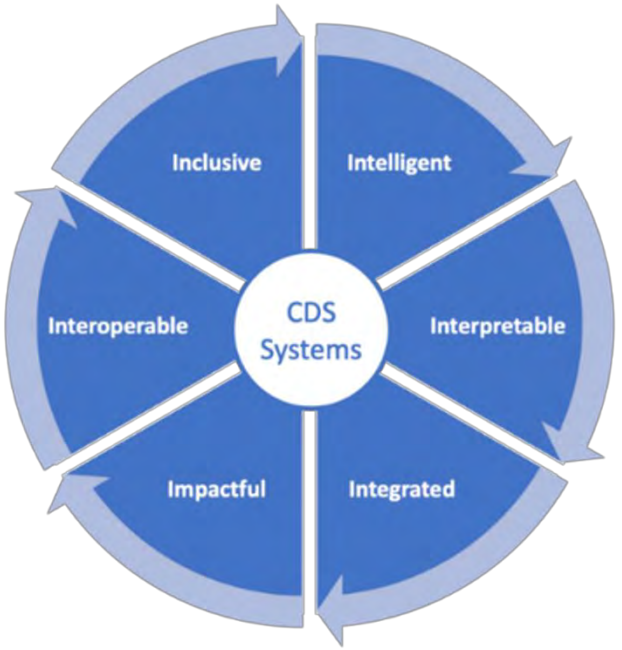
**Interpretable:** CDS systems need to consider the healthcare professional's knowledge of the topic, use clear and unambiguous content, and demonstrate validity and reliability of recommendations by linking to relevant explanations or evidence.

**Integrated:** CDS systems need to be designed to complement workflows. Integration with clinical systems can increase impact by embedding decision support in clinical workflows.

**Impactful:** CDS systems need to consider the experience of users, improve productivity and outcomes, and be clinically safe with mitigations made to reduce potential risks.

**Interoperable:** CDS systems need to interpret clinical data from systems to minimise manual data entry and present result data within relevant clinical systems by using open application programming interfaces (API) whenever possible. Where a relevant computable knowledge library is available, the CDS system should be configured to import high quality knowledge objects coded using global knowledge standards (Wyatt and Scott, 2020).

**Inclusive:** CDS systems need to consider a broad range of end users, be based on trusted clinical data that is representative of the target population and help minimise health inequities by standardising care.




**'Supporting clinical decisions with health information technology', NHS England.**

# Knowledge management – Guildford's opportunity

# Which local organisation will take the lead in data management and analytics?

‘The lessons from public- and private-sector actors aiming to develop AI in healthcare to date suggest that scale matters - largely due to the resources needed to develop robust AI solutions or make them cost-efficient.

Smaller organisations can benefit from working in innovation clusters that bring together AI, digital health, biomedical research, translational research or other relevant fields.’
**McKinsey & Co.**

For the whole GW Alliance system to function efficiently and collaboratively it should work off a common data set .

Both the hospital and practices have their own freestanding patient record systems.

Combining the two would deliver quick wins - early identification of at-risk patients in the community, for example. We have covered this in detail in previous presentations.

We understand there have been Surrey-wide initiatives which could provide long term solutions.
**https://mycouncil.surreycc.gov.uk/documents/s92184/Item%208%20-%20Appendix%201%20-%20Surrey%20Wide%20Data%20Strategy.pdf**

Is there a role for Healthcare Partners Ltd, the RSCH subsidiary?

There are sufficient local initiatives which could lead to combinatorial, marketable, new product opportunities.

With the possibility of Guildford becoming a centre of excellence.

# Can Guildford find its own R&D niche? Care pathway analytics might be one of them.

# The intellectual wealth of local institutions could create a strong foundation for Guildford's economic development

Is there an opportunity to build on the value added by the University?

RSCH says 'we have a Research & Development strategy which we will deliver to attain "University Hospital" status – an external accreditation which would recognise our expertise in R&D and more closely bind us and our partner University of Surrey'.

'This will increase our attractiveness to staff, enhance our reputation and lead to more research and development opportunities'. **RSCH Strategy 2022-25.**


## EXECUTIVE SUMMARY

### The Determinants of Regional Innovation Capacity and Economic Competitiveness

The central economic goal for regions should be to attain and sustain a high and rising **standard of living** for their citizens. The ability to earn a high and rising standard of living depends on increasing **productivity**, which in turn depends on innovation. The central challenge then in enhancing prosperity is to create the conditions for **sustained innovation output**.

A critical driver of innovation output, and one not well understood by academics and policy-makers, is the quality of the regional business environment in which firms operate. This environment is embodied in four broad areas that affect the productivity that can be achieved as well as the rate of innovation. (See Exhibit 1 below).

Exhibit 1: Determinants of Regional Productivity

# This could see the town make substantial GVA gains


In the academic year 2021/22, the University of Surrey generated:

- £1.1 billion GVA and 14,500 jobs in the Borough of Guildford;
- £1.3 billion GVA and 17,620 jobs in the County of Surrey; and
- £1.9 billion GVA and 25,360 jobs across the UK.

## Medical Research

Medical Research generates both health and economic benefits. Not all these benefits can be quantified but those that can are substantial.

The University of Surrey is well regarded for the quality of its health-related research. It ranked 6th in the 2021 UK Research Excellence Framework for research power for health professionals[23] and has a strong track record of working with and on behalf of national charities, research councils, other universities and research institutes.

Adopting a service line approach, operated to best practice by properly funded, equipped and staffed units could create a differentiated, competitively advantaged asset for the town.

Each service line could easily become a new business opportunity. Developing and marketing a best-of-breed model for use across the NHS should attract investors.

# Guildford seems exceptionally well-positioned to build this capability as we pointed out before

| Organisation | Competences |
|---|---|
| Royal Surrey County Hospital | Patient care, hospital management, estate planning, contracting, analytics, IT, Surrey Care Record, Doccla Virtual Ward System, NHS Foundry. Surrey Safe Care |
| Its subsidiary company, Healthcare Partners Ltd https://www.healthcarepartnersltd.co.uk/ | Management consultancy, project management, patient pathway design, supply chains, medical device management, clinical support |
| Surrey Heartlands ICS | Commissioning, care procurement, finance, strategy, estate planning, contracting, IT/Informatics, analytics. Health tech accelerator programme with University of Surrey |
| Procare https://www.procarehealth.co.uk/about-procare/ | Primary care network coordination, community health, out-of-hours service, GP back office services, practice record coordination, management consultancy, IT support, contracting, project management |
| Guildford and Waverley Health and Care Alliance | Local NHS HQ, system coordination, strategy, finance and budgeting |
| PCN GP practices | Primary care, patient records, other GMS and PMS services, contracting |
| University of Surrey School of Medicine | Medical school, AI, Machine Learning, Research, patient risk stratification, hospital management, clinical placements with providers and commissioners |
| University of Surrey Faculty of Health and Medical Sciences | Undergraduate and graduate programmes –biochemical sciences, clinical and experimental medicine, microbial sciences, nutrition |
| Surrey Research Park collaborators | Local companies with health care tie-ins including diagnostics, genomics, therapeutics, molecular imaging, cloud solutions |
| Surrey County Council | Public Health Data. See Surrey-wide Data Strategy, SODA, also Integrated Care System (ICS) strategy |