SECTION COLLOQUIUM 2019

THE MODERN ACTUARY - CHALLENGE • INFLUENCE • LEAD

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Hosted by

ACTUARIAL SOCIETY
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Population health management

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Agenda

1. Defining a population health management strategy
2. Case study 1: Devolution Manchester
3. Case study 2: Setting up a regional health system database for seamless population health management in Singapore
4. Evaluation framework principles

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Defining a PHM strategy

Defining population health management (PHM)

There is no single, universally accepted definition of PHM.

Different countries, health systems and organisations will define PHM in line with their own policy priorities and within their own contexts.

Rand Health Care

"The PHM model is characterized by three key principles: a focus on the health outcomes of the entire population; coordination of health and medical services through the continuum of care needs, from prevention and health promotion to curative care, disease management, and palliative care; and proactive management of care needs."

David Kindig and Greg Stoddart in the American Journal of Public Health

Population health relates to *"the health outcomes of a group of individuals, including the distribution of such outcomes within the group. The field of population health includes health outcomes, patterns of health determinants, and policies and interventions that link these two."*

NHS England

"Population Health Management is an approach aimed at improving the health of an entire population and improves population health by data driven planning and delivery of care to achieve maximum impact for the population."

Centers for Disease Control (CDC)

"CDC views population health as an interdisciplinary, customizable approach that allows health departments to connect practice to policy for change to happen locally. This approach utilizes non-traditional partnerships among different sectors of the community – public health, industry, academia, health care, local government entities, etc. – to achieve positive health outcomes. Population health brings significant health concerns into focus and addresses ways that resources can be allocated to overcome the problems that drive poor health conditions in the population."

https://www.rand.org/pubs/periodicals/health-quarterly/issues/v5/n1/01.html

https://www.england.nhs.uk/hssf/background/

https://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.93.3.380

https://www.cdc.gov/pophealthtraining/whatis.html

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When reviewing a multitude of PHM definitions, common 'buzz words' emerge

Data driven
Triple value
Prevention
Multi-disciplinary
Outcomes
System redesign
Risk stratification
Population segmentation
Integration
Wider social determinants
Equity
Quadruple aim
Engagement
Risk triangle
Partnerships
Entire population
Quality of life

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While these buzz words sound like sensible ideas to include in the definition, you need more to turn a PHM strategy into action

1. A set of health outcomes that are objective and measureable

2. A set of principles that govern how you deal with inevitable trade-offs. E.g.

- Improve health of worst-off or improve average health?
- Improve health of those with highest capacity to benefit or those most likely to be responsive?

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Enablers of a PHM programme

People

A PHM unit needs a collaborative and multi-disciplinary team with a high level of influencing skills with internal and external stakeholders.

Ideal skills:

- Team members with backgrounds in business, public health, nursing, integrated health, healthcare administration, data analytics
- Advanced project management skills
- Ability to communicate across a range of stakeholders
- Strong knowledge of medical and care management practices

Process

Exact processes will depend on the objectives of the programme but will likely require some broad and well-developed processes including:

- Data management
- Population segmentation
- Setting goals and outcome measures
- Use of benchmarks to drive performance measurement
- Develop interventions
- Critical evaluation and feedback process

Technology

The use of technology in healthcare is rapidly evolving and progressing and applicability in PHM programmes includes:

- Sophisticated data management and analytical tools
- Tele-medicine/virtual health solutions
  - Use of medical technology that syncs to smart phone apps
- Electronic medical records
- Technology and apps aimed at education and driving engagement

Many of these technology solutions are aimed at delivering integrated care.

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Case Study 1:
Devolution Manchester

The Greater Manchester Health and Social Care Partnership (The Partnership)[1] was formed in 2016 to oversee the devolution of health and social care services in the Greater Manchester regions for the 2.8 million people in the area

- Without devolution:
  - Healthcare services for geographical sub-regions are typically purchased by Clinical Commissioning Groups (CCGs) while social care services are provided through local councils.
- With devolution:
  - Decentralise public services
  - Run locally rather than nationally

Partnership objectives

- ✓ Improve population health
- ✓ Integrate health and social care services and join up with other services that affect health (e.g. education)
- ✓ Standardise care and access throughout the region

[1]http://www.gmhsc.org.uk/

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The partnership has three main focus areas to address population needs across the age spectrum, each with particular activities and objectives

"Start well" goal outcomes

- **More/Increased:**
  - Breast feeding
  - Dental health
  - Vaccinations
  - Education
  - Parental mental health
- **Less/Decreased:**
  - Low birth weights
  - Smoking during pregnancy
  - Child obesity
  - Emergency visits

"Live well" goal outcomes

- Get people back to work sooner after injury/illness
- Improved self-care
- Improve lifestyle behaviours
- Prevention and earlier cancer detection
- Eliminate HIV within a generation

"Age well" goal outcomes

- Increase in housing provision
- Improved living conditions
- Improved nutrition and hydration
- Prevent falls and fractures

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Has it worked? The jury is still out

Research conducted by The University of Manchester[1] has concluded that it is too early to tell exactly how successful the Partnership has been but cautioned against being too optimistic:

"If this is successful, it represents a revolution. If not, it's been a very time-consuming and expensive exercise."[1]

"Soft devolution" rather than "devolution"

- Partnership is a series of administrative agreements between Department of Health (DoH), NHS England (NHSE) and other authorities. No statutory basis and very few formal levers.

No real autonomy over policy

- Agenda reflects existing mandates and priorities of DoH and NHSE
- No real autonomy over policy but implementation has been different

What is the added value of devolution?

- Difficult to distinguish between Partnership objectives and other plans for new models of care in England.

Be cautious in assuming this will lead to cost savings and population health improvements

- The move towards place-based governance makes sense and integration is needed but assumptions about rate at which changes lead to shift in demand are optimistic.

Security of developed relationships and shared governance/decision making is questionable

- The Economist[2] suggests that there has been difficult in getting authorities to share data and expenditure, with little pressure on them to do so.

Leaders initially overpromised what devolution could achieve

- This has been recognised by current leadership and focus is now strongly on implementation.

[1]https://www.mbs.ac.uk/media/ambs/content-assets/documents/news/devolving-health-and-social-care-learning-from-greater-manchester.pdf
[2]https://www.economist.com/britain/2019/03/30/manchester-shows-how-hard-it-is-to-integrate-health-and-social-care?frsc=dg%7Ce

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Case Study 2:

Setting up a regional health system database for seamless population health management in Singapore

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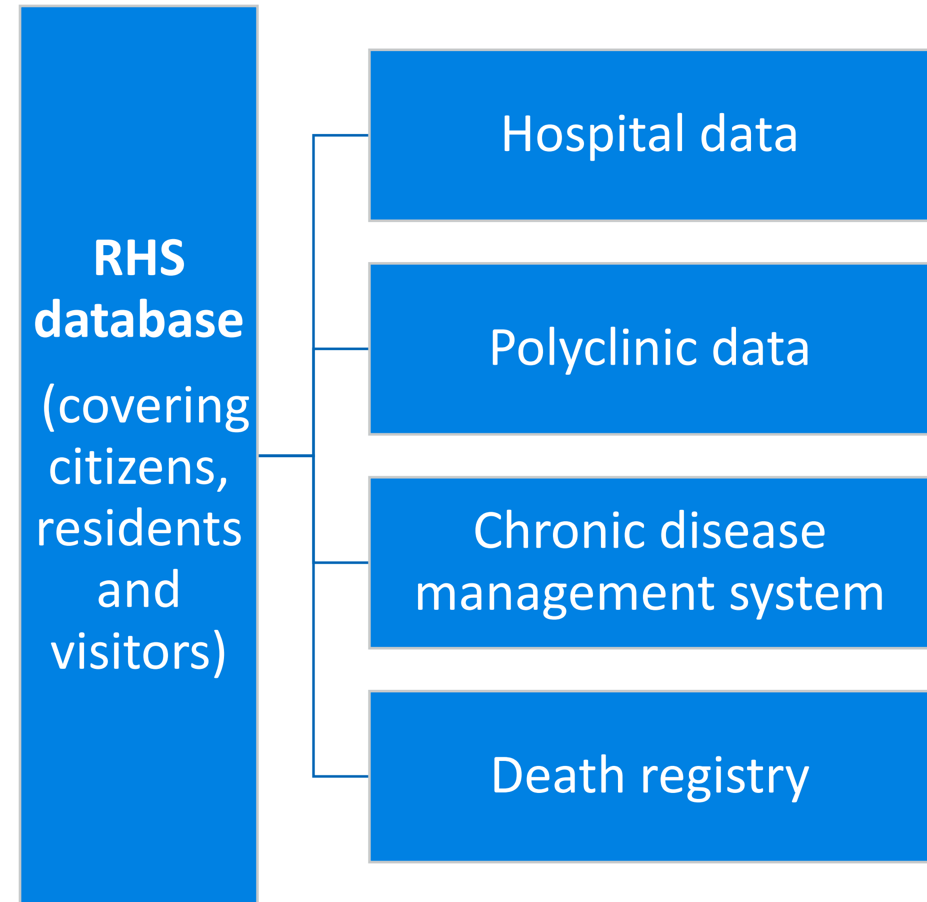
The Singapore government established the Regional Health System (RHS) in 2010, with a view to moving away from a hospital focused system to a more efficient PHM framework

- 6 regional health clusters were established, with geographical boundaries determined by proximity to the nearest "anchor hospital".
- Each cluster was mandated by the Ministry of Health to prioritise Population Health Management.
- 3 of these clusters collaborated to develop the RHS database – designed to link data from different health systems to improve patient experience and health outcomes, with a view to facilitating big data analytics.
- Patients are linked through the system using their National Registration Identity Card.



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The data collected into the database was sufficient to use risk stratification on the population, with the intention of developing appropriate interventions for the populations under care.

What is risk stratification?

A risk stratification tool can be used to divide a population into homogeneous groups that are defined by characteristics that members within a group have in common: e.g. age, sex and/or clinical conditions.

Members within a particular group are estimated to have a similar risk profile to other members within the group.

Risk stratification allows us to identify the most at-risk members of the population so that appropriate interventions can be targeted where they are most needed.

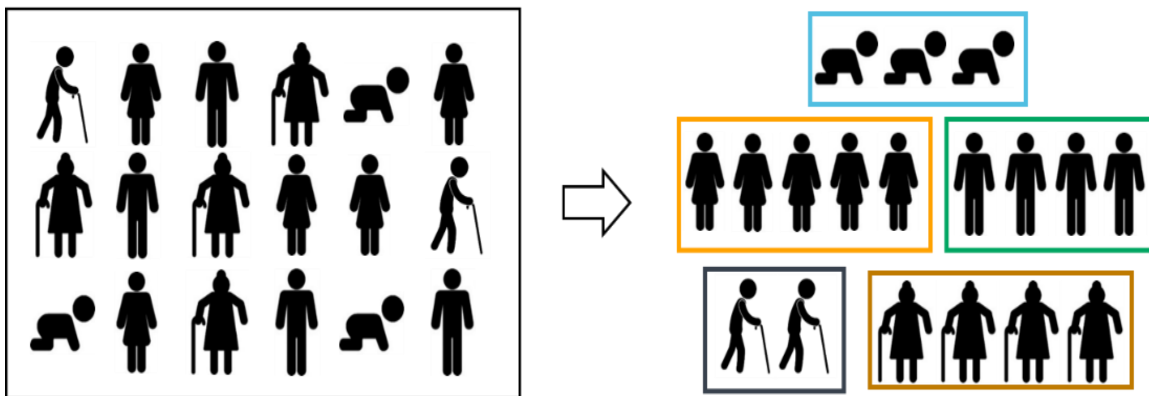

Table 3. Top primary diagnoses of frequent admitters who cross-utilized inpatient services, 2011–2013.

DRG	Inpatient episodes
Chronic obstructive airways disease	838
Other digestive system diagnoses	604
Respiratory infections/inflammations	588
Kidney & urinary tract infections	564
Heart failure & shock	560
Bronchitis & asthma	538
Chest pain	521
Oesophagitis, gasteroenteritis & miscellaneous digestive disorders	477
Diabetes	447
Circulatory disorders	412
Other kidney & urinary tract diagnoses	404

No. of frequent admitters: 10,920.
No. of FA who cross-utilize: 1952 **(17.9%).**
No. of cross-inpatient episodes: 15,788.

Source: Setting up a regional health system database for seamless population health management in Singapore, Proceedings of Singapore Healthcare, 2015

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Outcomes and challenges

Outcomes

- The data linkage process was conducted using the unique identification number as the linking variable.
- The final anonymized database has multiple interconnected tables that includes patient demographics, chronic disease and healthcare utilisation information
- Risk stratification of patients based on their past healthcare utilization and chronic disease
- Provides a system-wide perspective of healthcare and offers an opportunity for proactive PHM

Challenges

- Inconsistency of National ID due to change in visitor/resident status
- Ethical and privacy issues with accessing and consolidating data
- Time and resources required to get approval from data custodians and the research ethics board
- Difficulties in expanding the database beyond the initial pilot service providers

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Evaluation framework for a PHM programme

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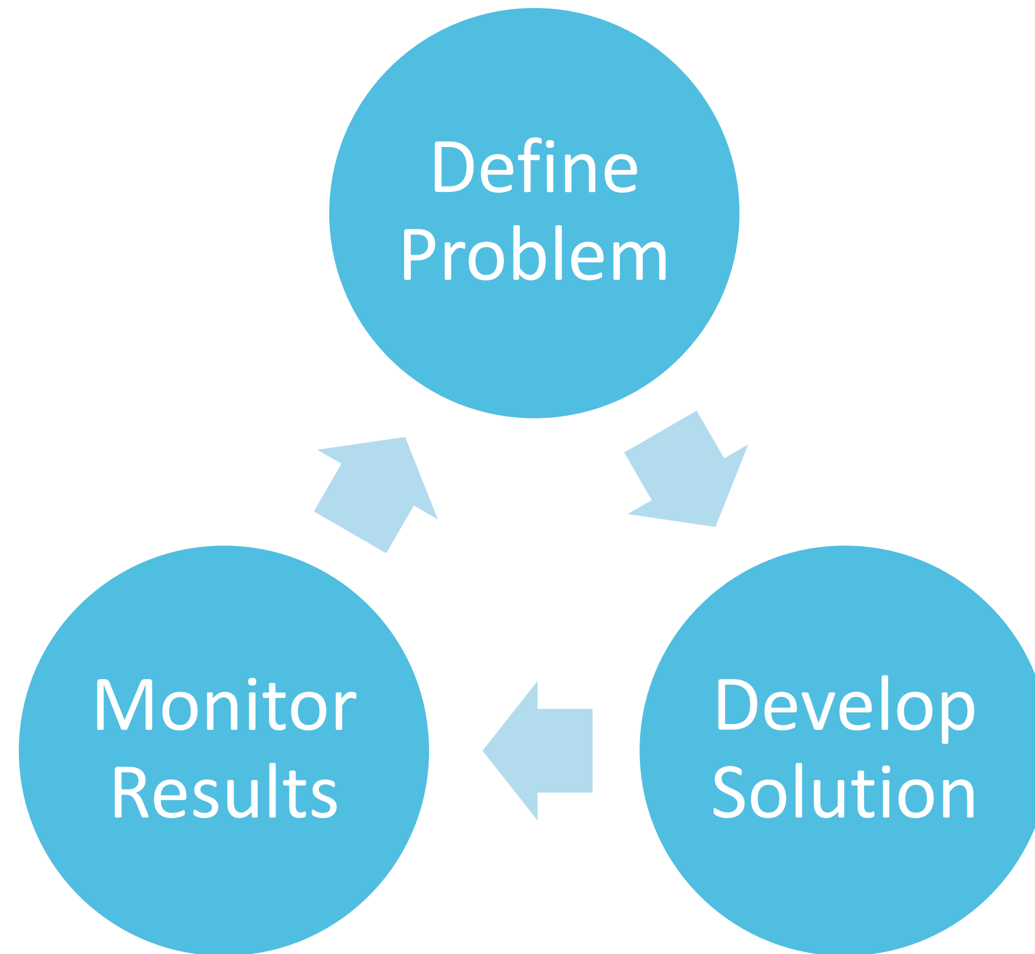
The Actuarial Control Cycle



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Planning

Understanding the current position
Identifying key measures of success

Define Problem

Develop Solution

Monitor Results

Build enablers for evaluation into the solution.

Monitor
Take corrective action
Be wary of limitations and pitfalls

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Adjusted Morbidity Groups (AMG) Spain

	Population (%)	Mortality rate (x 100)	Visits to primary care (mean)	Emergency admission rate (x 100)	Emergency visit rate (x 100)	Dispensed drugs (mean)	Health care expenditure (mean)
High-risk population	5	16.6	22.2	58.1	160.8	13.4	7067€
Moderate-risk population	15	1.1	12.4	7.5	72.5	8.0	2121€
Low-risk population	30	0.2	7.0	2.9	51.9	3.6	779€
Baseline-risk population	50	0.1	2.0	0.6	17.3	1.0	164€

Source: Spanish ministry for health, social services and equality 2018

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Evaluation options

Complexity

Power

Meta-analysis
Randomised Controlled Trials

Before / After studies
Cross-sectional studies
Cohort studies

Qualitative analysis
Case Reports
Case Series

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Bias

The Literary Digest

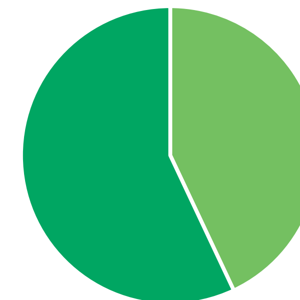
NEW YORK OCTOBER 31, 1936

Topics of the day

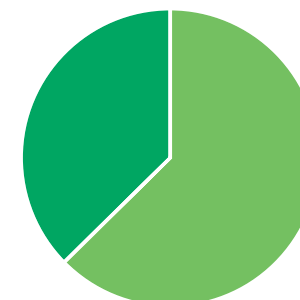
LANDON, 1,293,669; ROOSEVELT, 972,897

Final Returns in The Digest's Poll of Ten Million Voters

Prediction



Actual



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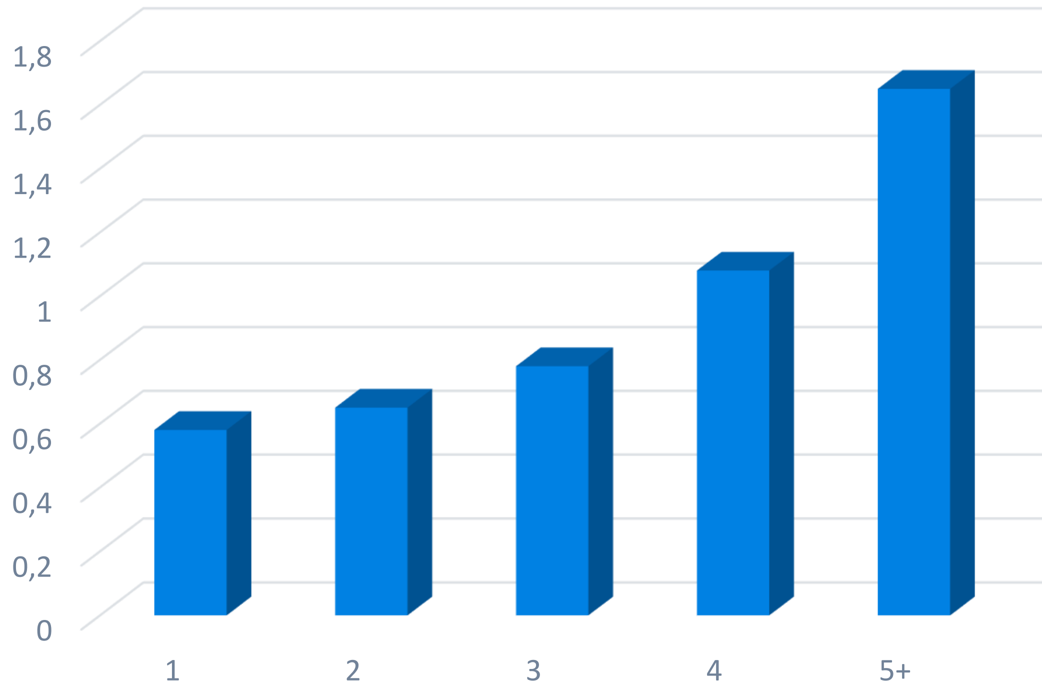
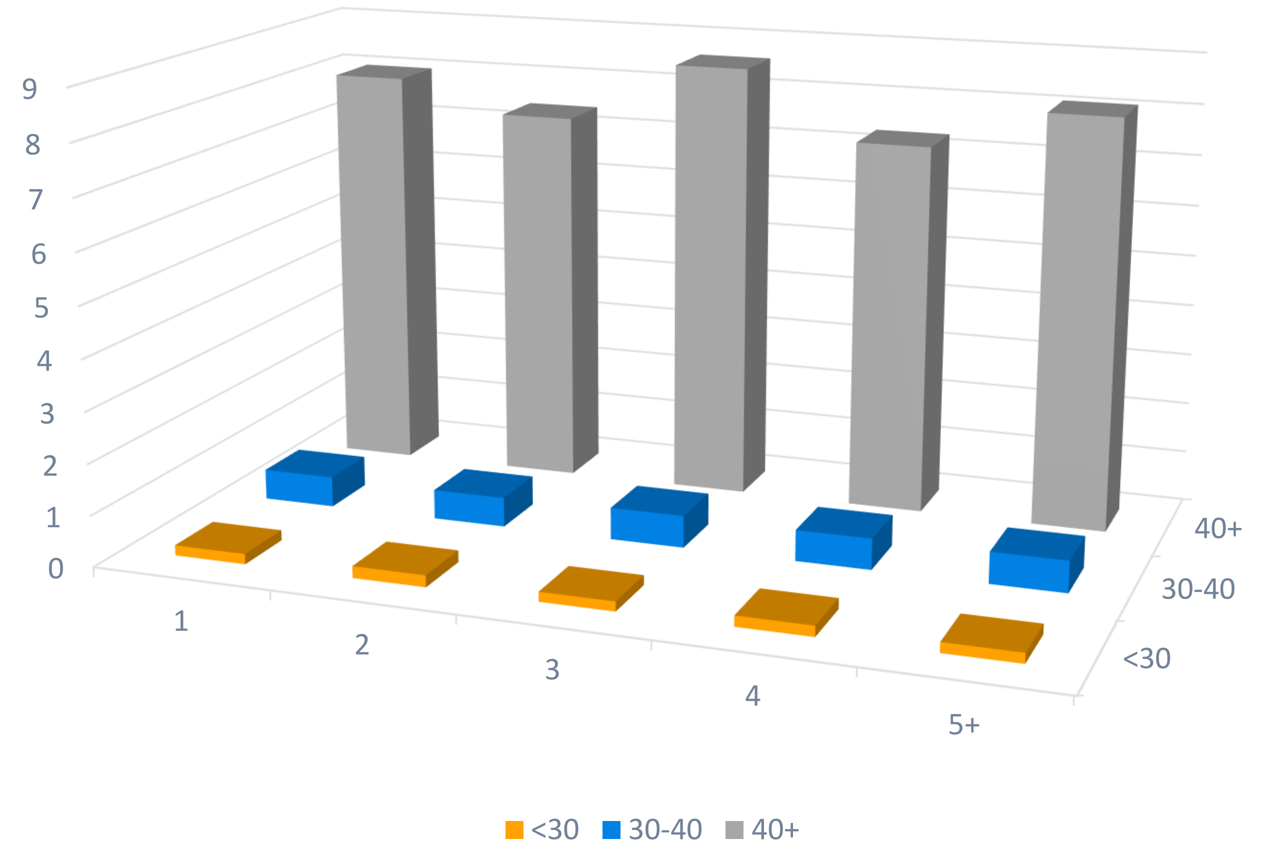
Confounders



Rates of Down Syndrome (per 1000 live births) plotted against birth order.



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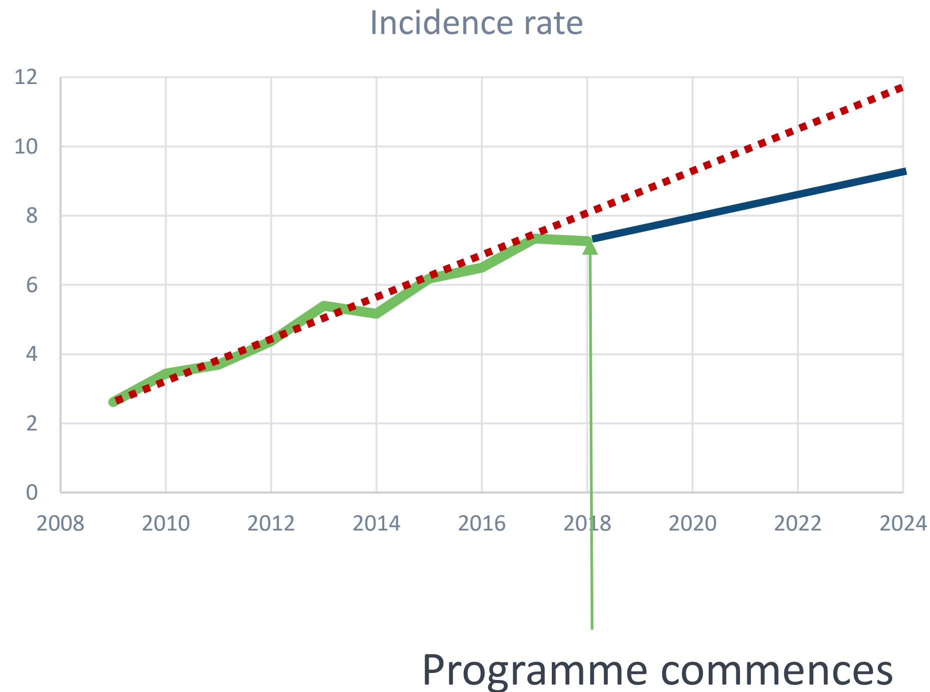
Actuarially adjusted historical control approach



- Historical information becomes your control data
- You will need to adjust for trends
  - How would the data have evolved without the intervention?

- Requires judgement (and / or good predictive analytics) to project trends appropriately.
- Confounders can be a challenge
- Regression to the mean can be a challenge

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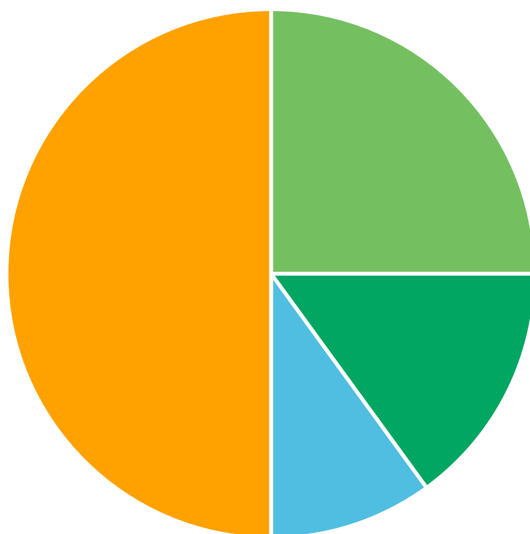
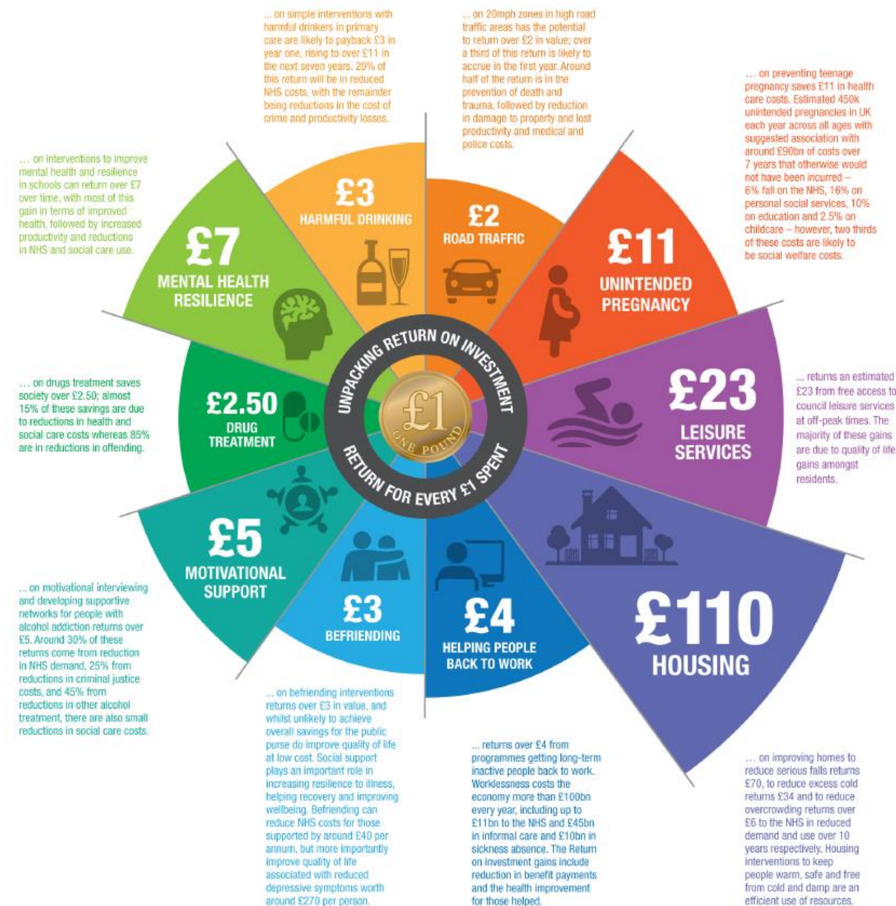
Financial measures of success

Drivers of Population Health



■ Health care ■ Genetics ■ Environment ■ Social / Economic

Source: Canadian Institute of Advanced Research 2012



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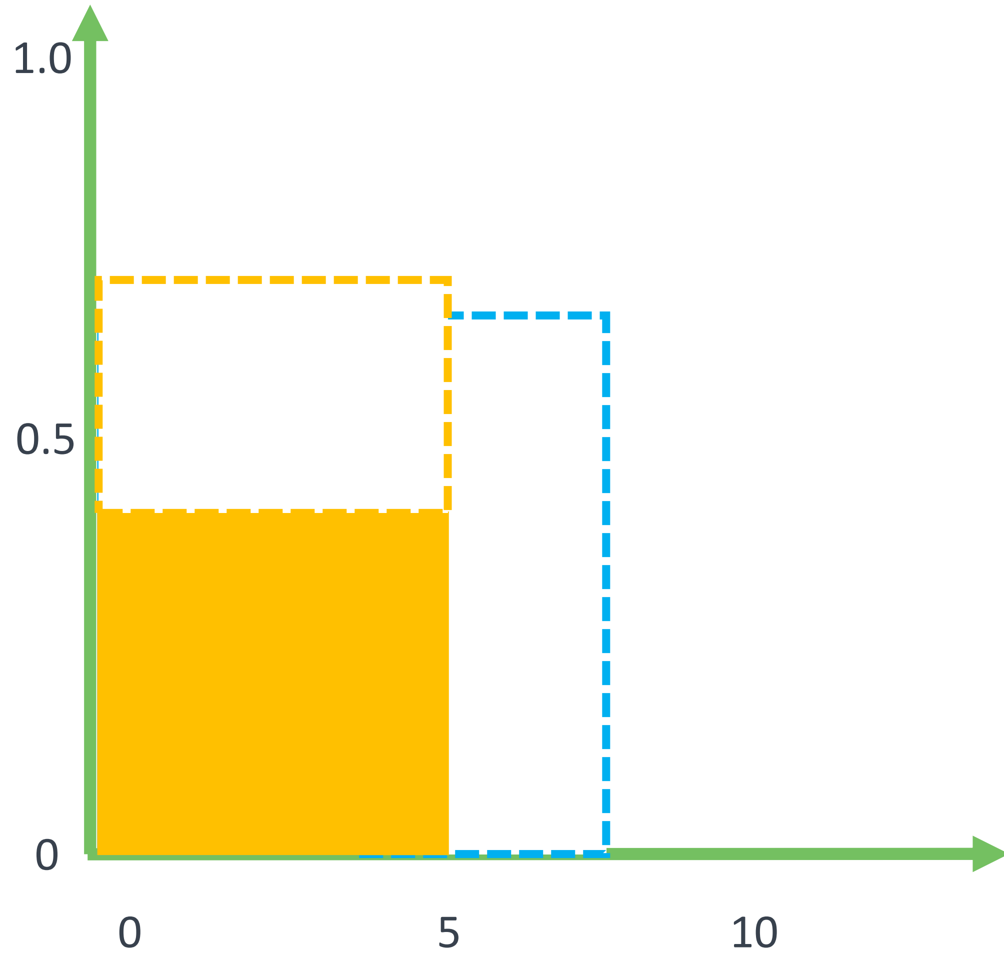
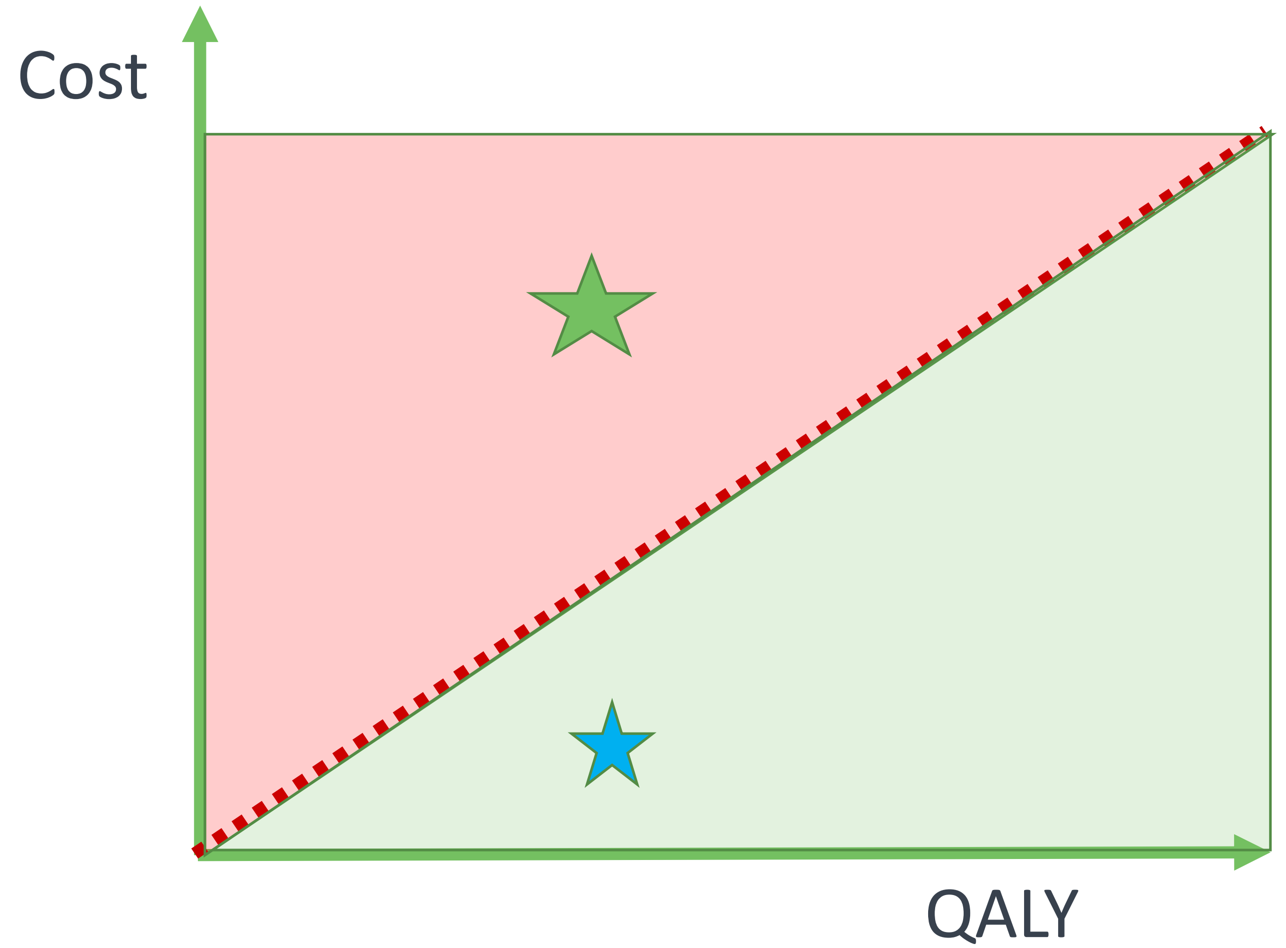
Cost per QALY





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Conclusion

Conclusions and learnings

Buy-in from the top	Without buy-in from the top (e.g. NHSE), you will struggle to mobilise anything
Align stakeholders	If the goal is to join up services, getting stakeholders on the same page and working towards a common goal with a willingness to share data, funding, successes and failures will be a key enabler of success
Define your goals	Clear definitions of the programme goals success are essential to ensure that the appropriate enablers are in place and that the programme's performance can be measured and evaluated
Tools and technology	Sophisticated tools and technology can aid PHM efforts but it is important to have suitably qualified staff and the right organisational culture
Data requirements	Robust population health management processes require comprehensive data which can be difficult to obtain and to utilise, taking into account technical challenges, privacy laws and the volume of data involved.
Plan to evaluate	In designing your solution, think about how you can evaluate it and plan to collect the data you need to measure success and also to adapt your solution to be more successful
Watch out!	Issues like reversion to the mean, bias and confounders can make good interventions look mediocre and mediocre interventions look good. Watch out for the pitfalls that can arise.

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