

Population Health Management Flatpack

A guide to starting Population
Health Management

Version 1.0 (September 2018)



Public Health
England





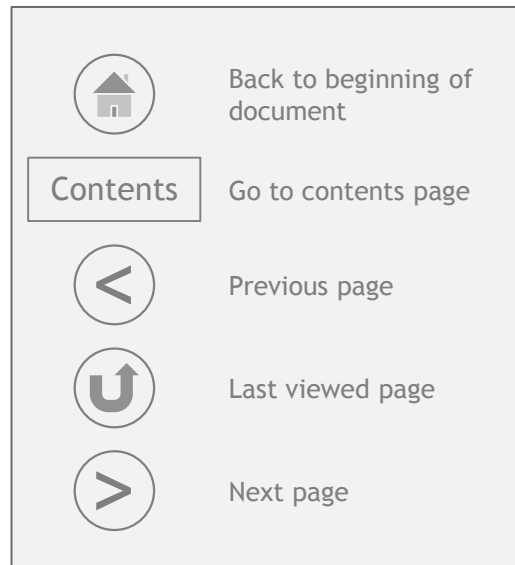
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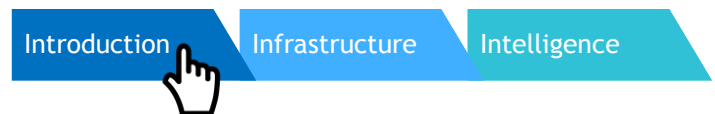
Hyperlinks

Throughout this document there are links to pages, other sections and web addresses for additional information and resources

Hyperlinks are underlined and / or [highlighted in a different colour](#) throughout the report. You can click on them to access further information

Navigation tabs

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About this document

Purpose of this document

The aim of this document is to provide a starting guide to Population Health Management (PHM); equipping systems with the basic knowledge required to understand what is meant by PHM and to allow them to initiate plans for PHM in their area

The flatpack includes:

- Introduction to what is meant by PHM and how it fits with the wider system
- Overview of the core building blocks for successful implementation of PHM
- Overview of intelligence requirements for PHM including approaches and links to resources for understanding population need and identifying and targeting those who will benefit from interventions
- Guide on finding effective interventions and ensuring evaluation is embedded into PHM processes to understand impact
- Case study examples in addition to published evidence to support materials

Target audience

This guide will help STPs and aspirant ICSs at the start of their PHM journey. Many of the applications in the 'flat pack' can be used effectively at 'place' and neighbourhood-levels, adding considerable value to community development, prevention and care re-design initiatives

It can also prove useful for systems who are more mature, but with gaps in capabilities, looking for short-term fixes.

Additional materials

In addition to this Flatpack there are other PHM resources that can support system level implementation:

- PHM Maturity Matrix (Under development)
- National Performance & Population Health Dashboard (Under development)
- [Population Health Management Kahootz Space](#)

Contacts

We welcome any feedback, corrections, etc. as well as any further questions. Please contact:

- Cassandra Yong (cassandra.yong@nhs.net)
- Sarah Smith (sarahsmith30@nhs.net)
- NHS England System Transformation Group PHM Support Team (england.stgphm@nhs.net)

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What is Population Health Management?

Population Health...

...is an approach aimed at **improving the health of an entire population**

It is about improving the physical and mental health outcomes and wellbeing of people, whilst reducing health inequalities within and across a defined population

It includes action to reduce the occurrence of ill-health, including addressing wider determinants of health, and requires working with communities and partner agencies

Population Health *Management*...

...improves population health by **data driven planning and delivery of proactive care to achieve maximum impact**

It includes segmentation, stratification and impactability modelling to identify local 'at risk' cohorts - and, in turn, designing and targeting interventions to prevent ill-health and to improve care and support for people with ongoing health conditions and reducing unwarranted variations in outcomes

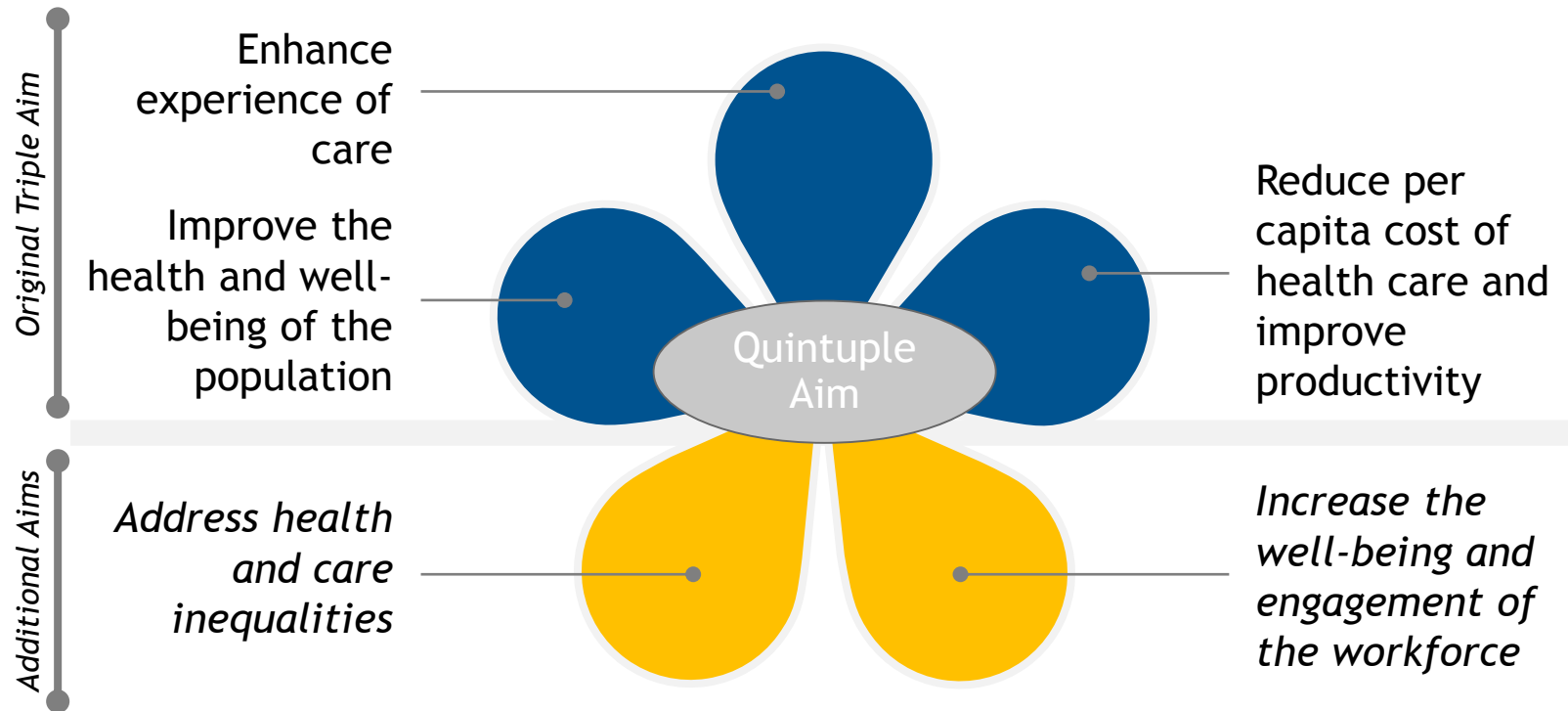




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There are five overall aims of Population Health Management



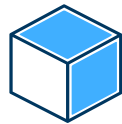
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There are 3 core capabilities for PHM



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What are the basic building blocks that must be in place?



Intelligence

Opportunities to improve care quality, efficiency and equity



Interventions

Care models focusing on proactive interventions to prevent illness, reduce the risk of hospitalisation and address inequalities



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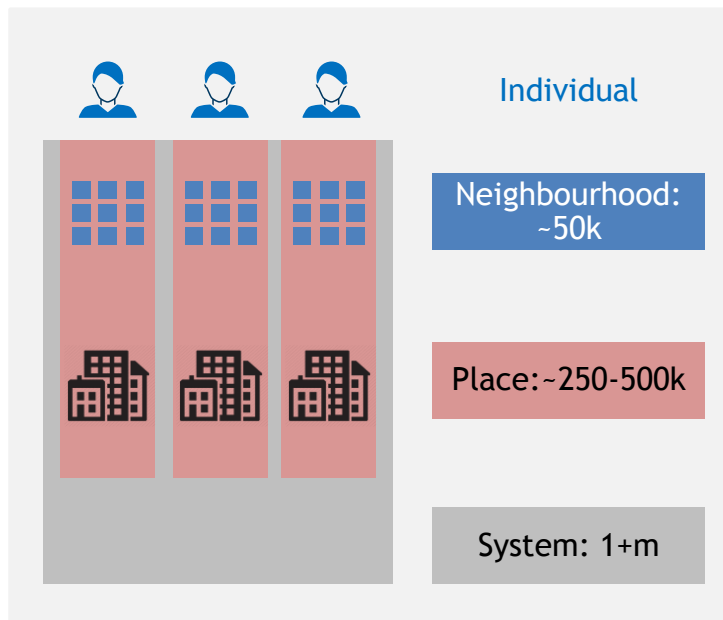


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The three capabilities should be present at different geographical levels

The principles of PHM across different geographical levels within a system should be the same but the purpose and process will differ to be relevant and appropriate to the different population groupings



At the individual level PHM can be used to help personalise care according to need

At the neighbourhood level care pathways and interventions can be considered

At the place level PHM techniques should inform integrated care design

At the system level PHM techniques can inform strategic planning of large scale prevention or tertiary services



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PHM requires a system wide approach to improving outcomes

PHM should have a system wide, **outcome focus**, driven by need and not by existing services.

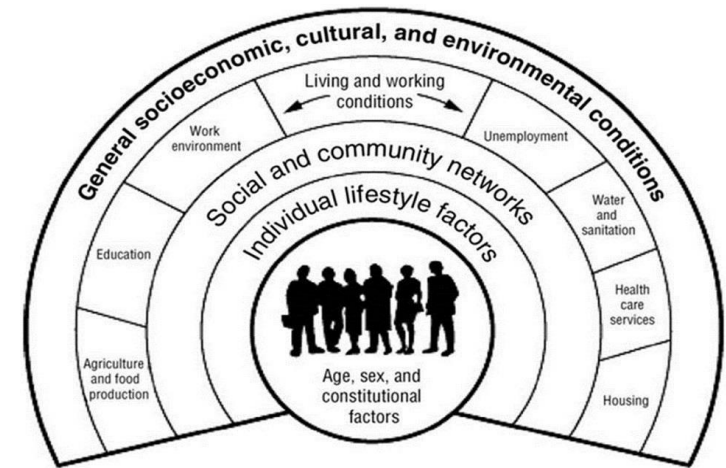
PHM should consider the whole **life course** from addressing the wider determinants of health to early intervention, **primary, secondary and tertiary disease prevention**.

Factors much wider than health and care services alone impact on health outcomes. These **wider determinants** must be taken into account in population health management.

In order to improve outcomes the distribution of health across a population should be considered. Understanding and addressing **inequalities in health** has a positive impact on outcomes overall.

References:

[LGA work on Fair Society Healthy Lives](#)
[Health Profile for England Wider Determinants Chapter](#)
[PHE Fingertips Wider Determinants data](#)
[The Kings Fund Health Inequalities publications](#)
[NHS England Health Inequalities Resources](#)
[PHE Health Equity](#)



Source: Dahlgren and Whitehead (1991)

Case Study: The Montefiore Health System in New York: integrated care and the fight for social justice

Highlights the benefits of health care organisations adopting a broad perspective on their social purpose: applying their skills to the most pressing health care or broader problems facing their communities, even when that leads them far outside their own institutional walls.



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Prevention and the Wider Determinants of Health

Population Health Management can be used as part of a whole system approach to support prevention. Design and delivery of interventions should cover the spectrum of prevention.

Those with diagnosed conditions who would benefit from an intervention that would support them to be as healthy as they can be (e.g. pulmonary or stroke rehabilitation).

Tertiary Prevention
Condition Management

Spot variation in screening uptake to identify those who may benefit from a screening or diagnostic intervention (to help treat, delay or reduce any disease symptoms).

Secondary Prevention
Early Detection

Identify disease risk factors to inform preventative action before a disease is present (e.g. smoking cessation).

Primary Prevention
Risk Factors

Understand what makes communities or individuals susceptible to poor health. This helps strengthen population health outcomes.

Wider determinants

Population Health Management provides opportunities for systems to work together to consider the impact of the **wider determinants of health** on population outcomes. Areas where systems may want to consider action include:

- Air quality : Systems can work in partnership to understand the health impacts of air quality and how these could be addressed to improve health outcomes. This could include joint working between local authority air quality teams, Respiratory Consultants, GPs, Public Health to understand the health impact of poor air quality and to target areas for action.
- Housing e.g. generating a system wide, intelligence led understanding on the impact of housing on physical and mental health.

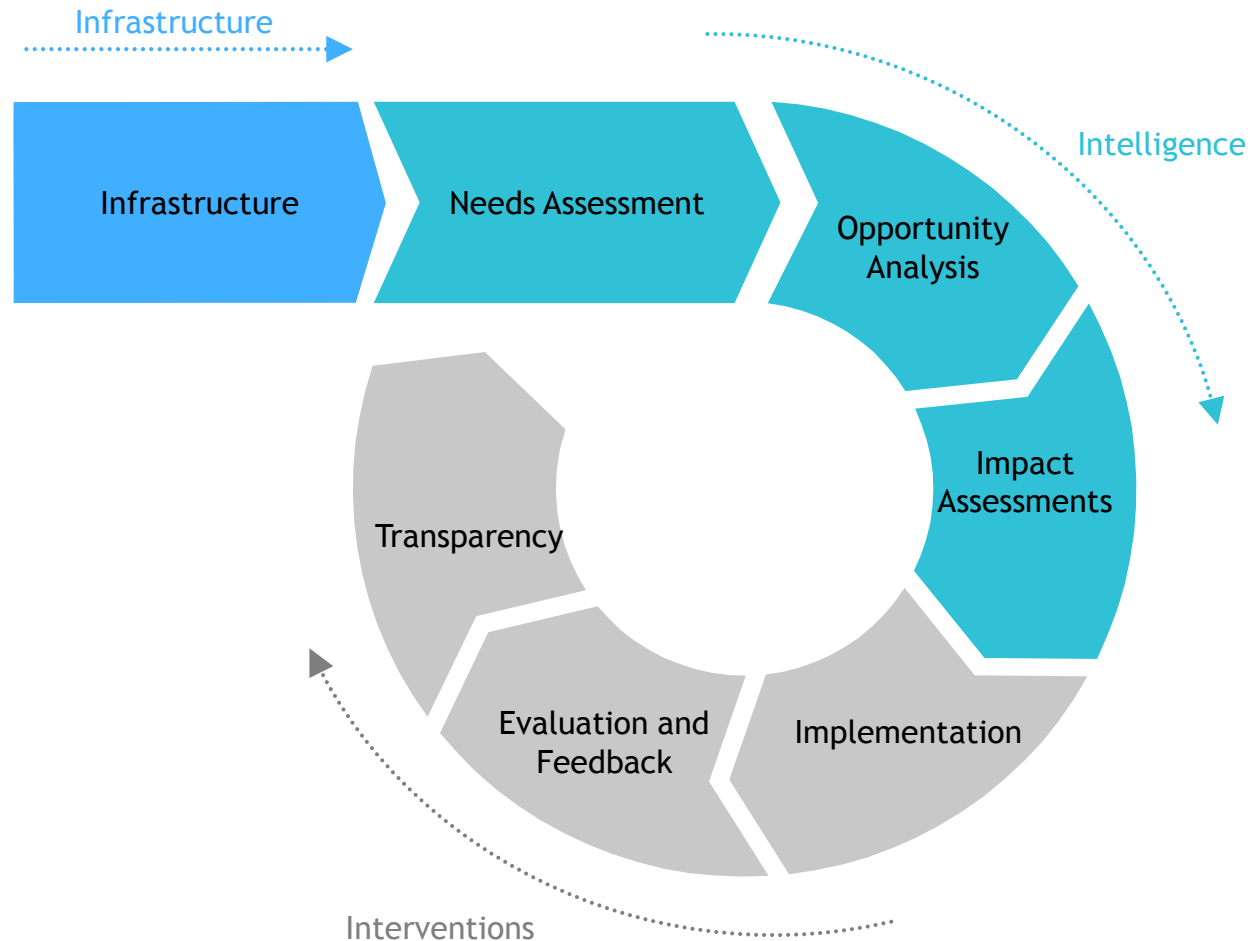




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PHM is a learning cycle; it is important to return to intelligence once interventions are implemented



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PHM is a practical, measurable journey of intelligence-led improvement



Infrastructure

- Set up a leadership team and governance representative of all parts of the system and capable of making decisions for the wellbeing of the population
- Have clearly defined, common population definitions across the system for each the geographical levels (system, place and neighbourhood)
- Make sure there is clear Information Governance (IG) set up across the system with a single accountable officer
- Be clear about the data sets that are available across the system and how they can be used



Intelligence

- Understand the specific needs of the local population, the impact of wider determinants (e.g. housing related data) and to explore gaps in care and unwarranted variation, through e.g. segmentation
- Identify high and emerging risk groups most amenable to interventions and target them through tools such as risk stratification and impactability models
- Size the opportunity and conduct system modelling to understand impact on financial risks and incentives



Interventions

- Design care models and interventions based on evidence to target priority patient groups and implementation plans, making a clear and compelling case for change with contributing resources agreed at all tiers
- Define key indicators and outcomes to be measured and evaluated for success
- Map and model workforce changes to determine gaps and new role definitions
- Implement interventions and care models
- Evaluate impact against agreed indicators and outcomes, and whether any changes are needed to be made (going back to understanding the needs of the population)

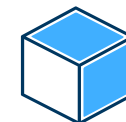
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Leadership

- Set up a leadership team driving PHM representative of all areas of the system (Social, community services, primary care and acutes; clinicians, patients, managers, public health experts)
- Develop a shared vision and collective understanding of the purpose of understanding population need

Population Definitions

- Have shared definitions of population geographies / levels (system, place and neighbourhood) across a system so there is a common language
 - Should be a meaningful geographic footprint that respects patient flows and local authority boundaries (or clear arrangements to manage this)

Data Infrastructure

- Look at what population-specific data is available in the system for analysis, including both healthcare data and non-healthcare data
- Think about how data can be brought together into records for each individual in the population

Information Governance

- Consider IG requirements as soon as possible to ensure compliance - involve internal IG teams to assist
- Key elements of IG in PHM to consider include transparency, adequacy of what data is shared and having a data sharing agreement in place

Digital Maturity

- Understand the potential digital requirements around PHM as it grows and develops (e.g. bespoke systems to integrate the data)

Capacity and Capability

- Understand the analytical capacity and capability already within the system and develop a plan on how to shape that to meet the future analytical capabilities required in order to conduct PHM analytics, etc.



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Understanding Need

- ✓ Decide on how population need will be identified.
- ✓ Decide on what outcome measures will be used across the population.
- ✓ Identify data sources that illustrate the outcome measures for the defined population.
- ✓ Collate the information on population need and share across the system.
- ✓ Combine information on need with views from across the system in a transparent way to summarise the agreed need for the population.

Define the question being asked:

- ✓ Translate outputs from the population health needs assessment to define question to be answered by population health management tools.

About who? - What is the organising principle?

- Condition specific
- Driven by a known effective intervention
- A demographic Factor
- A combination of factors, e.g. CVD and deprivation

For what purpose within the system?

- Decide how the information will be used
 - To inform strategic planning / system transformation / pathway development or individual care level design?
 - At what population geography?
 - Is it intervention led / outcome improvement led / need led?

Use this to decide of what approach to PHM is the most appropriate?

- Population Segmentation
- Risk Stratification
- Impactability
- Other tools



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Implementation of Effective Interventions

- Design care models, interventions and implementation plans based on evidence to target priority patient groups, making a clear and compelling case for change with contributing resources agreed at all tiers
- It is not necessarily about making wholesale changes to the local healthcare environment; it can be seeing where services can be adapted or tweaked so they are more relevant and useful for the local population
- A 'one-size-fits-all' approach may not work for all; therefore, it is important to be flexible and work to reduce any potential exacerbations in inequalities
 - May need multiple interventions, or think about interventions at system, place and neighbourhood levels

Workforce

- Understand the impacts interventions will have on the workforce and plan accordingly, leveraging resources across the system and tiers to fill gaps and identify further gaps and any new role definitions

Patient Empowerment and Activation

- As part of designing interventions and care models, consider what are the best suited tools to support the whole population, long term conditions and complex care needs, e.g. digital services, self-care programmes, personal health budgets, health champions and local area care coordinators

Care Integration

- A large part of change efforts is making the system data-led and heading towards data driven leadership
- As well as consulting the insights from the data, it is critical to engage with other key stakeholders such as clinicians, analysts and managers when making decisions to transform local care
- Getting front-line staff to drive initiatives forward, engaging them from the start of the analysis period is critical to successful implementation of new interventions and care models

Evaluation

- There needs to be ongoing monitoring and evaluation to ensure the programme being implemented remains fit-for-purpose as the population evolves and changes
- Define key indicators and outcomes to be measured and evaluated for success
- Evaluate impact against agreed indicators and outcomes, and whether any changes are needed to be made

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Infrastructure

The **infrastructure** is the set of basic building blocks that are core for a system to manage the health and wellbeing of a population

This includes having shared and effective leadership, defining the population in question, having an agreed information governance and basic elements of digital and data infrastructure

This section provides an overview of each of these elements and a starting point, although it can be developed much further





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Recap: Infrastructure Overview

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Leadership

In order for PHM to work, it is important that all organisations across a system are willing to collaborate and work together towards a common goal

It is recommended to have a working group that meets regularly, representing the whole system to help drive forward PHM

Who should be involved?

Representatives of the below organisations covering the various 'places' within the given system:

- Local Authorities
- Primary Care (incl. dental, pharmacy, etc.)
- Community Providers
- Mental Health Trusts
- Acute hospital Trusts
- Voluntary and Community Sector Organisations
- Integrated Care Systems

It is also important to involve different roles within decision-making, such as:

- Clinicians
- Directors of Public Health and other public health professionals
- Citizens / community groups and service users

What characteristics should the working group have?

- A common vision
- Commitment from all parties to making the vision a reality
- Mechanisms for effective collective decision-making
- Transparency in decision-making and governance
- Involvement of clinicians, patients, public health, citizens, etc. in decision making and system redesign through co-production



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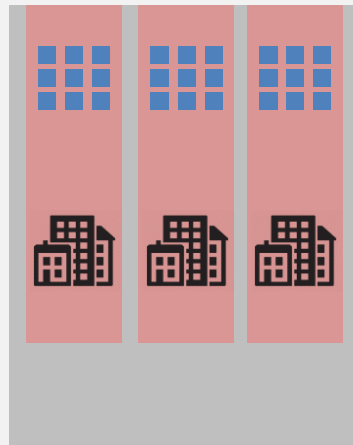
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Population Definitions

We must define what population is being addressed before we can start managing its health and wellbeing. A **system population** should be:

- A meaningful geographic footprint that respects patient flows
- Contiguous with local authority boundaries, or - where not practicable - clear arrangements for working across local authority boundaries
- Covers one or more existing STPs, with a population of ~1m or more

Reminder:



Population size

Neighbourhood:
~50k

Place: ~250-500k

System: 1+m

'Place' is typically synonymous with local authority and CCG footprints, meaning that some systems may have 1 Place but some may have as many as 5

'Neighbourhoods' typically corresponds with Primary Care Networks (groups of ~10 GPs)

The aim is to eventually have a shared understanding of the population and preventative measures in place at the system, place and neighbourhood levels, with priority target groups identified, based on evidence

See for further information:

[Understanding Population Need](#)



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Information Governance

Information Governance (IG) is the way in which Care Systems handle all of their information, in particular the personal and sensitive information relating to individuals

IG is an essential component of PHM because it requires the collation, linkage and analysis of data from a large variety of clinical and non-clinical sources, all of which needs to be protected through robust governance processes

Moreover, these data will be drawn from a range of local authorities, health and care organisations, which creates a further degree of complexity from an IG perspective. The key is to engage with IG professionals early enough in the process to ensure that privacy is designed into the whole process right from the start. By doing so, IG can become a facilitator of population health management rather than a blocker.

“ Experience showed us that many of the Vanguards regretted how they treated IG as a bit of an afterthought. If you have been involved with IG, you will know that the earlier you engage with IG professionals the better. The problem comes when clinicians and managers forget about IG and then half way through the journey they think ‘Oh no, what are we going to do about this?’

Dr Geraint Lewis
Chief Data Officer for NHS England

“ I think that’s a difficult one because you have a couple of elements to consider. You’ve got to have the right data available at the right time so you want the sharing of data between organisations and sources, but you also want there to be appropriate controls in place to ensure the data is protected and there’s a legal basis for sharing as well

NHS England



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Privacy and data protection

For any health system wishing to undertake population health management a key early task is to shape the information governance architecture. A privacy by design approach should be adopted within the information governance architecture which:

- “ Encourages organisations to ensure that privacy and data protection is a key consideration in the early stages of any project and then throughout its lifecycle, e.g. when:
- Building new IT systems for storing of accessing personal data,
 - Developing legislation, policy of strategies that have privacy implications,
 - Embarking on a data sharing initiative
 - Using data for new purposes

www.ico.org.uk/for-organisations/guide-to-data-protection

Due to the nature of PHM information collection from across the system it may be used for both primary and secondary uses. Person identifiable information for direct care activities can be shared between providers however this is not the case for information to inform commissioning where data must be de-personalised.

Commissioners can contract providers to undertake PHM activities on their behalf provided this scope of decision making is documented in advance.

Throughout the PHM process the roles and responsibilities of the data controller and processors must continue to be clearly defined to ensure accountability of data. In addition to obtaining patient consent to use data organisations must allow patients the option of removing their permission if they no longer allow their data to be shared.



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System-Wide Information Governance

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To facilitate the system wide approach that is required for PHM IG arrangements should cover a range of local data sources including; NHS providers and commissioners, PHE, local authority, third sector providers, housing associations, NHS Digital and other third parties.

IG requirements such as General Data Protection Regulation, the new Data Protection Bill and the Information Commissioners Office Code of Practice on Anonymisation should be adhered to. Gathering this wealth of information across the system is an onerous task and requires joint working with organisations to gain access to data. Data sharing agreements should be part of this process.

Linking the data

Once data agreements are in place and information is accessed, the next step is to link the data. The process can be complex. Not all data sources use the NHS number. In these cases different mechanisms to link the data can be explored. These can be done using a technique called “fuzzy matching” which some systems already have built in. This process is not completely accurate so other mechanisms should be explored.

In Kent a Unique Property Reference Number (UPRN) was used as an additional check. Allowing linkage of non-clinical data from organisations that collect household information.

Case study examples of system data collation:

- Kent Integrated Dataset - 800million rows of data from >230 local organisations.
- Salford Integrated Care Record - health and social care data relating to the Salford Geographical footprint.
- Arc digital platform. Connected Health Cities encompassing areas of Yorkshire, North East Coast, North West Coast and Greater Manchester.

Refreshing the data

Due to the nature of the measures some metrics do not require real-time refreshes. PHM information used to inform strategic planning relies on longer term patterns and trends.

The use of data and type of metric should therefore be considered in writing data agreements so that data refreshes are fit for purpose.



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Information Governance - Getting Started

- ✓ Appoint a single accountable officer for IG across the system; typically a CIO type role for the system
- ✓ As a starting point for Information Governance when dealing with data, there are few questions to think through:
 - What are the identified priorities of the system?
 - What are the questions that we are seeking to answer?
 - Are there anonymous data-sets that could be used to answer those questions?
 - What data-sets need to be linked?
 - Could people be identified through linking those data-sets?
 - What is the legal purpose for linking those data-sets?
 - Who has the statutory authority?
 - Thinking about data protection 'by design' and 'by default', i.e. need to integrate data protection into processing activities and business practices from design stage and through the lifecycle



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Information Governance - Resources

Useful Links

- [IGA GDPR guidance](#)
- [Information Commissioners Office - Regulator and Enforcer of GDPR/Data Protection Act 2018, along with FOI and EIR Regulations](#)
- [Information governance network](#)
- [Personal Health Record Interoperability Handbook](#)
- [Anonymisation Code of Practice](#)
- [Health Research Authority \(for s251 applications and information on Confidentiality\)](#)
- [Department of Health and Social Care Webpage](#)
- [Information Governance Alliance \(IGA\)](#)
- [National Opt-Out](#)

Case Studies

- [Examples of sites that have integrated care records](#)
- [Tower Hamlets - East London Patient Record \(eLPR\)](#)
- [Case study - North East Hampshire and Farnham - Hampshire Health Record](#)
- [Case study - Salford - Integrated Care Organisation \(ICO\)](#)
- [Case study - Wirral - Sharing information](#)



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Digital Maturity

Digitalisation is a core component of delivering effective population health management

Why is digitalisation important?

- It allows a health and care system to understand the needs of its population and opportunities to improve the care being delivered
- It supports transparency of financial information to ensure that value-for-money is being achieved
- It allows a health and care system to understand unwarranted variation both within in the health system and between the health system and its peers
- It helps budget holders and care providers ensure the quality and efficiency of the care being provided and its impact on health inequalities
- It provides access to intelligence to support planning, implementation and evaluation of the population health strategy.

Digitalisation can support clinicians in delivering direct patient care, but also allowing us to design care systems around a whole population, backed up by effective business intelligence systems. The prospect of giving patients more influence over the care they receive and the digital capabilities that support that has shifted from a noble intention to a strategic imperative.



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The End Goal: Shared Electronic Records

The long-term aim is to have:

- All parts of a system with core digital capabilities in place supported by effective decision support tools
- Established use of shared longitudinal electronic record, in real time, to support integrated and patient-centred care pathways
- Consistent use of data to support population health management approaches and research

As [Greenhalgh \(2008\)](#) found, this is a difficult process. It requires a complete commitment from members of staff to the vision of what shared electronic records could do for the service and, most importantly, for patients. Data is only ever as accurate as the patients and professionals who are updating it.

When done correctly, it can:

- provide a systematic view across the health and care economy
- predict important changes in the defined population
- allow a tweaking process, as workforce and service delivery are carefully matched to the predicted population's changing needs.



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The End Goal: Shared Electronic Records (continued)

Initially built up from institutional electronic care records, the maturity of this record will increase over time. However, at a minimum it needs to alert all clinicians involved in a patient's care about gaps in care (for example, overdue immunisations) and their patient's eligibility for preventive interventions (for example, eligibility for review by a multidisciplinary team).

The journey to becoming fully digitalised requires common information standards, common coding standards and shared - or fully interoperable - IT systems to support the real-time exchange of information such as referral requests, social care assessments and discharge summaries. Although the data are recorded primarily for direct care, they can be analysed in depersonalised formats to allow for increasingly sophisticated analyses as the data becomes richer and more comprehensive.

Finally, for this long-term ambition to be realised, the health system will require a shared approach to improving data quality, together with a common data management policy, common processes, and agreement on topics such as data access, data storage, data processing, linkage and transformation.

However, it is key to remember that whilst it is important to be working towards the end goal, it is not necessary to be at full digital maturity in order to start doing PHM and that are many short-term workarounds, as laid out in this document.



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The End Goal: Shared Electronic Records (continued)

“ If these health systems are going to behave like a single organisation it means all of the clinicians working within them will need to be able to exchange information at a clinical level with each other. In an ideal world it would effectively look like a single electronic record for everyone working in that integrated care system (ICS). We all know that's far easier said than done, so in the meantime there probably needs to be some kind of more pragmatic approach to it where you might have a portal or tab where clinicians can at least read information entered by their peers.

I think there are some features which are critical for population health management such as alerts about gaps in care. A gap in care arises where a patient is receiving care that varies from what evidence-based guidelines recommend. An important feature of any shared electronic record is a way for everybody working in that ICS to see all of an individual patient's gaps in care. A great feature of many Accountable Care Organisations in the United States is that every clinician can see all of the gaps in a given patient's care. So, for example you might have a patient who was going to Dermatology to have somebody look at their rash, but in that Dermatology clinic, an alert would pop-up and say this patient's blood pressure hasn't been measured for the last 12 months. Staff in the Dermatology clinic can then go ahead and measure the patient's blood pressure there and then and close that gap. Crucially, every clinician in that ACO would know that the blood pressure had been measured and that's therefore one less thing for the patient's GP to worry about. So, it's a way of improving a patient's experience because they can have all their issues dealt with there and then, but also improves the quality and efficiency of care.

Dr Geraint Lewis
Chief Data Officer for NHS England



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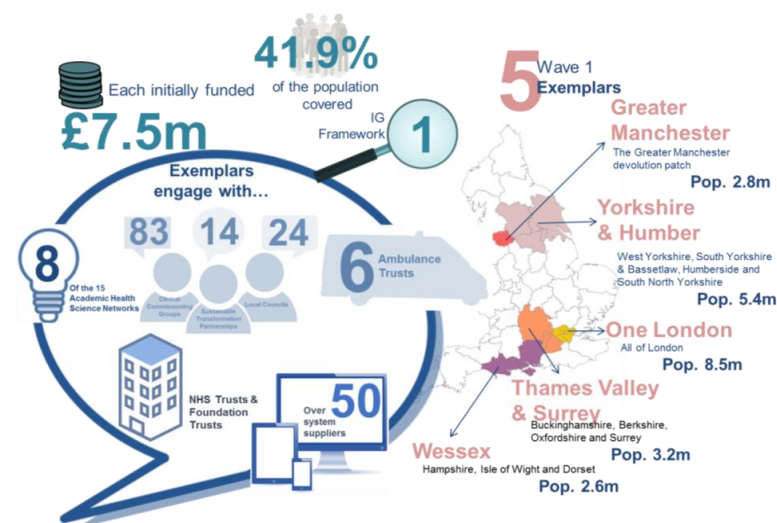
Local Health and Care Record (LHCR) Programme

The Local Health and Care Record (LHCR) programme supports NHS and local government organisations to collaboration in creating an information sharing environment that helps our health and care services continually improve. In ensuring information is collected consistently it enables people's information to be accessed by their health and care team as they move between different parts of the NHS and social care and provide access to patients themselves. In the long term, Exemplars will help the NHS, public health and social care to understand patterns of illness and preventative measures, allowing providers to run their services effectively and flexibly to meet the needs of local people.

Five Exemplars were funded in the first wave, with further waves planned throughout 2019/20. The successful first wave Exemplars are based in local areas that are already adopting best practice in the collection, protection and use of health and care data

They will:

- Ensure information is collected consistently and made available across local areas to support **joined up and safer care**
- Enable people's information to be **accessed by their health and care team**, safely and securely, as they move between different parts of the **NHS and social care**
- **Build on** and learn from **existing local initiatives**
- Encourage further waves to **follow swiftly in their footsteps**





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Digital Maturity

Useful Links

Digital Maturity Assessment:

<https://www.england.nhs.uk/digitaltechnology/info-revolution/maturity-index/>

- The Assessment measures maturity against the following key themes:
 - Readiness: the extent to which providers are able to plan and deploy digital services
 - Capabilities: the extent to which providers are using digital technology to support the delivery of care
 - Infrastructure: the extent to which providers have the underlying infrastructure in place to support these capabilities

HIMMS Usability maturity Model: <http://www.himss.org/himss-usability-maturity-model>

EMR Adoption Model (EMRAN): <https://www.himss.eu/healthcare-providers/emram>

- This model allows to track progress against other healthcare organisations around Europe and across the world. This eight-stage (0 - 7) maturity model measures the adoption and utilisation of EMR functions required to achieve a paperless environment that harness technology to support optimised patient care.

Local Digital Roadmaps: <https://www.england.nhs.uk/digitaltechnology/info-revolution/digital-roadmaps/>

Digital Primary Care: <https://www.england.nhs.uk/digitaltechnology/info-revolution/digital-primary-care/>

Local Health and Care Records: <https://www.england.nhs.uk/publication/local-health-and-care-record-exemplars/>

Fully interoperable data set: [NHS Digital information on SCRs](#)



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Case Studies

[Case study - Morecambe Bay - Increasing use of Telemedicine](#)

[Case study - Erewash - Telehealth](#)

[Case study - Airedale & Partners - Telehealth technology and virtual learning](#)

[Case study - Morecambe Bay - Telemedicine](#)

[Case study - Fylde Coast - Teleswallowing](#)

[Case study - Neuro Network - Walton Centre telehealth](#)

[Case study - Hampshire - Web GP eConsultant](#)

[Case study - Fylde Coast - Digital Leaders](#)

[Case study - Mid Notts - Florence telehealth \(Harnessing Technology\)](#)

[Case study - West Wakefield Schools App Challenge - Wakefield Connecting Care](#)

[Case study - Stockport Together - Advice and Guidance](#)

[Case study - Stockport Together - Breaking down communication barriers between GPs and consultants](#)

[Case study - Dudley - Nurse avatar](#)



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Data Infrastructure

The Data (Management) Infrastructure capability encompasses the specification, sourcing, exchange, storage and processing of useful, high-quality data that is used to generate population health intelligence

There are three stages of maturity (in increasing maturity):

- Data only available about individual care settings aggregated across the system, no ability to link person level data sets.
- High quality data available and capable of being linked in ways that support effective analysis, with appropriate legal basis, across several settings of care (primary, secondary, social care, ambulance, community). Some real time data.
- High-value and quality data comprehensively available, linked to the priorities of the system, integrated across all settings of care including data sets that inform understanding of wider determinant of health. Data are capable of being linked in ways that support effective analysis. Real time data and patient tracking available.

As with digital maturity, whilst the long-term aim is to reach full maturity, there are short-term solutions that are able to help systems start with basic PHM



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Capacity and Capability for delivery of Population Health Management

Analytical Capacity and Capability

PHM often pulls on an analytical skill set that may not exist in a system, due to the different nature of analytics required ('strategic' vs reporting)

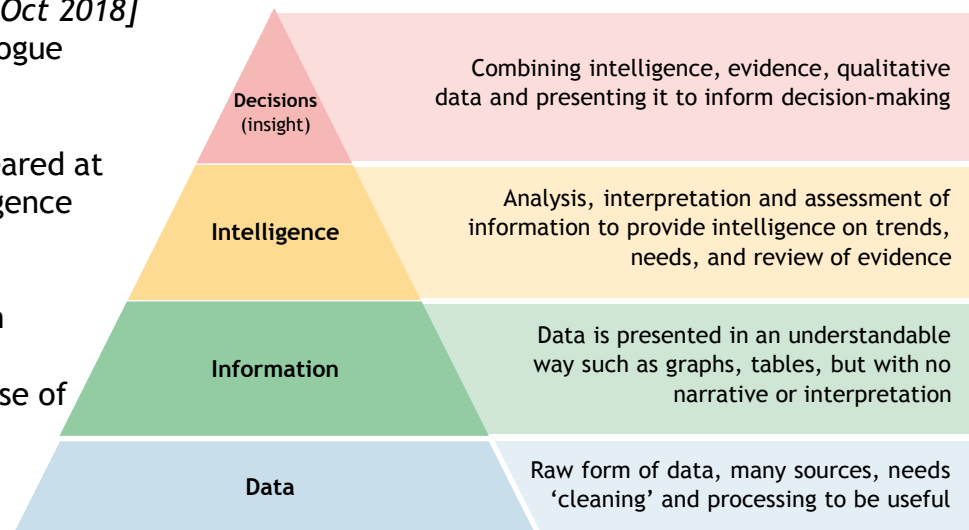
Setting up a system for the future may involve the creation of new roles, training of staff, pooling of analytical resources across organisations, amongst other changes

There are a number of resources available to help shape and develop analytical teams for PHM

- NHSE - Analytical Skills audit *[Launch: Oct 2018]*
 - Tool designed to help systems catalogue existing
- PHE - LKIS PHI Training programme; geared at
 - local authority public health intelligence analysts
 - public health practitioners
 - people working in population health intelligence roles
 - managers wanting to make better use of population health data



PHE PHI Training
Prospectus





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Tips for getting started on Infrastructure

- ✓ Start on a small scale before scaling up: do not be over-ambitious at the outset
- ✓ Consider the state of the local population and understand their key areas of focus
- ✓ Consider the organisational culture in relation to the principles of PHM. Develop a shared vision and collective understanding of the purpose of understanding the population's needs
- ✓ Look at what population-specific data is available within the organisation for analysis, including both healthcare data and non-healthcare data
- ✓ Initiate and develop relationships with other local organisations with the aim of using their data for the purpose of PHM. These organisations do not necessarily need to operate in healthcare, as nonhealthcare data is also valuable (wider determinants of health)
- ✓ Think about how data can be brought together into records for each individual in the population.
 - This process could be as simple as brining the data together in a single table or file. Unique identifiers such as NHS number and UPRN could help join the data of individuals together, as well as techniques such as 'fuzzy matching' or 'data blending'
- ✓ Understand the potential digital requirements around PHM as it grows and develops (e.g, bespoke systems to integrate the data)
- ✓ Consider IG requirements as soon as possible to ensure compliance - involve internal IG teams to assist in this
- ✓ Key elements of IG in PHM to consider include transparency, adequacy of what data is shared and having a data sharing agreement in place



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PHM involves intelligence-led planning and delivery of services, aligning services with population need in order to improve outcomes.

Once the right infrastructure is in place, the first step in the intelligence process is to [understand population need](#). This is then followed by use of tools and techniques to [align need with effective interventions](#).

The information gathered in the intelligence phase of PHM informs “what” interventions are implemented to “who” in the population and “how” this will be measured.

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- I. Understanding Population Need
 - Collating and Presenting Data
 - Information Sources
 - Population Health Profile
 - System Level Workshop
 - Prioritisation of Need
- II. Opportunity Analysis
- III. Tools to target those in need
 - Population Segmentation
 - Risk Stratification
 - Impactability
 - Other tools
- IV. Impact assessments



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Recap: Intelligence Overview



Understanding Need

- ✓ Decide on how population need will be identified.
- ✓ Decide on what outcome measures will be used across the population.
- ✓ Identify data sources that illustrate the outcome measures for the defined population.
- ✓ Collate the information on population need and share across the system.
- ✓ Combine information on need with views from across the system in a transparent way to summarise the agreed need for the population.

Define the question being asked:

- ✓ Translate outputs from the population health needs assessment to define question to be answered by population health management tools.

About who? - What is the organising principle?

- Condition specific
- Driven by a known effective intervention

For what purpose within the system?

- Decide how the information will be used
 - To inform strategic planning / system transformation / pathway development or individual care level design?
 - At what population geography?
 - Is it intervention led / outcome improvement led / need led?

Use this to decide of what approach to PHM is the most appropriate?

- Population Segmentation
- Risk Stratification



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Understanding Population Need

The first step in PHM intelligence is to understand the needs of the population as a whole, as well as the sub populations within it. In order to improve population outcomes the current state of population health needs to be understood.

For ICS this involves both considering information at a system level and for those geographies within the system - the constituent CCGs and Local Authorities and the communities that make up these areas. This may already be available at a “place” geography in the form of a Joint Strategic Needs Assessment (JSNA).

What are the key health and care issues affecting our population?

This process should be outcome led and support a strategic shift in focus from designing and commissioning services based on utilisation and financial measures, to designing services based on population need in terms of health and care outcomes and reducing inequalities. The information gathered should focus on improving outcomes around the quintuple aim.

Where should we focus our efforts?

Once the information is gathered to this should be presented and considered with other aspects of the system to inform a needs assessment. These other aspects include; political will, existing national and local policy, knowledge of existing initiatives, clinical and professional input and the view of those living within the system population.

This will communicate the focus for a system, combining intelligence with other drivers to give an overall picture of where effort should be targeted.



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There are three steps to defining Population Need

1 Collate and present data on population need

Gather information relevant to the geography of the population. Present the information in a format that provides an overview of the need of the population. Summarise and share insight with system leaders.

Example Output
This could be achieved using a **Population Health Profile**.

2 Critically review the data in the context of the system

Review the available data in the context of the population and the system. Combine the information with information from clinical and patient / citizen feedback.

Example Output
A system level workshop to consider the quantitative and qualitative insight from across partnerships on population need.

3 Prioritise issues facing your population

Agree key priority areas for the population. These could be specific disease groups, demographic factors, disease risk factors or wider determinants of health. Quantify what improvements the system would hope to see in which areas and how this will be evaluated.

Example Output
A document detailing the key priorities and rationale behind these .



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1 Collating and Presenting data on Population Need

A first step with in understanding need is to gather and present information that communicates the issues that are most pressing for the population. For an ICS this involves both considering information at a system level and for those geographies within the system.

It should include information on factors across health and social care and the wider determinants of health. Condition specific intelligence should be considered alongside the impact of co-morbidity and complex conditions such as frailty. The impact to the whole population should be considered in addition to subgroups of the population such as different geographies, different demographic factors and different groups with protected characteristics.

Joint Strategic Needs Assessment

A Joint Strategic Needs Assessment (JSNA), currently available at each “place” demonstrates how population need is summarised locally. It looks at the current and future health and care needs of local populations to inform and guide the planning and commissioning (buying) of health, well-being and social care services within a local authority area.

JSNA is a statutory responsibility of the local Public Health teams under the remit of Health and Wellbeing Boards and JSNAs inform local Health and Wellbeing strategies.

JSNAs offer a useful starting point for ICSs to understand local “place” needs and can be useful to inform system level priorities.

References

NHS Improvement: [Making Data Count](#)

Department of Health: [Joint Strategic Needs Assessment and joint health and wellbeing strategies explained](#)

King's Fund: [Health and Wellbeing Boards - Explained](#)

Nuffield Trust: [Trusted measures: analytical resources for integrated care](#)



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Information Sources to Help Understand Population Need

There are multiple sources of data available to help to quantify population needs

On the next few pages, suggested example metrics along with information sources have been laid out, organised by the quintuple aim for improving population health:



A full list of information sources available at a system level through PHE Fingertips <https://fingertips.phe.org.uk/> can be found here [INSERT DOC LINK]

References

[Analytical Resources for Integrated Systems - The Nuffield Trust](#)

[NHS Improvement Good Indicator Guide](#)



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Example Metrics: Address Health and Care Inequalities

Category	Metric	Measure / Data source
Deprivation	Index of Multiple Deprivation (2015)	Assigned to practice at MSOA level also available at LSOA level
Vulnerable population groups	Learning Disability Prevalence	Learning Disability Profiles https://fingertips.phe.org.uk/profile/learning-disabilities
	Care Home Patients	GP reported prevalence, QOF, GP Practice Level Data https://fingertips.phe.org.uk/profile/general-practice
Employment	Income, Hours worked	https://www.ons.gov.uk/employmentandlabourmarket https://fingertips.phe.org.uk/profile/wider-determinants/
Population demographics	Population numbers, Age, Gender, Ethnicity, Population Change, Immigration	https://www.ons.gov.uk/peoplepopulationandcommunity
Education	Information education as a wider determinant of health	https://www.compare-school-performance.service.gov.uk/
Built and natural environment	Information on the wider determinants of health that are linked to the physical environment in which people work and live	https://fingertips.phe.org.uk/profile/wider-determinants/
Crime and criminal justice		https://fingertips.phe.org.uk/profile/wider-determinants/



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Example Metrics: Enhanced Experience of Care

Category	Metric	Measure / Data source
Secondary Care service User Experience	PRMOS, Cancer patient experience survey , CQC (leadership and care quality by broad specialty)	CQC insight tool https://grp.cqc.org.uk/Login.aspx?ReturnUrl=%2f
Primary Care Experience	Written complaints, Patient satisfaction surveys, Extended access, CQC data	GP Patient Survey All data at the GP Hub https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/general-practice-data-hub GP practice profiles - PHE Fingertips https://fingertips.phe.org.uk/profile/general-practice
Friends and Family Test	Friends and family test for: General practice, Ambulance, A&E, Community, Dental, Inpatient, Maternity, Mental Health and Outpatient	https://www.england.nhs.uk/fft/friends-and-family-test-data/



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Example Metrics: Improve the Health and Wellbeing of the population

Category	Metric	Measure / Data source
Disease Prevalence	Cancer, CVD, Stroke, Asthma, COPD, Diabetes, Overall MH, Dementia, COPD	GP reported disease prevalence, practice Level Data https://fingertips.phe.org.uk/profile/general-practice Disease specific profiles https://fingertips.phe.org.uk/
Risk Factor Prevalence	Smoking, Obesity, Hypertension, Alcohol and substance misuse, physical activity	GP reported prevalence, QOF GP Practice Level Data https://fingertips.phe.org.uk/profile/general-practice Local tobacco control profiles https://fingertips.phe.org.uk/profile/tobacco-control Childhood obesity profiles https://fingertips.phe.org.uk/profile/national-child-measurement-programme Local alcohol profiles https://fingertips.phe.org.uk/profile/local-alcohol-profiles Physical activity https://fingertips.phe.org.uk/profile/physical-activity
Improving overall health outcomes	Life Expectancy (Males and Females) Infant Mortality	Local authority level information https://fingertips.phe.org.uk/ https://healthierlives.phe.org.uk/



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Example Metrics: Improving Quality

Category	Metric	Measure / Data source
Access to preventative interventions	Immunisation Smoking cessation Diabetes Prevention Programme	Public Health Outcomes Framework https://fingertips.phe.org.uk/ GP Practice Profiles https://fingertips.phe.org.uk/profile/general-practice
Access to effective treatments	Medications prescribed to those with LTCs known to be effective (e.g. AF, Hypertension, CHD) Access to effective services for those with LTCs e.g. pulmonary rehabilitation, smoking cessation	GP Practice Profiles https://fingertips.phe.org.uk/profile/general-practice
Access to screening and diagnostics	Cancer Screening AAA screening	Public Health Outcomes Framework https://fingertips.phe.org.uk/
Overall access to services	Mapping of geographic access to services considered alongside deprivation. Mapping of public transport access to services	SHAPE Atlas - mapping software (PHE) https://shapeatlas.net/
Outcome framework metrics	Adult Social Care Outcomes Framework NHS Outcomes Framework Public Health Outcomes Framework	Adult Social Care Outcomes Framework NHS Outcomes Framework Public Health Outcomes Framework



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Example Metrics: Reduced per capita cost of care and improved productivity

Category	Metric	Measure / Data source
Unwarranted variation in activity	Unplanned emergency hospital admissions Delayed transfers of care	
Unwarranted variation in spend	Length of stay for hospital admissions	
Workforce	Primary Care Workforce	https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/general-practice-data-hub
	Numbers and experience of Doctors by speciality, Nurses by area of work, Senior managers, technicians and admin staff. Turnover of all groups (& where they move to)	https://digital.nhs.uk/data-and-information/publications/statistical/nhs-workforce-statistics More information can be requested from NHS Digital



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Example Metrics: Increase the well-being and engagement of the workforce

Category	Metric	Measure / Data source
Workforce	Primary Care Workforce	https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/general-practice-data-hub
	Numbers and experience of Doctors by speciality, Nurses by area of work, Senior managers, technicians and admin staff. Turnover of all groups (& where they move to)	https://digital.nhs.uk/data-and-information/publications/statistical/nhs-workforce-statistics More information can be requested from NHS Digital



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Additional sources of Information

In addition to the sources of data related to specific measures there are also a number of intelligence tools that can be used to support population needs assessment:

Name	Overview	Link
Public Health Fingertips Profiles	A rich source of indicators across a range of health and wellbeing themes. With these profiles you can: Browse indicators at different geographical levels, Benchmark against the regional or England average, Export data to use locally.	https://fingertips.phe.org.uk
NHS Right Care Products	A number of useful products to support needs assessment. Including: <ul style="list-style-type: none"> CCG and STP data packs - The information in these packs include headline opportunities, improvement opportunity tables and pathways on a page. Atlas of Variation - to be used as a stimulus to start a search for unwarranted variation, 	https://www.england.nhs.uk/rightcare/products/
PHE Segment Tool	Information on life expectancy and the causes of death that are driving inequalities in life expectancy at national, regional and local area levels. Targeting the causes of death which contribute most to the life expectancy gap should have the biggest impact on reducing inequalities.	https://fingertips.phe.org.uk/profile/segment
SHAPE Atlas Tool	Informs and supports the strategic planning of services and assets across a whole health system. Facilitates scenario planning and option appraisal at a system level.	https://shapeatlas.net
STP/ICS Data Packs from NHS Improvement	The data packs draw together in one place relevant data and indicators to aid the understanding of gaps and the development of transformational solutions.	https://future.nhs.uk/connect.ti/STPanalytics/view?objectId=341843&exp=e1
Primary Care Web Tool	This site provides a web portal for Primary Care data accessible to GP practice staff, CCGs area and regional teams of NHS England and other approved stakeholder organisations	https://www.primarycare.nhs.uk/default.aspx



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Population Health Profiles

One approach to collating and presenting information to give an overview of population health need is the development of a population health profile.

The aims of a profile would be to help systems:

- Start to consider where population health need may lie
- Understand overall need
- Start to quantify inequalities which can be addressed.
- Initiate strategic discussions about population health

The profile could take the form of an information dashboard or a stand alone document.

The information required for a health profile should be readily available from existing data sources.

A population health profile should aim to deliver the following:

- ✓ An overview of health across the system, both for the system as a whole and the different geographies within the system
- ✓ Identification of inequalities within the system and any unwarranted variation in outcomes.
- ✓ A view of health outcomes (e.g. life expectancy), wider determinants of health (e.g. housing) burden of ill health (disease prevalence and incidence) and risk factors that are attributable to preventable disease (e.g. smoking)
- ✓ Provide a view of how the system compares in terms of health outcomes both nationally and with similar areas
- ✓ Identification of geographical or demographic characteristics that are unique to the system that could impact on health outcomes (e.g. rural geography or prison population)
- ✓ Understanding where pockets are within the system which may require additional resource due to geographic (e.g. urban) or demographic needs (e.g. deprivation)
- ✓ Within an ICS these assessments could be split by different geographies



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Suggested Measures for a Population Health Profile

In order to provide a brief overview of system level population health, the following metrics could be used:

Description	Example measures
What is the make-up of my population?	
Population pyramid (age / gender profile)	Population pyramid
Inequalities	Index of Multiple Deprivation, variations in life expectancy
How is their health?	
Preventable mortality	Preventable mortality under 75 years
Life expectancy	Life expectancy at birth
Quality of life	Disability Affected Life Years (DALYs), Healthy Life Expectancy
What are their quality outcomes?	
Patient surveys	Friends and family survey
Readmissions	30 day hospital readmissions
What care are they receiving?	
Activity on key pathways	CVD / Mental Health/ Cancer / Respiratory / Diabetes metrics
Unmet Needs	Highlight any key gaps (e.g. CVD prescribing)
What care is being provided?	
Workforce	Clinicians per 1000 population
Service Access	Proportion of population within XX minutes of XX services
What are the future risks?	
Population projections	Future population estimates, including age profiles
Risk factor prevalence	Childhood obesity, smoking prevalence, alcohol, physical activity



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Population Health Profiles - Resources

Case Study Examples

Lancashire County Council

[Lancashire County Council](#)

Dorset

[Dorset](#)

Existing System Level Information

PHE Fingertips Example Profile

[Example PHE Fingertips ICS Profile](#)

NHS RightCare “Where to look packs”

<https://www.england.nhs.uk/rightcare/products/stp-footprints/>

NHS STP Data Packs

<https://future.nhs.uk/connect.ti/STPanalytics/view?objectId=341843&exp=e1>



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2 Critically review the data in the context of the system: System Level Workshop

Once intelligence has been gathered on population needs this information should be combined with other sources; such as feedback from clinicians, other service providers and members of the population in order to decide on key priorities.

One mechanism for facilitating this would be to run a system level Population Health workshop. The aim of this workshop is to align population needs assessment intelligence with other priorities to decide on key system priorities.

Activities at the workshop could include:

- Introduction - definition and purpose of PHM
- Presentation of Health Profile (or similar overall summary of population health)
- Clinical perspective on perceived population needs
- Service user perspective on priorities
- Group discussion on how the outputs of the needs assessment fit with other priorities
- Group discussion on aligning outputs of the needs assessment with other priorities

Representation at the workshop would include:

- ICS System leads
- Constituent commissioner and provider organisations
- Clinicians and social care professionals including Directors of Public Health.
- Other key local organisations (e.g. Fire Service, Police, 3rd Sector)
- Public representation
- *NHS England, Public Health England*

It is important to have the right types of people in the room; decision-makers as well as those that understand the data



Outputs from the workshop would include:

- Recommendations for 3-5 agreed priorities
- Identification of key gaps in intelligence that are required to support priority areas



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3 Prioritisation of Issues Facing the Population

Needs Assessment Output

To set priorities for population segmentation and on going population health management key areas of need should be agreed and communicated.

This document should:

- Be a short paper communicating ideally 3-5 priority areas identified through the needs assessment process.
- Have clinical and analytical input and should be to be presented in a format that is accessible to both system leaders and people living and working in the population served by the system.
- Clearly set out the rationale including quantitative and qualitative evidence for the chosen priority areas and who has contributed to the decision making.
- Briefly communicate the next steps for how the identified needs will now influence population segmentation and additional Population Health Management techniques to translate to action.
- Communicate what improvements the system hopes to achieve in these areas and in what timescales and how this will be measured.



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Understanding Population Need - Getting Started

- ✓ Decide on how population need will be identified at:
 - System level
 - Place level
 - Community / Neighbourhood Level
- ✓ Decide on what outcome measures will be used across the population.
- ✓ Identify data sources that illustrate the outcome measures for the defined population.
- ✓ Collate the information on population need and share across the system.
- ✓ Combine information on need with views from across the system in a transparent way to summarise the agreed need for the population.
- ✓ Communicate the agreed areas of need for the population

Information for System Level Profile

PHE Fingertips provides access to 312 measures that are available at a system (STP) geography.

The list of metrics can be found here:



Metrics

Under the "[Your data](#)" section of PHE fingertips website a customised profile can be generated incorporating a selection of these measures.

Here is an example profile with data readily available at a system level. PHE Fingertips Example Profile

[Example PHE Fingertips ICS Profile](#)



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Opportunity Analysis

Once a needs assessment is complete, opportunity analysis can be undertaken to determine which areas of focus might best meet the current organisational and population requirements.

An Opportunity analysis uses the data to identify opportunities to improve the quality, efficiency or equity of the care being delivered.

Outputs from a needs assessment should be combined with opportunity analysis to produce areas of focus that are actionable to deliver improvements in defined population health outcomes.

Opportunity Analysis can be considered in the following ways:

- Detecting unwarranted variation within the system
- Detecting unwarranted variation between the system and its national (and international) peers
- Duplication analysis (e.g. which service users are receiving the same interventions twice unnecessarily?)
- Gap analysis (e.g. which evidence based practice is not being followed?)
- Weighted gap analysis (e.g. weighting these gaps according to how important they are)
- Quadruple Fail analysis (e.g. which events are occurring in the population that are simultaneously high cost, low quality, represent a poor patient experience and lead to increased inequalities?) - What is the distribution of these events across the population

What can be done now?

The following tools are available to use to support opportunity analysis and prioritisation:

STAR Tool

<https://health.org.uk/collection/star-socio-technical-allocation-resources>

SPOT Tool

<https://www.gov.uk/government/publications/spend-and-outcome-tool-spot>



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Tools to Target Those in Need

Once the needs of the population are understood and priority areas are identified, those who are in the greatest level of need aligned to these areas can be targeted.

The aim of this is to identify those who can be offered preventative care which will reduce the likelihood of adverse events and improve overall population health outcomes.

*Who has the
ability to
benefit the
most?*

There are different approaches that can be used which fit broadly in to the following categories at a system level:

Population
Segmentation

Risk
Stratification

Impactability
Modelling

Other tools &
techniques

These techniques can be used individually or together to give a more comprehensive view of population need and opportunity

- At a individual level additional techniques such as threshold models, gap analysis and clinical experience can be used
- For effective use the outputs from the tools should be considered in the wider context including the use of impact assessments and applying clinical judgment to the outputs



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Process for targeting those who will benefit

There are different approaches to the overall process of matching interventions with those that will benefit from them, applying various tools and techniques

	Matching interventions to known need	Matching need to known interventions
Description	<ul style="list-style-type: none"> Based on the outcomes of the needs assessment Start identifying those at risk or rising risk through tools such as segmentation and risk stratification Impactability analysis could then be undertaken to identify those most likely to benefit from interventions - either through condition related criteria or through other characteristics such as patient activation 	<ul style="list-style-type: none"> Following needs assessment, the system could review the known effective interventions matched to those needs Segmentation, risk stratification and impactability analysis could then be undertaken based on the inclusion criteria for the known interventions
Pros	✓ Truly needs based approach	✓ Allows system to be led based on existing evidence based interventions
Cons	✗ There may not be interventions available to meet population need	✗ Where evidence based interventions are not available, for example for complex or co-morbid cohorts, need may not be fully addressed



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Population Segmentation

Overview

Segmentation offers the potential to deliver bespoke care to individuals while benefitting from economies of scale. It involves grouping the population in to groups based on identified criteria.

Grouping helps understand the distinctive needs of different parts of the population. This is an important first step to achieving better outcomes through integrated care.

Different sets of people have different needs. Segmentation begins to provide intelligence that helps to tailor care to people's interdependent needs. Ideally segmentation would be unique to each individual, but this isn't practical at a population level so different groupings are used.

Segmentation can be completed at different levels; either for the whole population or a smaller sub-group.

Segmentation can be performed in multiple ways, including the following:

- Clinical (e.g. people living with diabetes, frailty or multi-morbidity)
- Defined geographical area (e.g. specific community)
- Data-driven (e.g. cohorts of patients with similar patterns of health care use)
- Demographic characteristics (e.g. ethnicity, age)
- Risk based (e.g. people at very high risk of being admitted to a care home in the next 3 months)
- A combination of the above factors

Segmentation can be completed at different levels; either for the whole population or a smaller sub-group.



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Population Segmentation - Application in Practice

Individuals in the segmented groups will have different needs and there will be different opportunities to improve care and optimise health outcomes.

In order to prioritise where to focus efforts further PHM analysis can be undertaken. This can be through:

- Further lower level segmentation e.g. those with other co-morbidities, those with specific demographic characteristics or those with identified risk factors (e.g. smoking, high BMI etc.)
- Use of additional PHM techniques on segmented population such as risk stratification and impactability analysis.
- Combining segmentation with benchmarking to make comparisons of segmented population groups between sub populations e.g. within CCGs, Primary Care Networks or GP practices.

Population Segmentation can be used:

- At an **individual** level to facilitate the delivery of personalised care based on segmented characteristics
- At a **population** level to plan system level interventions based on what is known to be effective for the segmented cohorts across a system

Uses in financial modelling

Segmenting the population can inform the development of new payment models. Population grouping along with the relevant budgets allows the consideration of capitated budgets and payment models. Typically the population is split by age and presence of a condition. This approach is easy to define however additional modelling using risk stratification can be used to give a more detailed view of each population segment.



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[Kent Case
Study](#)

Leeds

[Leeds Case
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based on life
course*

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Hamlets
Segmentati
on

[Tower
Hamlets](#)

Camden

[Segmentati
on by
Utilisation](#)

Somerset
Symphony
Project

[Symphony
Project](#)

References

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- ACORN classifications <https://acorn.caci.co.uk/>
- Different ways to segment: Solis <https://www.sollis.co.uk/sollis-insights/population-health-management/>
- Lynn et al (2007) "Using Population Segmentation to Provide Better Health Care for All: The "Bridges to Health" Model" *Milbank Q.* 2007 Jun; 85(2): 185-208. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2690331/>



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Risk Stratification

Overview

Risk stratification tools (also known as predictive risk models) can be used to predict adverse events that are undesirable, costly and potentially preventable.

They use patterns in historic data to assign a risk score to each member of a population. This score reflects that individual's risk of experiencing the adverse event in question during a particular time window (e.g. risk of unplanned hospital admission in the next 12 months).

There is a **wide range of adverse events** that could potentially be predicted, and a **wide range of time windows** over which predictions could be made (e.g. risk of developing a bed sore in the next four days; risk of having an episode of ketoacidosis in the next three years etc.)

Risk stratification constitutes one form of segmentation (i.e. the subdivision of the population into cohorts of people with similar characteristics)

Risk stratification can be used for:

- Case Finding
 - i.e. identifying named individuals who are at a particular level of risk, so that they can be offered a preventive intervention aimed at mitigating that risk; or
- Population Intelligence
 - i.e. studying de-personalised data to understand the patterns and distribution of risk across a population



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How does risk stratification work?

Risk stratification models are developed by analysing person level data. They use patterns in historic data to assign a risk score to each member of a population.

This score reflects that individual's risk of experiencing the adverse event in question during a particular time window (e.g. risk of unplanned hospital admission in the next 12 months).

Traditionally regression analysis has been used for risk stratification but machine learning and neural network techniques can be used.

There is a wide range of adverse events that could potentially be predicted, and a wide range of time windows over which predictions could be made (e.g. risk of developing a bed sore in the next four days; risk of having an episode of ketoacidosis in the next three years etc.)

Predictive power and breadth can be improved by using data wider than acute data.

Risk stratification should not be undertaken in isolation. It should form part of a wider package of package of population health management that begins with understanding the needs and experiences of the population, and the opportunities to improve the care being received.



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Practicalities of using Risk Stratification

- The **information governance** arrangements for 'risk stratification for case finding' are different from those for 'risk stratification for population intelligence'
- Like any form of population screening, risk stratification has the potential to do more harm than good (e.g. due to the harms associated with false positive and false negative results). It should therefore only be introduced after a number of checks have been conducted, including:
 - **Data protection** impact assessment
 - **Equality impact assessment**
 - **Financial impact assessment** (see for example Table 2 in [this paper](#))
 - **Ethical assessment** (see for example the checklist below, adapted from the WHO screening criteria, based on the recommendations of this [paper](#))
- An additional problem is that not all 'true positives' identified by a risk stratification will benefit from the associated preventive intervention; there is therefore growing interest in '**impactability modelling**', which aims to predict which high-risk patients identified by a risk stratification tool will have their risk successfully mitigated by the intended preventive intervention. It is important to note that some forms of impactability modelling will help reduce inequalities, whereas others may worsen them - hence the importance of conducting an equality impact assessment. (Read more [here](#))
- The new **Medical Devices Regulation** means that all algorithms that affect clinical decision-making (including risk stratification tools and impactability models) will in future be regulated as a medical device - including algorithms that have been developed in-house.



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Risk Stratification - Caveats

Risk stratification will help to segment the population based on future risk, however there are a number of caveats with this approach.

- There are some practical challenges in targeting the highest risk cohort
 - Majority of **individuals in this group do not remain “high risk”**
 - This is due to either care being optimised and risk reduced, high mortality rates in this risk group or recovery from an acute event that no longer requires complex care
 - For the individuals that do remain high risk, their **care may already be optimised**.
 - They may however remain “high risk” as they are people with very complex needs that do require high levels of care utilisation to keep them as healthy as they can be
 - The **“highest risk” group are a heterogeneous group with very different and complex needs**. There are often individuals in this group with additional care needs who require a specific package of care and for whom population level, non-specific interventions may not apply. Evaluation from the vanguard sites showed that people in the top 0.6% risk had high levels of multi morbidity (an average of 2.4 long term conditions), 30% had a diagnosed mental health condition, 10% had alcohol abuse issues and 17% had a BMI over 30



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Risk Stratification - Caveats (continued)

- It is **more effective to focus on the “rising risk population”** with the aim of intervening with an effective intervention to stop them from becoming “high risk”. However this group still provides a heterogeneous group of individuals who may require different interventions in order to optimise their care and have a population level impact on reducing health outcomes.
- **Analytical challenge.** Risk stratification tools predict the likelihood of an individual having an **adverse event in the next period** this leads to potential implications with clinical engagement. Managing expectations of the purpose of risk stratification tools is therefore important.
- Risk stratification tools predict future risk, but **do not directly predict where the greatest improvement opportunities lie**. Therefore an additional step to identify those individuals who are amenable to interventions is required. **‘Impactability modelling’, aims to predict which individuals identified by risk stratification will have their risk successfully mitigated by the intended preventive intervention.**



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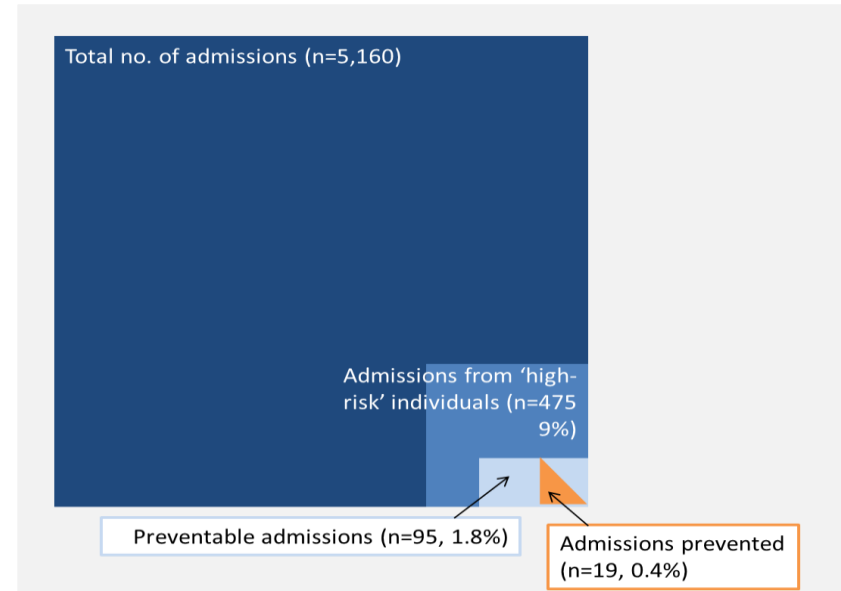
Risk Stratification - Learning from the Vanguard Sites

Under half of those identified as high risk now (top 1%) will have an admission in the following 12 months. This accounts for a small proportion of admissions overall

By focussing on the top 1% risk strata only 0.4% of admissions in the following year were actually prevented

To prevent a greater proportion of future admissions, a larger risk strata could be used. However, this would involve trade-offs. Targeting a larger population with lower risk necessitates the use of lower cost interventions

There are other challenges with regards to data timeliness, meaning adverse events can have happened before changes can be made.



Lessons from Practice:

- Information Governance needs to be considered
- Clinical Ownership is key to success
- Fit with the system: use existing tools & referral services
- Think about impactability
- Consider outcomes beyond emergency admissions
- Offer suite of tailored proactive care approaches
- Look beyond the highest risk users



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Risk Stratification – Resources

Case Study Examples

Flyde Coast Risk
Stratification

[Flyde Coast](#)

Slough CCG

[Slough](#)

Croydon

[Virtual Wards at Primary
Care Trust](#)

References

- Lewis G.H. “Next Steps for Risk Stratification in the NHS”. London: NHS England; 2015. <https://www.england.nhs.uk/wp-content/uploads/2015/01/nxt-steps-risk-strat-glewis.pdf>
- Snooks et al 2018 “Predictive risk stratification model: a randomised stepped-wedge trial in primary care (PRISMATIC)” HEALTH SERVICES AND DELIVERY RESEARCH VOLUME 6 ISSUE 1 JANUARY 2018 <https://njl-admin.nihr.ac.uk/document/download/2012003>
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- <https://www.nuffieldtrust.org.uk/chart/key-resources-on-predictive-models>



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Impactability

Overview

Impactability modelling can be seen as the next step on, after risk stratification.

It further sorts the sub-groups of at risk patients (from the risk stratification stage) based on how amenable they are to different forms of care.

In other words, impactability models aim to work out what impact an intervention could have.

They can address multiple health and care outcomes depending on the parameters used

Practical Application

Where risk stratification sorts individuals into different levels (or strata) of risk, impactability further sorts individuals based on how likely they are to respond (be impacted) by different treatment options.

This can help direct resources most effectively, so that treatments that are most likely to work are used.

NHS England is currently supporting a working party on this topic, to produce further guidance





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Limitations

It is important to consider the aims of impactability modelling aligned both with improving overall health outcomes and reducing health inequalities.

Case Study Example

Community Care
of North Carolina
and
CareOregon

[North Carolina](#)

The [Vanderbilt
Inpatient Cohort
Study](#)

Outcomes related
literacy and
numeracy skills in
CHD care.

References

- Lewis G. (2010) “*Impactability Models*”: Identifying the Subgroup of High-Risk Patients Most Amenable to Hospital-Avoidance Programs. Milbank Q. 2010 Jun; 88(2): 240-255
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2980345/>
- DuBard and Jackson (2018) *Active Redesign of a Medicaid Care Management Strategy for Greater Return on Investment: Predicting Impactability*. Popul Health Manag. 2018 Apr 1; 21(2): 102-109.
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Other tools and techniques

For smaller populations (e.g. Primary Care Networks or individual GP practices) where the implementation of risk stratification or impactability models may not be feasible the following techniques may be considered.

Tool	Method	Considerations
Threshold Model	<p>Threshold models are simple, rules-based criteria</p> <ul style="list-style-type: none"> An example of such a rule is to classify as “high-risk” any patients in the population aged 65 or over who have experienced two or more unplanned admissions in the previous year 	<ul style="list-style-type: none"> The approach is that it is simple and intuitive Regression to the mean The opportunity to prevent future utilisation may be missed
Clinical Experience	<p>To ask professionals, such as doctors and nurses to select patients based on their clinical experience</p>	<ul style="list-style-type: none"> Subject to a range of cognitive bias Evidence suggests that clinicians are less accurate than risk stratification tools at predicting risk
Gap Analysis	<p>Using this approach, a practice would focus attention on those high-risk patients whose care appears suboptimal, such as patients with multiple “gaps in care.”</p> <ul style="list-style-type: none"> An example of a gap is a patient with heart failure who had not been offered beta-blocker medication despite having no contraindications 	<ul style="list-style-type: none"> Can be used to determine which patients identified as being at “high risk” may benefit from treatment Requires an element of prior risk stratification This approach may help reduce health care inequalities because suboptimal care tends to be more prevalent in more deprived areas



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Tools to target those in Need - Getting Started

1 Define the question being asked:

Translate outputs from the population health needs assessment to define question to be answered by population health management tools.

- **About who?** - What is the organising principle;
 - condition specific (e.g. CVD, mental health, frailty, multi-morbidity),
 - driven by a known effective intervention (e.g. pulmonary rehabilitation),
 - a demographic factor (identified neighbourhood, deprivation quintile, protected characteristic),
 - A combination of factors e.g. CVD and deprivation.

2 For what purpose within the system?

- **Decide how the information will be used**
 - To inform strategic planning / system transformation / pathway development or individual care level design.
 - At what population geography
 - Is it intervention led / outcome improvement led / need led

3 Use this to decide of what approach to PHM is the most appropriate?

- Population Segmentation
- Risk Stratification
- Impactability
- Other tools



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Getting Started: Population Segmentation

Off-the-shelf approaches to population segmentation

Segmentation can be undertaken to split the population by any factor identified by the needs assessment process or known to be important for improving health outcomes. Here are examples of existing approaches:

Bridges to Health Model

High level approach which segments the population into eight groups

- People in good health
- Maternal/infant situations,
- Acute illness
- Stable chronic conditions
- Serious but stable disability
- Failing health near death
- Advanced organ system failure
- Long-term frailty

Resources:

- [Outcomes Based Health Care - Bridges to Health Model](#)
- [Bridges to Health Model paper](#)

Electronic Frailty Index

A condition specific approach to segment against risk and stage of frailty. The following segments are used:

- Fit
- Mild frailty
- Moderate frailty
- Severe frailty

Resources:

- [Health Foundation Frailty Index](#)
- [Kings Fund - Frailty Index](#)

Life Course Segmentation

High level approach combining health status with age, e.g.

- Children: Healthy & at risk of developing needs
- Adults (18-64): Healthy & at risk of developing needs
- Older People (65+): Healthy & at risk of developing needs
- Children: Living with long term conditions (LTCs) and disabilities
- Adults (18-64): Living with LTCs and disabilities
- Older people (65+): Living with LTCs and disabilities
- Frailty
- End of life care

Resources:

- [Leeds segmentation example](#)



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Getting Started: Risk Stratification

Once segmentation has been undertaken risk stratification tools may be used to identify those in the segmented groups who are at risk of future adverse events (e.g. Emergency admission to hospital).

It is important to note PHM is not a linear process and some systems may choose to risk stratify the population first and then segment specific risk strata (e.g. condition specific segmentation in the top 5% of risk).

Some systems may perform one form of segmentation (e.g. life course) prior to risk stratification and then another form of segmentation post risk stratification (e.g. to perform risk stratification on those identified as living with frailty and then perform additional segmentation post risk stratification to identify specific conditions (e.g. dementia).

Off the shelf approaches to Risk Stratification

Care Homes

A risk stratification tool aimed at the care home population, identifying those at greatest risk of admission to hospital

<http://www.qualitywatch.org.uk/focus-on/care-homes>



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Getting Started: Impactability approaches

Once population segmentation and risk stratification techniques have been applied to a population, impactability analyses can be used to indicate: what preventative intervention would be best performed, on which cohort, by whom, and how in order to maximise impact.

There are a number of methods for identifying those who are most likely to benefit. These include identifying those:

- With a condition known to benefit from preventative care (e.g. ambulatory care sensitive condition(s))
- With a gap between what care they are currently receiving and what care is evidence based best practice for their condition(s).
- With a rising risk score, who are likely to become “higher” risk of an adverse event within a specified timescale
- Whose health outcomes or utilisation is higher than expected for their diagnosed condition(s).
- With impactable moments (e.g. newly diagnosed, recent discharge from hospital)
- Who are likely to engage with behaviour change to improve health care (e.g. high patient activation)
- Past behaviour - a measure of receptivity to indicate how cohorts might respond to future interventions based on previous behaviours.

Many approaches to impactability modelling have been proposed, and NHS England is currently supporting an academic working party on this topic.



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Available PHM Tools for Predictive Modelling

Category	Type	Tool	Description
Condition Specific	Cardiovascular disease	Q-Risk (https://www.grisk.org/)	<ul style="list-style-type: none"> To help identify those at risk of cardiovascular disease
	Atrial Fibrillation	CHAD Score (https://www.chadsvasc.org/)	<ul style="list-style-type: none"> To help understand risk related to atrial fibrillation
	COPD	GRASP (https://www.nottingham.ac.uk/primis/tools-audits/tools-audits/grasp-copd.aspx)	<ul style="list-style-type: none"> To help improve outcomes for those living with COPD
Demographic characteristic	Older People	Older People (https://www.nuffieldtrust.org.uk/research/using-data-to-identify-good-quality-care-for-older-people)	<ul style="list-style-type: none"> To help use routine health care data to make quality improvements in the care of older people over time



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Impact Assessments

The next step after carrying out the population health management intelligence is to conduct a series of impact assessments these would include:

- **Equality Impact Assessment** - to ensure the proposal will not inadvertently worsen health inequalities
- **Financial Impact Assessment** - to ensure that the proposed intervention is cost-effective and affordable for the population cohorts identified
- **Ethical Impact Assessment** - to ensure that the proposed intervention will not cause more harm than good



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Case Study Example - Ethical Impact Assessment

Ethical assessment prior to introducing a risk stratification tool for case finding

(G.Lewis. Adapted from: Wilson J, Jungner G. *Principles and practice of screening*. Geneva: World Health Organization; 1968.)

- 1) The adverse event should be an important health problem.
- 2) There should be an intervention that can mitigate the risk of the adverse event.
- 3) There should be resources and systems available for timely risk stratification and preventive interventions.
- 4) There should sufficient time for intervention between stratification and the occurrence of the adverse event.
- 5) There should be a sufficiently accurate predictive risk model for the adverse event.
- 6) The predictive risk model and impactability model should be acceptable to the population.
- 7) The natural history of the adverse event (i.e. the practices and processes that typically lead to the event) should be adequately understood by the organisation offering the preventive intervention.
- 8) There should be an accepted policy about who should be offered the preventive intervention.
- 9) The of cost stratification should be "economically balanced" (i.e., it should not be excessive in relation to the cost of the program as a whole).
- 10) Stratification should be a continuous process, not just a "once and for all" occurrence.



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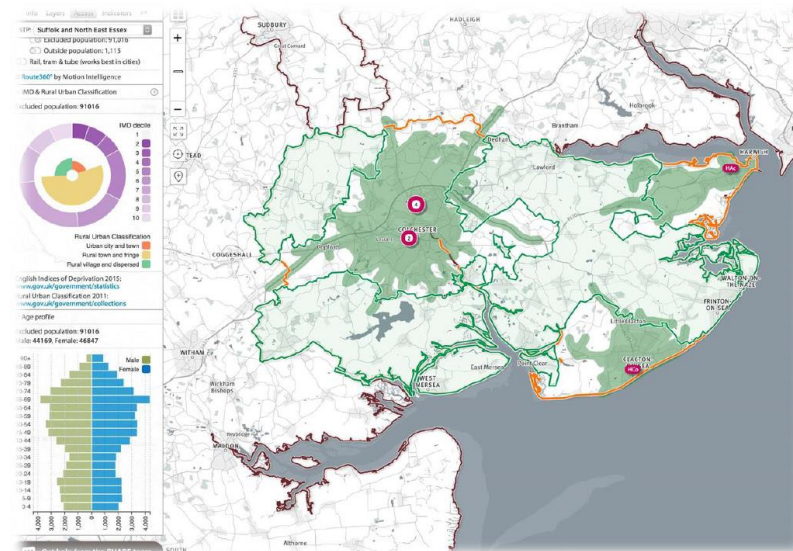
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Case Study Example - Equality Impact Assessment Informed by SHAPE tool

Strategic Health Asset Planning and Evaluation (SHAPE) is a web enabled, evidence based application designed to inform and support the strategic planning of services. In order to meet the challenges posed for STP and ICS areas, we have developed the 'Place Atlas' which provides an enhanced interactive mapping component for systems and local areas, specifically the tool aims to:

- Support evaluation of the impact of service configuration on local populations
- Provide intelligence to help assess the optimum location of services



Map: Location of clinical services and the percentage of the population who have access; and those that live in the most deprived areas

Additional Resources

- **Conducting a Health Equity Impact Assessment (HEIA):** Ontario Ministry of Health and Long-Term Care tool
 - This tool can be used to assess programs prospectively and retrospectively, and to inform system wide change to incorporate an equity lens in decision making
 - <https://www.nccmt.ca/knowledge-repositories/search/146>
- **Health Equity Impact Assessment: Project Report.** Liverpool Health Inequalities Research Institute
 - [https://www.liverpool.ac.uk/media/livacuk/instituteofpsychology/HEIA_Project_Report_-_FINAL_-_20_July_2010a_\(2\).pdf](https://www.liverpool.ac.uk/media/livacuk/instituteofpsychology/HEIA_Project_Report_-_FINAL_-_20_July_2010a_(2).pdf)





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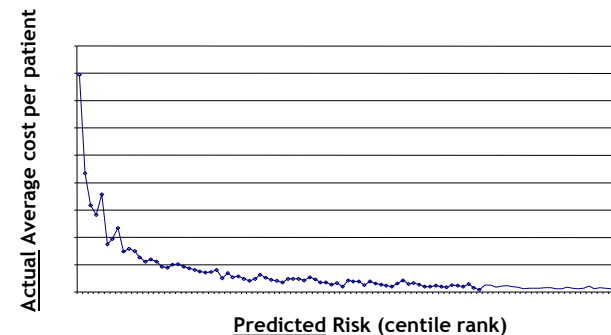
Financial Impact Assessment

Through tools such as risk stratification, it is possible to predict the risk of admission for a population. When viewed against average cost, unsurprisingly, **highest cost is associated with highest risk**

There are **three key drivers** for modelling the financial impact of an intervention:

- Risk threshold (e.g. centile rank)
- Effectiveness of the intervention (% of population impactable)
- Cost of intervention (per person)

Varying each of these levers will impact the net savings result from implementation of the intervention



Risk Threshold

Risk score threshold	Assumed reduction in admissions (%)	No (%) admitted patients identified	No (%) patients flagged incorrectly (not admitted)	Total cost (£) of intervention	Admissions within 12 months for correctly flagged patients	Intervention savings (£) (£2100/admission)	Net savings or loss (£)
Intervention cost of £500/patient							
50	10	399 (54.3)	213 (34.7)	306 060	2.26	189 603	-116 457
70	10	131 (17.8)	38 (22.6)	84 340	2.88	79 071	-5 268
80	10	59 (8.1)	11 (15.7)	35 261	3.56	44 429	8 168
50	15	399 (54.3)	213 (34.7)	306 060	2.26	284 405	78 345
70	15	131 (17.8)	38 (22.6)	84 340	2.88	118 607	34 267
80	15	59 (8.1)	11 (15.7)	35 261	3.56	66 644	31 383
50	20	399 (54.3)	213 (34.7)	306 060	2.26	379 207	73 147
70	20	131 (17.8)	38 (22.6)	84 340	2.88	158 143	73 803
80	20	59 (8.1)	11 (15.7)	35 261	3.56	88 859	53 597
Intervention cost of £750/patient							
50	10	399 (54.3)	213 (34.7)	459 090	2.26	189 603	-269 487
70	10	131 (17.8)	38 (22.6)	126 509	2.88	79 071	-47 438
80	10	59 (8.1)	11 (15.7)	52 892	3.56	44 429	-8 463
50	15	399 (54.3)	213 (34.7)	459 090	2.26	284 405	-174 685
70	15	131 (17.8)	38 (22.6)	126 509	2.88	118 607	-7 903
80	15	59 (8.1)	11 (15.7)	52 892	3.56	66 644	13 752
50	20	399 (54.3)	213 (34.7)	459 090	2.26	379 207	-79 884
70	20	131 (17.8)	38 (22.6)	126 509	2.88	158 143	31 633
80	20	59 (8.1)	11 (15.7)	52 892	3.56	88 859	35 967
Intervention cost of £1000/patient							
50	10	399 (54.3)	213 (34.7)	612 120	2.26	189 603	-422 517
70	10	131 (17.8)	38 (22.6)	168 679	2.88	79 071	-89 608
80	10	59 (8.1)	11 (15.7)	70 523	3.56	44 429	-26 093
50	15	399 (54.3)	213 (34.7)	612 120	2.26	284 405	-327 715
70	15	131 (17.8)	38 (22.6)	168 679	2.88	118 607	-50 072
80	15	59 (8.1)	11 (15.7)	70 523	3.56	66 644	-3 879
50	20	399 (54.3)	213 (34.7)	612 120	2.26	379 207	-232 914
70	20	131 (17.8)	38 (22.6)	168 679	2.88	158 143	-10 537
80	20	59 (8.1)	11 (15.7)	70 523	3.56	88 859	18 336

Cost of
InterventionEffectiveness of
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Financial Impact Assessment

Tool	Description	Resource
Health Economics Guide	Resources to help local commissioners achieve value for money by estimating the return on investment (ROI) and cost-effectiveness of public health programmes	https://www.gov.uk/guidance/health-economics-a-guide-for-public-health-teams
Health Economics Evidence Resource	Provides summary of economic evidence across 9 public health intervention areas such as sexual health and drug misuse	https://tinyurl.com/econ-evidence
Air Pollution Cost Analysis Tool	Estimates the annual future cost to the NHS and social care caused by air pollution at the national and local level and can simulate different 'what if' scenarios	https://tinyurl.com/air-pol-cost
Falls prevention ROI tool	Calculates the Return of Investment for a number of cost-effective community-based falls prevention interventions	https://tinyurl.com/falls-ROI
Best Start in Life ROI tool	Calculates the Return on Investment for a number of interventions aimed at children aged 0-5 years and / or pregnant women	https://tinyurl.com/BSiL-ROI



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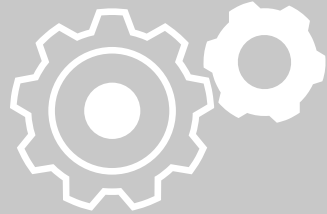
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It is not sufficient to only have the right infrastructure and do the analytics.

The next step is to build from the learnings of the analytics to make decisions on the services provided to the public; identifying effective, evidence-based **interventions** and **implementing** them.

It is not necessarily about making wholesale changes to the local health and care environment, but rather to see where existing services, system and community assets could be adapted or tweaked so they are more relevant and useful for the population and to re-balance services in favour of prevention and long term wellbeing.

“ I guess you could analyse data to death, but without transforming anything it's a pointless exercise.

Catherine McClennan
Programme Director, Cheshire and
Merseyside Children and Women's
Partnership

The extent to which transformation is possible is to a degree dependent on the level of commitment of the integrated care system. Key decision makers in the system need to be willing to take a certain amount of risk in making changes to services and sticking with them in the face of opposition.

That is not to say that blindly following an idea is the right thing to do - if an intervention is not working then there is no harm in turning back but the point is to give the proposed change sufficient time to have an effect on the system before deciding its fate. And this is where the need to constantly monitor and **evaluate** the results of the transformation comes in.



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Recap: Interventions Overview

Implementation of Effective Interventions

- Design care models, interventions and implementation plans based on evidence to target priority patient groups, making a clear and compelling case for change with contributing resources agreed at all tiers
- It is not necessarily about making wholesale changes to the local healthcare environment; it can be seeing where services can be adapted or tweaked so they are more relevant and useful for the local population
- A 'one-size-fits-all' approach may not work for all; therefore, it is important to be flexible and work to reduce any potential exacerbations in inequalities
 - May need multiple interventions, or think about interventions at system, place and neighbourhood levels

Workforce

- Understand the impacts interventions will have on the workforce and plan accordingly, leveraging resources across the system and tiers to fill gaps and identify further gaps and any new role definitions

Patient Empowerment and Activation

- As part of designing interventions and care models, consider what are the best suited tools to support the whole population, long term conditions and complex care needs, e.g. digital services, self-care programmes, personal health budgets, health champions and local area care coordinators

Care Integration

- A large part of change efforts is making the system data-led and heading towards data driven leadership
- As well as consulting the insights from the data, it is critical to engage with other key stakeholders such as clinicians, analysts and managers when making decisions to transform local care
- Getting front-line staff to drive initiatives forward, engaging them from the start of the analysis period is critical to successful implementation of new interventions and care models

Evaluation

- There needs to be ongoing monitoring and evaluation to ensure the programme being implemented remains fit-for-purpose as the population evolves and changes
- Define key indicators and outcomes to be measured and evaluated for success
- Evaluate impact against agreed indicators and outcomes, and whether any changes are needed to be made



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Implementation of Effective Interventions

For adverse events to be avoided, (cost-)effective interventions need to be implemented, and therefore it is important to use national and local evidence. Due to the non-homogenous nature of population groups, a range of interventions is likely to be required.

At a [system level](#), outputs from needs assessments and from predictive modelling and impactability tools can highlight population level need or gaps in care, informing areas where services or pathways could be developed.

Outputs from [individual level](#) analysis can lead to identification in population level gaps in care. Where a number of individuals who are identified as being at high risk but not receiving effective interventions this might be for a number of reasons which in turn may lead to a number of differing needs.

At both a system and individual level, the next step is to match up effective evidence-based interventions with the gaps in need.



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Catalogues of evidence-based interventions

There are a number of catalogues of evidence-based interventions available which give potential interventions for a gap in care as well as the potential impact. These are a good place to start looking for potential solutions.

It is important to remember interventions can go beyond healthcare and include wider determinant angles

Name	Overview
Public Health England - Menu of Interventions	Outlines Public Health interventions that can improve the health of the population and reduce health and care service demand
Public Health England - Health Economics: evidence resource	Provides a summary of economic evidence underpinning public health interventions. The tool shows the main cost-effectiveness and return on investment evidence on activities in the public health grant
CVD Size of the Prize and NHS Health Check Factsheet	Provides a summary of gap in care, potential interventions and estimated savings for CVD by STP area
NHS RightCare - Casebooks	Best practice summaries from local examples of commissioning innovations, showcasing NHS RightCare philosophy or tools available through the programme
NHS RightCare - Long Term Condition scenarios	Series of long term conditions scenarios to support local health economies, including clinical, commissioning and finance angles, to think strategically about designing optimal care for people with long term conditions and their carers, highlighting potential improvement opportunities
NHS RightCare - Pathways	Set of resources to support Local Health Economies concentrate improvement efforts on where there is greatest opportunity to address variation and improve population health. Includes a high-level overarching national case for change; priorities for improvement and key high impact interventions along a pathway; underpinning guidance and evidence; implementation resources to help make change on the ground; and practice examples that show the potential in population health approaches.



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Catalogues of evidence-based interventions

Name	Overview
NHSE - Catalogue of Interventions  Catalogue of Interventions	Catalogue of best practice interventions and care models based on the New Care Models / Vanguards work
NHSE - PHM Maturity Matrix  PHM Maturity Matrix	Contains case studies of implementation of effective interventions
Nuffield Trust - Evidence for shifting care	Assessing evidence of care in the community Assessing evidence of shifting care in five areas: elective, urgent and emergency, admission avoidance and easier discharge, at risk populations, and self-care
NICE - Resources for STPs and ICSs	Collection of guidance, quality standards, advice and practical tools to help tackle STP / ICS priorities; designed to help systems work in partnership to provide consistent, high-quality care, based on the best evidence


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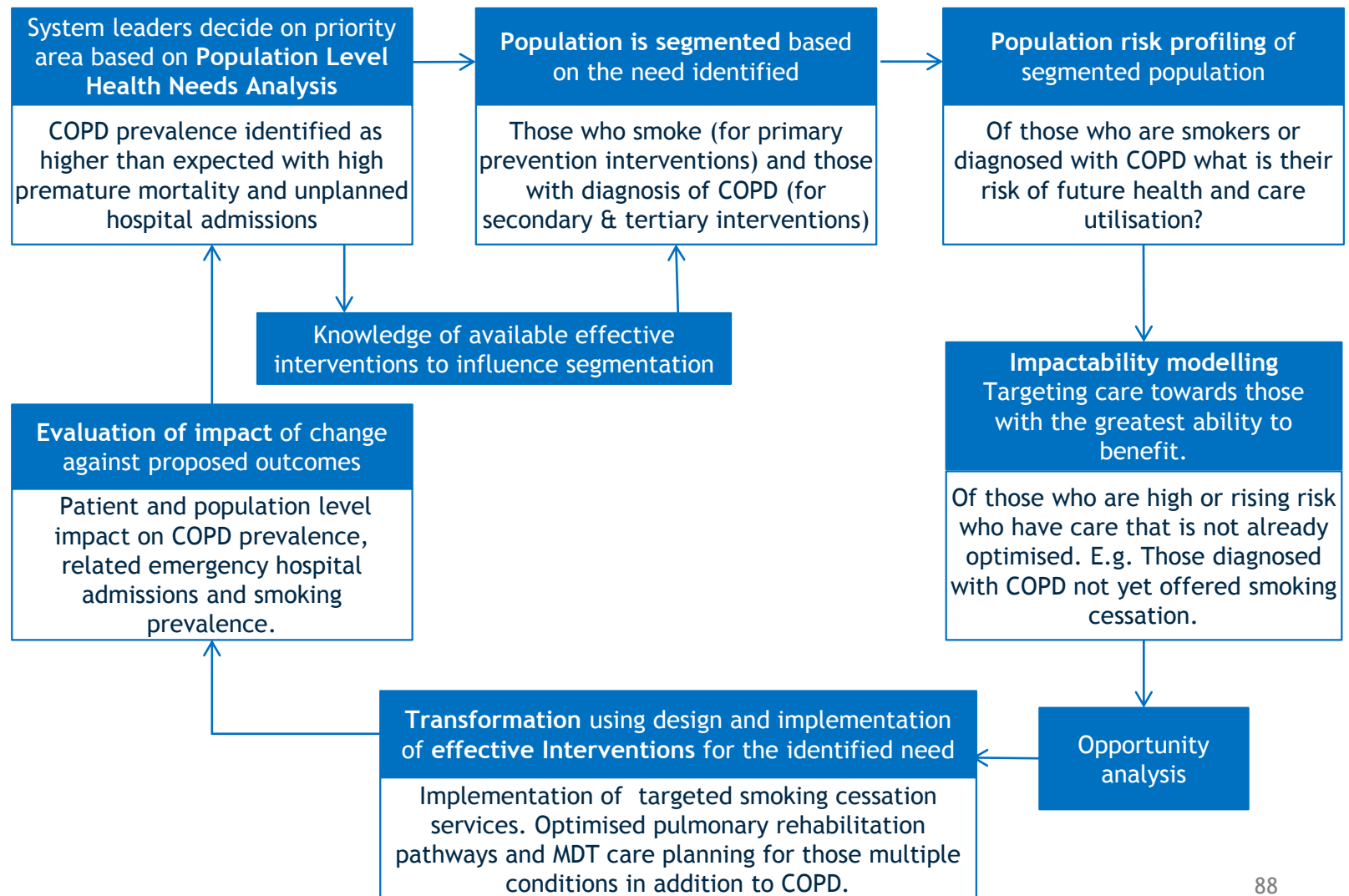
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Example COPD PHM Process: System Level (COPD)



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Example COPD PHM Process: Individual / Neighbourhood level

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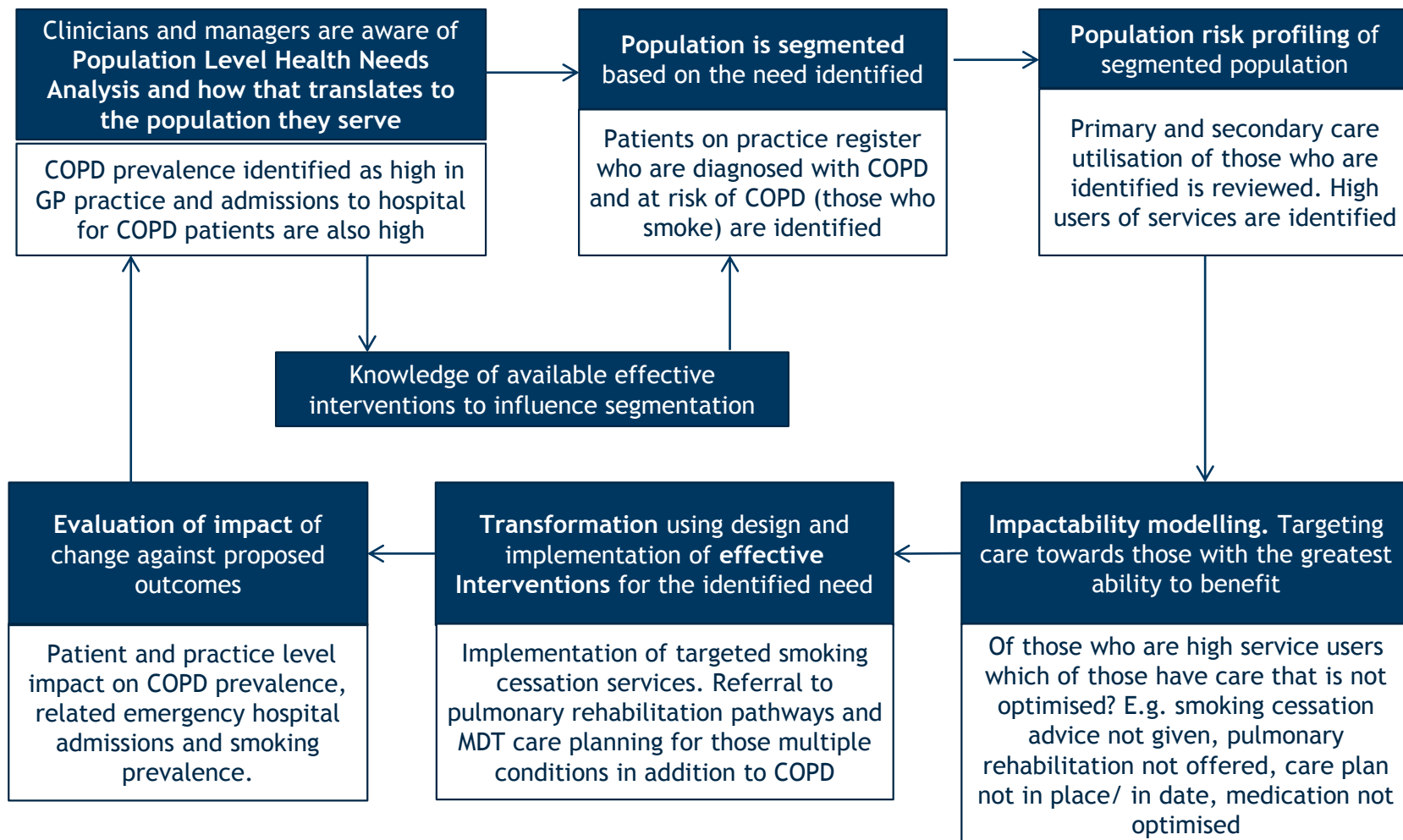
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Case Study: NHS Halton CCG 'Game Changer' Programme

Problem

High no. of children visiting A&E unnecessarily

Understanding the Population

Children attending A&E but who didn't need to correlate with children with child health problems, specifically obesity and diabetes

Targeting the population group

- Level of gestational diabetes above national average; children with a mother who developed gestational diabetes whilst pregnant had one-in-six chance of giving birth to a child who would become overweight
- Looked at local data to understand how many children in primary school going into secondary are classed as overweight

Intervention

- Increased child fitness and activity levels through the sport, specifically rugby, and through the use of local role models through sporting heroes
- Used activity-based model consisting of assemblies and classes to influence children and their families into a more positive approach to health & wellbeing, nutrition and participating in local activities
- Used a tracker given to every child to monitor progress and create competition between schools. An app was also introduced to allow children to summarise their emotions (for example, happy or sad) throughout the programme

Evidence / Evaluation

- It was seen that sport has a psychological aspect on children who are enthralled by sportsmen and sportswomen and are more likely to look up to and follow these individuals. As such, the programme utilised the local sports stadium, where children were invited to train alongside their sporting heroes. In this instance, the Widnes Vikings Rugby club partnered with the CCG and the catchphrase 'if you wanna be a pro, you have to eat like a pro' was developed to entice and encourage children to participate.
- As well as developing and running the programme, Halton CCG commissioned John Moors University to evaluate the impact of the programme, which showed positive outcomes from the first phase. As a result, Halton CCG are looking to expand the programme and involve different sports and role models.





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Identifying the right intervention is important, but a system must also have the right workforce to support this. As a system matures, it will wish to undertake a thorough review of its human resources. This review should include workforce planning, the development of new roles, as well as training, recruitment and retention of current staff. Of crucial importance is leadership development at all levels of the ICS: transformation requires skilled system-leadership to make these changes happen across organisations

There are three core elements to consider when ensuring appropriate staff levels and improved retention:

- 1) Transformational workforce planning
 - Development of a vision for the systems workforce that is able to deliver new models of care, including out of hospital models; tools dynamic modelling and support, to understand the implications to the workforce of the new vision; system wide strategic resource planning across organisational boundaries; redefinition of existing staff roles (clinical and non-clinical) and development of appropriate training and support to implement changes; support for the system with workforce HR analysis and planning, including developing the new models of care and a focus on primary care where necessary.
- 2) Workforce development
 - Clinical supervision across providers e.g. re-registration; ensuring the systems workforce is adequately trained and developed to fulfil their roles including statutory and mandatory training; provision of specialist advice and support to manage changes to the workforce (including transition to/from other organisations and appropriate application of TUPE, etc.).
- 3) System leadership development
 - Support, training, development and advice that offers executive, senior team and board capability building to aid strategic decision making and problem-solving; considering and balancing the needs of the cross-system leadership and individual organisations, so that the system is balanced and robust.



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How do you use population health data for workforce planning?

When organisations think about workforce planning, they essentially think about how many individuals are present in the population and calculate the number of professionals and professions would be needed. So what many organisations tend to do is look at a growing therapeutic area within the region (for example, orthopaedics) and conclude that a further 'x' number of consultants are required to meet this increase - this is a very well used way of allocating resources in the NHS.

However, with System Dynamic Modelling, organisations are able to use their population health data (specifically their needs analysis over the next five, 10 and 15 years), and model different scenarios in terms of the composition of the workforce to meet the forecasted flux in population needs. In this way, the workforce is modelled around the population's health needs rather than the number of people within the population. The other advantage of System Dynamic Modelling is that it uses competencies, and not professions - so it will tell users what competencies are required within the workforce rather than simply specifying professions or levels of seniority.

Finally, there might be an instance where a new service is created to deal with a growing therapeutic area with a backlog of patients, so initially these services will be quite busy but will then tail off once the needs of the population have been met. As a result, many new services are very busy initially and then become underutilised. By using System Dynamic Modelling an ICS can consider what services should be offered and ensure they are broad enough to meet the needs of the population, once the initial backlog has been overcome.

For further information around workforce planning and System Dynamic Modelling, access the following resources:

- [Introduction to System Dynamics Workforce Modelling](#)
- [Dynamic Modelling of Workforce Planning For Infrastructure](#)



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Workforce - Resources

For other useful resources around workforce:

- NHS Employers: <http://www.nhsemployers.org/your-workforce>
- Workforce and skills: [“Our work on staffing and training across the NHS, health and care”](#) (The Kings Fund)
 - [Health Foundation: Funding matters; staffing counts](#)
 - [Supporting Integration - The King's Fund](#)
 - [Reshaping the workforce to deliver the care patients need, Nuffield Trust \(May 2016\)](#)
 - [Skills for Care: the principles for workforce integration](#)
 - [Case study - Erewash - SWIPE framework](#)
- Guidance:
 - [Learning from the Vanguards: planning and modelling](#)
 - [Workforce matrix](#)
 - [Skills for Health, , increase quality of healthcare, patient safety and productivity.](#)
 - [Retaining your workforce](#)
 - [Retrain, and Retain objectives.](#)
 - [EHCH Vanguard learning guide - workforce development](#)
 - [HEE STAR tool for workforce transformation](#)
 - [HEE meeting UEC workforce challenges](#)
- NICE guidance
 - [NICE guidance allows GPs and GPwSI with the appropriate skill base to treat low risk basal cell carcinomas \(BCCS\) without the need for referral to specialists](#)
 - [NICE guidance on intermediate services, including reablement](#)
 - [Commissioning guidelines on Active Rehabilitation](#)



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Workforce - Resources (continued)

- Useful tools
 - [HEE workforce redesign tool](#)
 - [Scarred Liver Project delivers fibroscan diagnostic tests in community settings to identify patients with liver disease at a stage when the disease can be reversed.](#)
 - [Kardia AliveCor is a mobile heart monitor that allows individuals to detect, monitor & manage heart arrhythmias with automatic analysis](#)
 - [ERAS+ - supports patients \(and carers\) through an online web tool and education programme to prepare and recover from surgery reducing their risk of post operative complications](#)
- NHS case studies
 - [Wakefield General Practice Workforce Development Academy focus on the Recruit,](#)
 - [Nottinghamshire STP / ICS - Insight and Learning Case Study](#)
 - [HEE Midlands and East UEC Programme](#)
 - [South East Essex Collaborative Medical Bank](#)



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Clinical Governance

Clinical governance is the system through which NHS organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care by creating an environment in which clinical excellence will flourish

Clinical governance encompasses quality assurance, quality improvement and risk and incident management

When developing and implementing new care pathways and integrated services, clinical and care governance requirements must be considered. This is important when considering integrated and multi-disciplinary approaches to care interventions

Resources:

- Royal College of Nursing - <https://www.rcn.org.uk/clinical-topics/clinical-governance>
- Pearson B. (2017) "The Clinical Governance of multidisciplinary care" - <https://www.emeraldinsight.com/doi/full/10.1108/IJHG-03-2017-0007>



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Patient Empowerment and Activation

Patient activation is the knowledge, skills and confidence a person has to manage their own health and care. It links to all the principles of person-centred care, and enables the delivery of personalised care that supports people to recognise and develop their own strengths and abilities. It underpins an asset-based approach that supports people to develop their capability to manage their own health and care by giving them information they can understand and act on, and providing them with support tailored to their needs.

The concept of patient activation recognises that people have a role to play in the management of their own health and care, whether it's about staying well or managing their long term condition. In reality individuals with a long term condition only spend a small amount of time with a healthcare professional, the majority is spent managing their condition on their own or with their family. Therefore, patient activation can be used to understand the needs of the local population and then tailor approaches and interventions accordingly, providing them with the necessary tools to help them increase their confidence in managing their health.

Digital services (with the right support) are empowering people to take control of their health and care through secure online access to clinicians, personalised and relevant health information, digital tools and advice that helps them to better manage their conditions; whilst supporting shared decision making. These tools and services will enable people to live with greater independence, confidence and safety, and in many cases reduce the need for unplanned care.

- Self-care programmes, including social prescribing and innovative technologies and associated wrap around support
- Personal health budgets & integrated personal commissioning through sharing information with care providers remotely to enable the activation and empowerment of individuals to more effectively manage their own health, care and wellbeing
- Health champions and local area care coordinators



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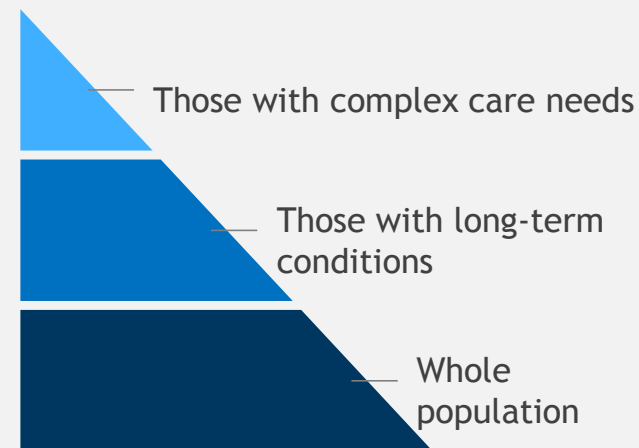
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Patient Empowerment and Activation

Patient activation operates at three broad levels

At the **whole population** level the aim is to consider what can be done to support the local population to stay well and also support them to make informed decisions if their health needs change. The next level encompasses those with **long term conditions** where the objective is to understand what can be done, and what support can be provided to help them manage their condition. And, the final level is those with **complex care needs** where the aim is to ensure these individuals receive the co-ordinated support through a joined up, integrated approach



Patient Activation Measure (PAM)

PAM is a way of measuring an individual's level of 'activation'. It is done through a psychometric tool consisting of 13 questions, best used in a healthcare setting with a healthcare professional. Individuals receive a score out of 100 and a level between 1 and 4 (lowest to highest level of skills, knowledge and confidence to manage their care). This can then in turn inform approaches and interventions, tailored to specific needs.

There are a number of interventions being utilised such as health coaching, structured self-management education, peer support as well as group, asset and community based approaches. These came about following the Realising the Value programme which set about understanding what practical things the population needed to empower them to manage their health.

The PAM score can also be used as an outcome measure to evaluate the impact of interventions



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Case Study: PAMs Patient Story (I)

“A had her first PAM assessment completed in June and this was then repeated in November. In this time A moved from a score of 63 to 72.5. This equates to a PAM level 3 to a PAM level 4. The team around her included an advanced practitioner, a clinical care-coordinator and a wellbeing support worker. In addition to her own long term conditions A also had dyslexia. A cared for her husband who was also on the service and at that time very poorly. A expressed to her wellbeing support worker that she was doing everything for her husband and this was causing her to feel exhausted. A informed her wellbeing support worker that as a couple they had some concerns over their finances. She explained that whilst they had a number of properties they were in negative equity. A’s wellbeing support worker noted that she had a very active social life, always seemed to be taking phone calls and her nails and make up were always done.

At Patient Activation Level 3 A was able to recognise that her busyness and reluctance to stop and relax was having an impact on her energy levels. She was also able to recognise that the level of care she was providing for her husband was having an impact on her wellbeing. She was able to explain that in addition to feeling tired, the stress of caring for her husband and their financial situation was not helping her levels of anxiety. A explained to her wellbeing support worker that every week she would organise both her and her husband’s medication. She would begin counting out the medication, if she was interrupted she would have to stop and start again from the beginning. This meant that this job could take her hours. A was able to explain that she wanted to do something about this, and also able to identify a goal around addressing their financial situation. A had picked up some forms from McMillan and asked her wellbeing support worker to complete them with her. A also requested lots of assessments from the clinical team and also seeking to understand medication.





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Case Study: PAMs Patient Story (II)

A's wellbeing support worker observed that she was reluctant to talk about herself and would very quickly move on to talking about how her husband was. A's wellbeing support worker directed her to Age UK for support in completing the forms. She also coached A through different options she had for managing time, using coaching questions and an appropriate amount of challenge to do so. They identified options such as using blister packs for medication, setting an "activity" cut off time at which point A would sit down and watch a movie and they discussed different ways her husband could become more involved in his own care, lifting some of the responsibility from A. A identified ideas such as creating her own "update report" for when she spoke to her wellbeing support worker. She also decided to put the phone on speakerphone to involve her husband in discussions concerning him.

A's wellbeing support worker described a phone call not long before A was discharged from ECS where A gave her own update without being prompted, informing her that she had joined slimming world. This is a goal that had not been discussed and had been a decision made independently of wellbeing support worker discussions. Additionally, A explained that her husband was now looking after his own medication, freeing up some time for her and that she was not planning any activity after 3 pm so she could relax. A then put the phone on loud speaker so that her husband could also talk with the wellbeing support worker. It was these behaviours that indicated a PAM level 4, which was what the last PAM was scored at."

Useful Resources for Patient Empowerment and Activation

- <https://www.kingsfund.org.uk/publications/supporting-people-manage-their-health>
- <https://www.england.nhs.uk/ourwork/patient-participation/self-care/patientactivation/>
- <https://www.england.nhs.uk/ourwork/patient-participation/self-care/patientactivation/pa-faqs/>
- [Realising the Value Programme](#)
- Case Study: [Symphony Programme](#)



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Making change in a system can be difficult due to the number of parties involved and the scale of change being made. There is also a shift in culture in terms of working together across organisations. However, through PHM process, leadership can use data to influence change - data-driven leadership.

It is essential to involve operational managers and clinical staff right from the start, as it is these individuals on the frontline, working with patients, who will be asked to implement changes in care that have been identified through the application of analysis and intelligence. The impact on health outcomes will depend not only on the aims outlined at the start of the process and on the analysis of the available data but crucially on changes at the level of individual patients and clinicians.

By engaging staff from the start, this increases buy-in within the workforce and helps to instil a new culture within the system as workforce practices change

Staff and patients therefore need to be involved in co-designing:

- Clinician and patient decision-support tools at the point of care
- Prevention services for cohorts of patients at risk of adverse outcomes
- Shared care records across the continuum of care



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Tips for getting started

- As a leadership team, agree on a shared vision and 'case for change' based on population needs assessment
- Start engagement with stakeholders early, laying out the facts and data
- Remember to involve all parties, from patients to front line clinical staff and clinicians
- Identify clinical champions across the system; they are instrumental in making clinical change happen
- Set up working groups with stakeholders and give them ownership; making them feel as though they are driving change is key to success
- Iterate and refine with stakeholders to come to implementable effective interventions to get to the future vision
- Consider the impact of interventions on other services

Resources

- [Planning for Scale: A Guide for Designing Large-Scale Improvement Initiatives](#); McCannon CJ, Schall MW, Perla RJ. Planning for Scale: A Guide for Designing Large-Scale Improvement Initiatives. IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement; 2008. (Available on www.IHI.org)
- [Whole System Measures](#); Martin LA, Nelson EC, Lloyd RC, Nolan TW. Whole System Measures. IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement; 2007. (Available on www.IHI.org)



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Evaluation - Overview

Evaluating the impact of changes being made is a core part of the PHM process. Without it, it is difficult to measure the impact of implemented interventions on the population.

It is important to be thinking about evaluation throughout the PHM journey. By embedding it into the process from the start, it becomes easy to measure at the end.

There are **five key things to be considering** when starting to think about evaluation:

- 1 A clear **purpose** for the evaluation - you understand who your audience are and what you need to demonstrate to them in an evaluation.
- 2 A clear **impact goal** for the project and realistic **outcomes** - you understand what it is you are trying to change.
- 3 Buy-in from **key stakeholders** and commitment to learn from evaluation - there is time built into your project plan to reflect on your evaluation findings.
- 4 Effective and appropriate **data collection** tools and systems - these need to be planned from the outset.
- 5 **Resources** available for evaluation - roughly you need to allocate 10% of your time and budget to an evaluation.



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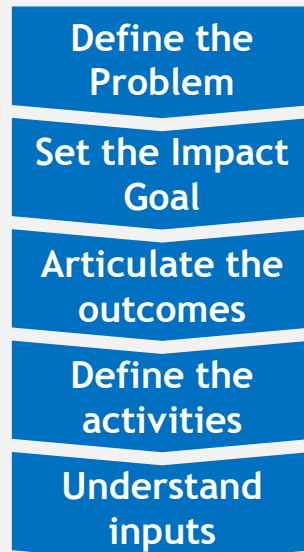


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Evaluation - Mapping backwards to the start

Evaluation is not added in at the end, its how you define how you *start*

We need to know what the problem is that we are trying to address and what it is that we are trying to change before we set out working out what it is we are going to deliver and what resources we need etc



What is the problem we are trying to address?

What change do we want to make to address the problem?

What needs to change in order to reach our impact goal?

What activities do we need to do to achieve the outcomes?

What resources do we need to invest to do those activities?

Ready to Start



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Evaluation - Defining the purpose of your evaluation

There are two main types of evaluation: Process and Outcome. Understanding who are the key stakeholders and what they are wanting to learn from the evaluation is key to setting up the evaluation in the right way.

In the context of PHM, there is more of a focus on outcome evaluation, but process evaluation is also important for improving the next implementation of an intervention

Process Evaluation

Understand how well the project was implemented, what worked well and what didn't work so well

- What worked well?
- How could we improve?

Outcome Evaluation

Understand whether your project has achieved the intended changes you set out to achieve and whether these were met for the right target group

- Is the project achieving its outcomes?
- What impact is the project having?
- What is the size of the impact?
- Did we reach the target group?



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Evaluation - Defining the outcomes

Once clarity has been developed on the goals of the project and purpose of the evaluation, the next step is clearly define the outcomes

Outcomes are the changes or benefits that occur as a result of the activities. They are the changes necessary to have achieved the overall impact goal.

Guiding Principles

- 1) An outcome should be **clearly linked** to the problem trying to be addressed
- 2) An outcome describes a **single change** - there may be a need for more than one outcome for if there is more than one thing that is to be changed
- 3) An outcome is clearly written in **simple and specific** language
- 4) An outcome makes it explicit **for whom** the change will occur
- 5) An outcome makes it explicit **when** the change will have happened

Top Tips

- 1) Does the outcome contain language such as increase, decrease, more, less, better, improve, reduce, enable....etc? If not, maybe it is an output.
- 2) Does your outcome answer the your question? If not, maybe it is an output.



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Evaluation - Defining the indicators

Indicators are a means to measure outcomes, showing whether an outcome has occurred. They are tangible signs you can see in data that something has been achieved or changed

Each indicator describes a single change or deliverable; and they drive all subsequent data collection, analysis and reporting.

Baseline data should be collected for each indicator at the start of a project. Baseline data describes the situation at the start of the intervention against which progress can be assessed, or comparisons made, after the intervention.

An outcome can have several indicators, but a project should have a manageable number of indicators.



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Evaluation – Useful Resources

- Example projects by the joint NHS-E/Health Foundation Improvement analytics unit
 - <https://www.health.org.uk/publication/impact-enhanced-support-rushcliffe>
 - <https://www.health.org.uk/publication/impact-providing-enhanced-support-sutton-homes-care-residents>
- ‘Introduction to evaluation’ guidance by PHE:
 <https://www.gov.uk/government/publications/evaluation-in-health-and-well-being-overview/introduction-to-evaluation>
- Accessible training slides on aspects of evaluation by PHE:
 <https://app.box.com/s/78eklfmebv9fsfe9gt1xmb7gas983ll8>
- Accessible videos on Evaluation by PHE:
 https://www.youtube.com/playlist?list=PLLDAq3SAWJh1Gkgpc7afmIG_77PVf4EGl
- Other resources:
 - [How to understand and measure impact](#)
 - [Using Metrics to Improve Population Health](#)
 - <https://www.health.org.uk/publication/evaluation-what-consider>
 - <https://clahrc-west.nihr.ac.uk/evaluation/evaluation-best-practice-and-guidelines/>
 - <https://www.weahsn.net/what-we-do/evidence-informed-commissioning/evidence-and-evaluation-toolkits/>
 - <http://www.strategyunit.co.uk/publications/logic-models-complex-programmes>
 - <https://www.gov.uk/government/publications/the-magenta-book>



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Tips on Getting Started on Interventions

- Transformation isn't necessarily about making wholesale changes to the local healthcare environment; it can be seeing where services can be adapted or tweaked so they are more relevant and useful for the local population
- A large part of change efforts is making the organisation data-led and heading towards data driven leadership
- As well as consulting the insights from the data, it is critical to engage with other key stakeholders such as clinicians, analysts and managers when making decisions to transform local care
- Initiating a programme after considering population health is not enough: in order to implement meaningful transformation, there needs to be ongoing monitoring and evaluation to ensure the programme being implemented remains fit-for-purpose as the population evolves and changes
- There must be a realisation within the organisation that a 'one-size-fits-all' approach may not work for all; therefore, it is important to be flexible and work to reduce any potential exacerbations in inequalities
 - You may need multiple interventions, or think about interventions at system, place and neighbourhood levels
- It is also important to understand the impacts interventions have on the workforce and to plan accordingly