ICS Stories: Closing the data-action gap for patient and population health in Cheshire and Merseyside

8th July 2022 at 13:30

Speakers: Wesam Baker, Mersey Care NHS Foundation Trust and Professor Iain Buchan, University of Liverpool

hfma

Closing the Data-Action Gap
for Patient Care & Population Health

Webinar, 8th July 2022

Wes Baker
Director of Strategic Analytics, Economics & Population Health Management
Mersey Care NHS Foundation Trust

Iain Buchan
Associate Pro Vice Chancellor for Innovation; Professor of Public Health & Clinical Informatics
University of Liverpool

The Need for System-P

"Enabling the NHS to programme equity, rather than just describe inequality"

'The long & winding road to healthy life expectancy'

Healthy Life Expectancy for women 58.2 years Liverpool, 63.9 years nationally

Healthy Life Expectancy for men 57.6 years Liverpool, 63.3 years nationally

Social Contact
Adult social care users not having social contact
Liverpool 55.6%
CC 57.0%
England 54.6%

Accessing appropriate care
Avoidable admissions rate per 100,00 population
Liverpool 1,112
CC 1,011
England 821

Good Mental well being
Liverpool 77%
CC 78%
England 81%

Injuries due to falls over 65 yrs
Rate per 100,000 population
Liverpool 3,168
CC 2,544
England 2,114

Warm Home
Fuel Poverty
Liverpool 14.3%
CC 14.3%
England 11.0%

Employed
Long-term unemployment
Liverpool 0.58%
CC 0.75%
England 0.37%

Eating 5 or more portions of fruit and vegetables per day (adults)
Liverpool 52%
CC 53%
England 57%

Not Smoking
Adults who smoke
Liverpool 18.9%
CC 18.0%
England 15.5%

Maintain a healthy weight
Adults who are overweight or obese
Liverpool 65%
CC 64%
England 61%

Not regularly drinking alcohol
Adults who are drinking over 14 units of alcohol a week
Liverpool 30%
CC 27%
England 26%

Physically active
Adults who are physically active
Liverpool 64%
CC 65%
England 65%

Self Harm
Emergency admissions for self harm aged 10-24 yrs per 100,000
Liverpool 462
CC 392
England 431

Young adults in education, training or employment
16-18 NEETs accounted for
Liverpool 6.3%
CC 5.7%
England 4.2%

Doing well at school
GCSE attainment
Liverpool 50%
CC 52%
England 58%

Healthy Weight for 10-11 year olds in year 6
Overweight and Obese children
Liverpool 38%
CC 38%
England 34%

School Readiness
Liverpool 62%
CC 66%
England 71%

Looked after children
Rate per 10,000 <18 population
Liverpool 114.5
CC 77.2
England 60.3

Child Poverty
Liverpool 32.7%
CC 29.7%
England 20.1%

Not smoking during pregnancy
Pregnant women who smoke at time of delivery
Liverpool 14.2%
CC11.2%
England 10.5%

Healthy birth weight babies
Low birth weight
Liverpool 3.4%
CC 3.4%
England 2.8%

Breastfeed your baby
Breastfed babies at 6-8 weeks
Liverpool 34%
CC 47%
England 44%

Child Vaccinations
MMR 2 vaccine
Liverpool 88%
CC 87%
England 88%

Key:
LCR = Liverpool City Region
CC = English Core Cities

Public Health Epidemiology Team, Liverpool City Council , April 2018

NHS as civic partner helping communities escape poverty while providing care equitably

Public Health perspective: Liverpool c.f. England

- **4th most deprived** upper tier local authority

- **Smoking** in early **pregnancy**: **21.5%** c.f. **12.8%**

- **28% children** living in **poverty**
(~75% mental health problems arise in childhood)

- **16x more children in care**

- **School** pupils with **mental health** issue **3.7%** c.f. **2.8%**

- Common mental disorders: **193** c.f. **156** per 100k

- Cheshire & Mersey: **half** of **6.3%** using **mental health services** from **fifth most deprived** neighbourhoods

- **Obese** at **11** years **25.7%** c.f. **21%**

- **Healthy life expectancy** for **males: 58.3** c.f. **63.1**

- **Healthy life expectancy** for **females: 57.9** c.f. **63.9**

https://fingertips.phe.org.uk 2020/1 data

Connected World
Disconnected Health Statistics

Adult Social and Health Disadvantage

Poor Antenatal Health

Poor Development

Poor Child Health

Poor Learning

Adult Social and Health Disadvantage
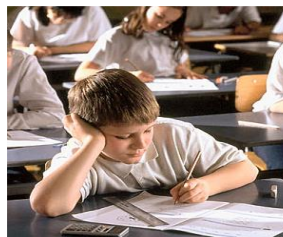
Most public health indicators of how well children are growing up look at yearly snap-shots of populations and not the journeys of children and families

UK's first birth cohort in 20y will study the 'digital twins' of 10k children growing up in Liverpool using NHS and local authority linked data from www.cipha.nhs.uk

Children Growing Up
in Liverpool

UNIVERSITY OF LIVERPOOL

Mobilising Data
To Support Children and Families

We asked leaders in the public sector about their stickiest issues, about what opportunities that come from these problems and the barriers they are facing (whether that's adoption, integration, or growth).

We invited SMEs to submit project proposals to tackle three challenges:

- **Increasing family support to stop children entering care**

- Reducing childhood asthma through better environments and awareness

- Making digital feel doable in local authority social care teams

We funded **Koala NW** to coproduce a framework of support for families at risk of being separated.

Koala NW will work with vulnerable parents with social care involvement to find out what barriers stopped them asking for help earlier. In coproduction with the parents Koala will produce a set of key indicators to be used as a framework to identify and improve pathways for parents seek help sooner.

Aim: to normalise families asking for help in the first 1001 days of a baby's life to prevent children from going into care settings.

GP, Social Care Sources

Hospital Sources

Community, Public Health Sources

Patient Sources

TRUSTWORTHY LINKAGE, PSEUDONYMISATION, CODE EXECUTION

ICS 1/x…

Provider
Data Processing

Integrated Care System
Data Processing
Linked
Pseudonymised
Part-curated data

National Data Service
Trusted Third Party
❖ Key management
❖ Deidentification
❖ Reidentification

Approved Tools for
Dataset production
Data curation
Analysis & Simulation

Actionable Analytic & Trustworthy Research Environment (TRE) leveraging national Federated Data Platform (FDP)
Dataset Extraction and Curation Pipeline
Audited Execution of Code on Data
Population Health Management Linked to Care Workflow

API

TRE Network FDP

OVERSIGHT

CIVIC GOVERNANCE

Strategic Data Insights
Steering Group

Role-based Access

Efficiently considering data access requests, processing agreements and monitoring data quality, curation and transferable value from innovative data processing – while driving patient, practitioner and public involvement within an ICS 'diameter of trust & actionability'

GOVERNED EXECUTION

OPEN DISCOVERY

CIPHA COMMONS
Data Catalogue
Analytic Code Books
Algorithm Library
Terminology Services
Metadata Resources
Federated Analytics

CIPHA APPROACH
Open Standards
Open Development
Open Assurance
Open Maintenance
Open Innovation

CIPHA COMMUNITY
Expanded to 11 ICS
Dashboard exchange
Analytic load-balancing
Shared learning resources

3 key components for closing the data-action gap

People-to-data:
Spring 2019
Liverpool City Region
Civic Data Cooperative
civicdatacooperative.com

Data-to-analysis:
Summer 2020
NHS/social care/public health record for 2.7m stood up in 90 days
"Combined Intelligence for Population Health Action"
cipha.nhs.uk

Analysis-to-action:
Autumn 2020
World's first universal voluntary Covid-19 rapid antigen testing

2021/2…
System-P brings public health actionable analytics on CIPHA into the build of Cheshire & Mersey ICS

• *Ainsworth J, Buchan I. Combining Health Data Uses to Ignite Health System Learning. Methods Inf Med. 2015;54(6):479-87*
• *Buchan I, National Grid of Civic Data Cooperatives for Health in The Health of the Nation February 2020*
• *www.liverpool.ac.uk/coronavirus/research-and-analysis/covid-smart-pilot/*

COVID-19 Wake-up Call
Need for Real-time Joined-up Intelligence

Tests & Cases

All Cheshire & Merseyside (C&M) residents tested at any Pillar 2 test site and non-C&M residents tested at a C&M test site

Note: this report does not include Pillar 1 data.

Note: positivity rate calculations do not follow PHE methodology

| Show Filters | Clear Filters | Filters Applied |

17,822,321 Tests Completed (LFT+PCR)

2,423,299 Individuals Tested (LFT+PCR)

777,092 Individuals Tested Positive (LFT+PCR)

2.94% LFT Case Positivity Rate (Asymptomatic)

15.07% PCR Case Positivity Rate (Symptomatic)

TEST COUNTS

Test Kit	Tests Completed	Positive Tests	Negative Tests	Void / Insufficient Tests
	366,368	19,828	333,668	12,872
LFT	12,994,470	382,103	12,597,464	14,903
PCR	4,461,483	659,097	3,715,779	86,607
Total	**17,822,321**	**1,061,028**	**16,646,911**	**114,382**

INDIVIDUALS TESTED POSITIVE

Test Kit	Individuals Tested	Individuals Tested Positive	Case Positivity Rate (Individuals)
	110,137	19,362	5.61%
LFT	1,644,510	286,236	2.94%
PCR	1,584,148	609,883	15.07%
Total	**2,423,299**	**777,092**	**5.99%**

TESTS OVER TIME: LFT — Positive, Negative, Void/insufficient

TESTS OVER TIME: PCR — Positive, Negative, Void/insufficient

INDIVIDUALS TESTED POSITIVE OVER TIME: LFT

INDIVIDUALS TESTED POSITIVE OVER TIME: PCR

Data available up to: 25/1/2029 10:40. Run by: buchan@liverpool.ac.uk on 8/7/2022 06:51: V1.9.0

Graphnet

#DATA SAVES LIVES
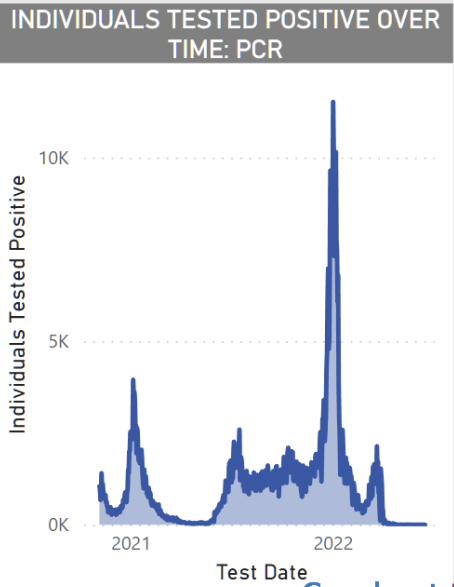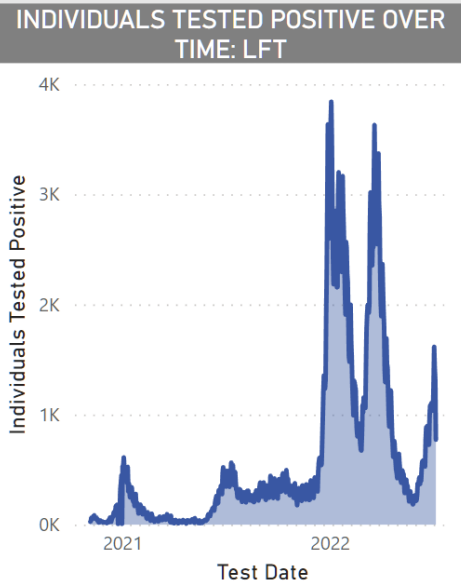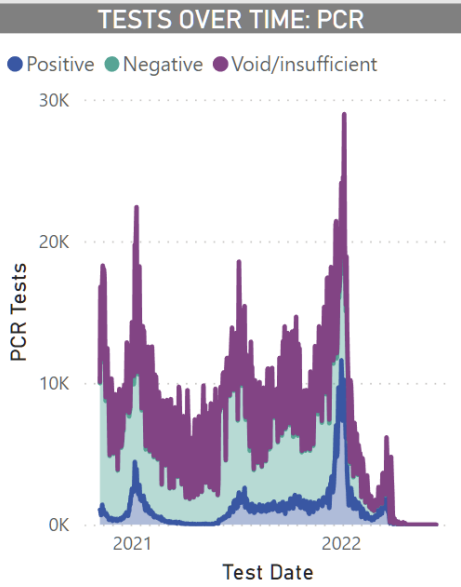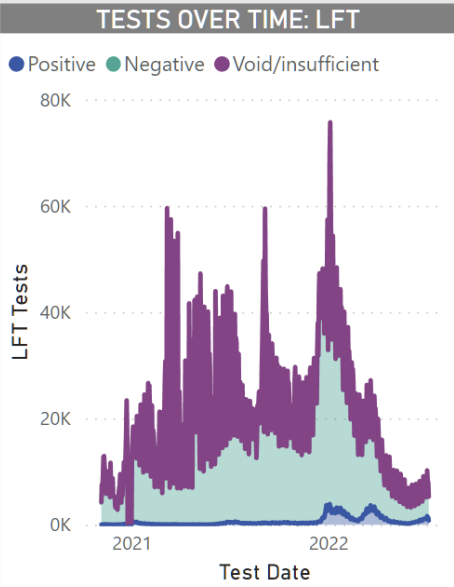
Persistent longitudinal health & care record with real-time population analytics linkable to care workflows / notifications for Cheshire & Mersey 2.7m ICS population

CIPHA Combined Intelligence for Population Health Action
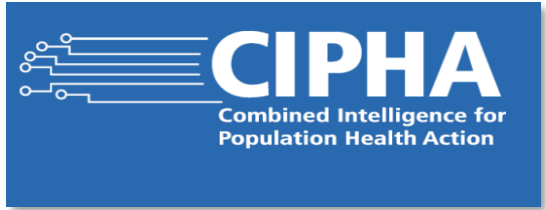
Putting Data to Work for Residents at Pandemic Pace
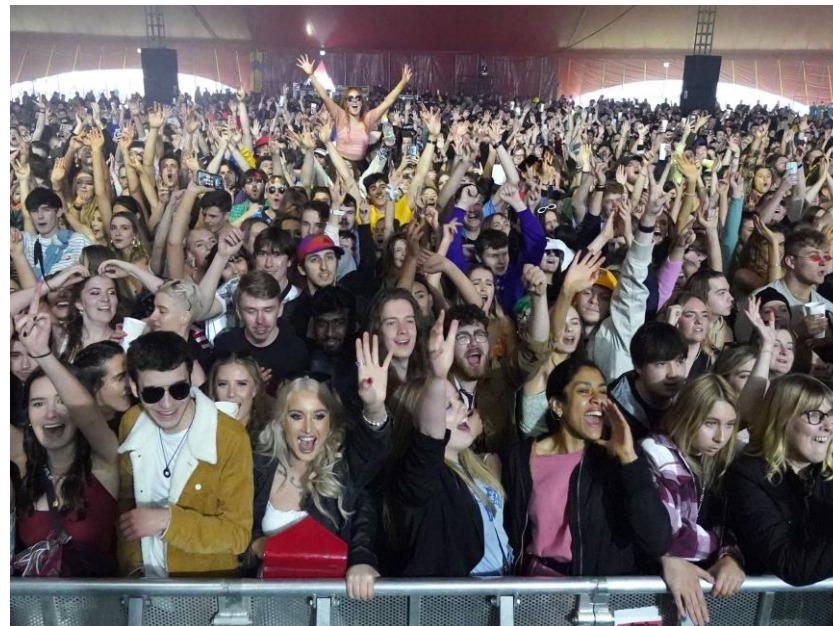

World's first city-scale voluntary SARS-CoV-2 rapid antigen testing:
Cases fell by a 21% and hospitalization by 43% then 25% overall even after reopening in lower Tier
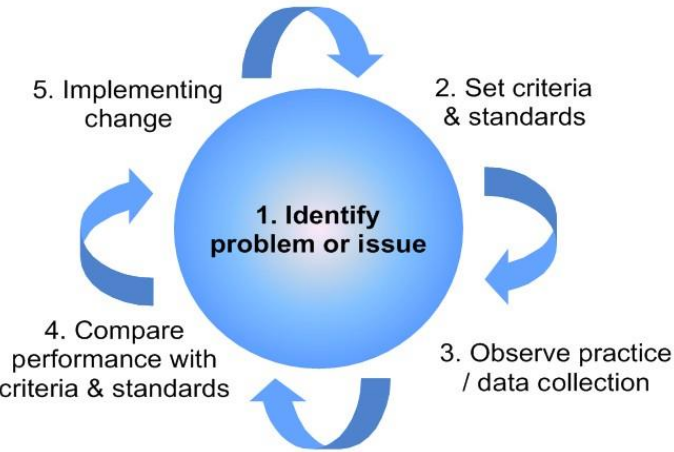

First reopening of mass gatherings regional cluster in N. Hemisphere: only 12 cases / >13k eventgoers

UK's first Civic Data Cooperative, and CIVC NHS Combined Intelligence

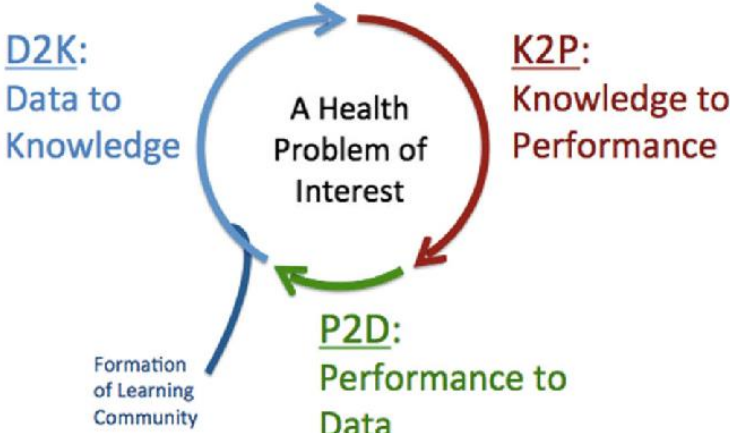# From Nice- to Must-have System Resilience

Clinical Audit → Governance
(1980s/90s → 00s)

Learning Health Systems (10s)

Pandemic-resilient Systems (20s)

Specialist registry data

Integrated care record data

Wider health & care data

Crude predictive models
(baseline risk factor loaded)
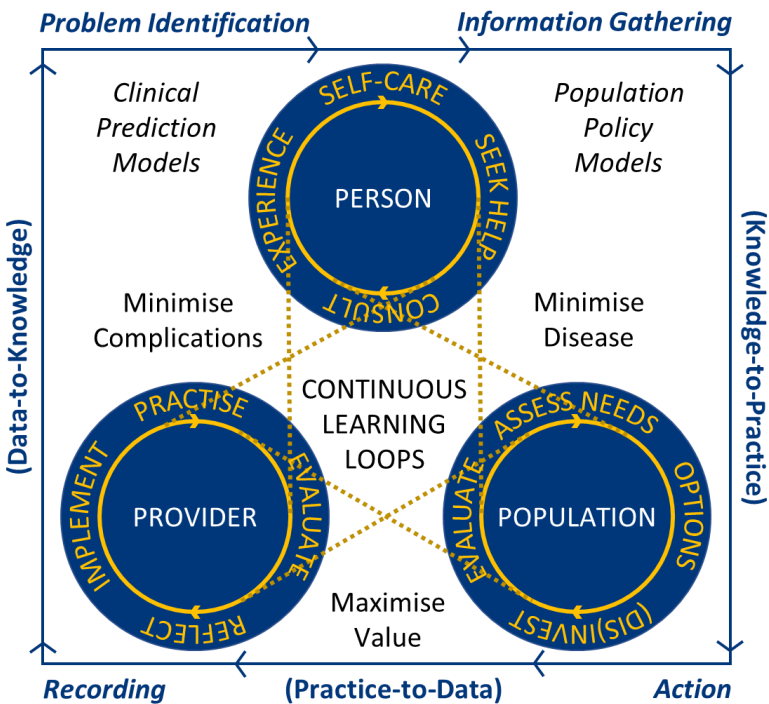
Fuller longitudinal prediction
(difficulty learning models from data)

Multi-outcome prediction
(system dynamics; causal, counterfactual AI)

1-way translation
(trials evidence into practice)

2-way translation aim
(more practice-based evidence)

Combined intelligence
(system resilience; embedded trials)

System-P into Action

Deploying in Cheshire and Merseyside Integrated Care System, a preventative, predictive, precise approach to population, patient and person in a joined-up intelligence-led way

What is [System-P?](#)

what is System P?

DATA   **ANALYTICS**   **CARE**   **PAYMENT**

[System P](#)

System P is the whole system approach to addressing multiagency, multisector challenges that negatively impact population health and will deliver transformational change in service provision through collaborative working.

It is based on four 'DACP' pillars of work – **data** transformation **analytical** transformation, **care** transformation and **payment** transformation – to reflect our belief that transformation in all four areas is required if we are to

Enabling us to programme equity, rather than tackle inequality

genuinely change public services in order to manage population health more effectively.

Data – Flow and integrate all data necessary to understand and improve residents' health and care journeys.

Analytics – Network and invest in the data analysts and technologies

delivering a world-leading combined health intelligence cooperative.

Care – Optimise care processes to improve outcomes and reduce cost as an integrated, health and care system.

Payment – ensure providers are being paid fairly for the value they provide in terms of individual patient and population care.
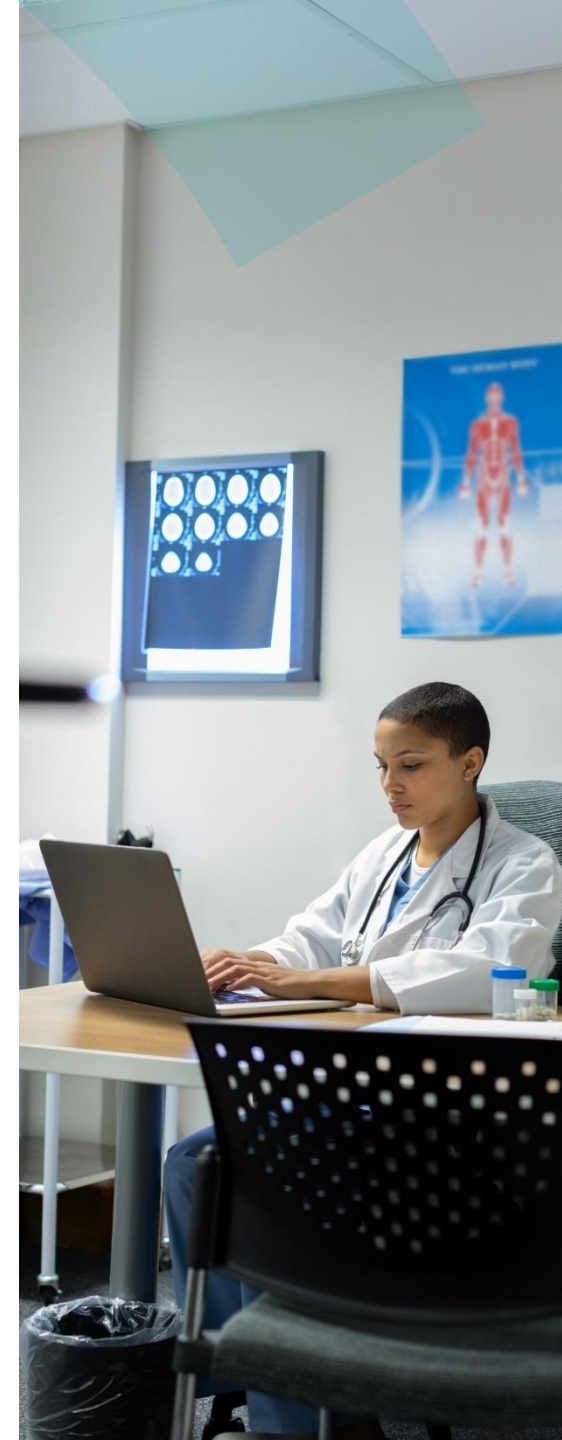
At a glance :
https://youtu.be/tz1Do_tUTpl

System-P: Hackathon

1. Hackathon 10th of November 2021

2. Hackathon 27th April 2022

System-P

# How is the Complex Lives Segment Defined?

Either...				Or...
One or more physical condition	**&**	One or more mental condition	**&**	

One or more of:

Homelessness

Substance Abuse

Alcohol Abuse

History of Offending

High Intensity Use A&E

History of Being Looked After

Domestic Abuse

Regardless of physical/mental health, three or more from:

Homelessness

Substance Abuse

Alcohol Abuse

History of Offending

High Intensity Use A&E

History of Being Looked After

Domestic Abuse

In Cheshire & Merseyside ICS 11,857 individuals (0.6% of the population) were identified as belonging to the Complex Lives segment. In this pack we describe the characteristics of people in this segment, before moving on to describe their other healthcare issues and how they use services.

Patient Characteristics: Age & Gender

For the Complex Lives segment the mean average age of these patients is 48 (interquartile range from 36 to 58).

Gender splits within the segment are 54% male and 46% female.
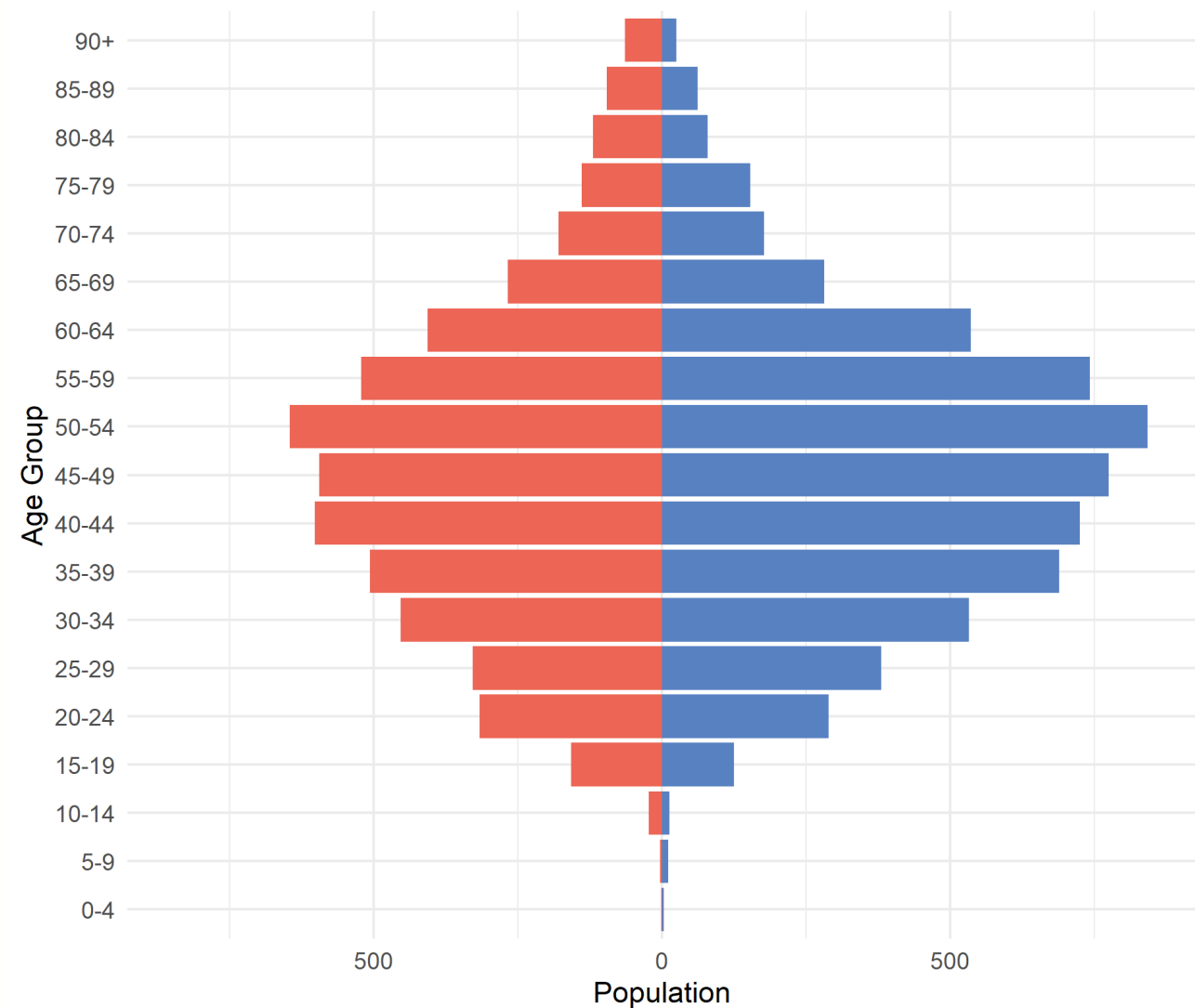
Patient Characteristics: Deprivation

Those with Complex Lives are more likely to reside in areas of higher deprivation. 69% of the segment live in the most deprived quintile.

Proportionately, this is 1.7 times the share of the CCG population living in the most deprived quintile.
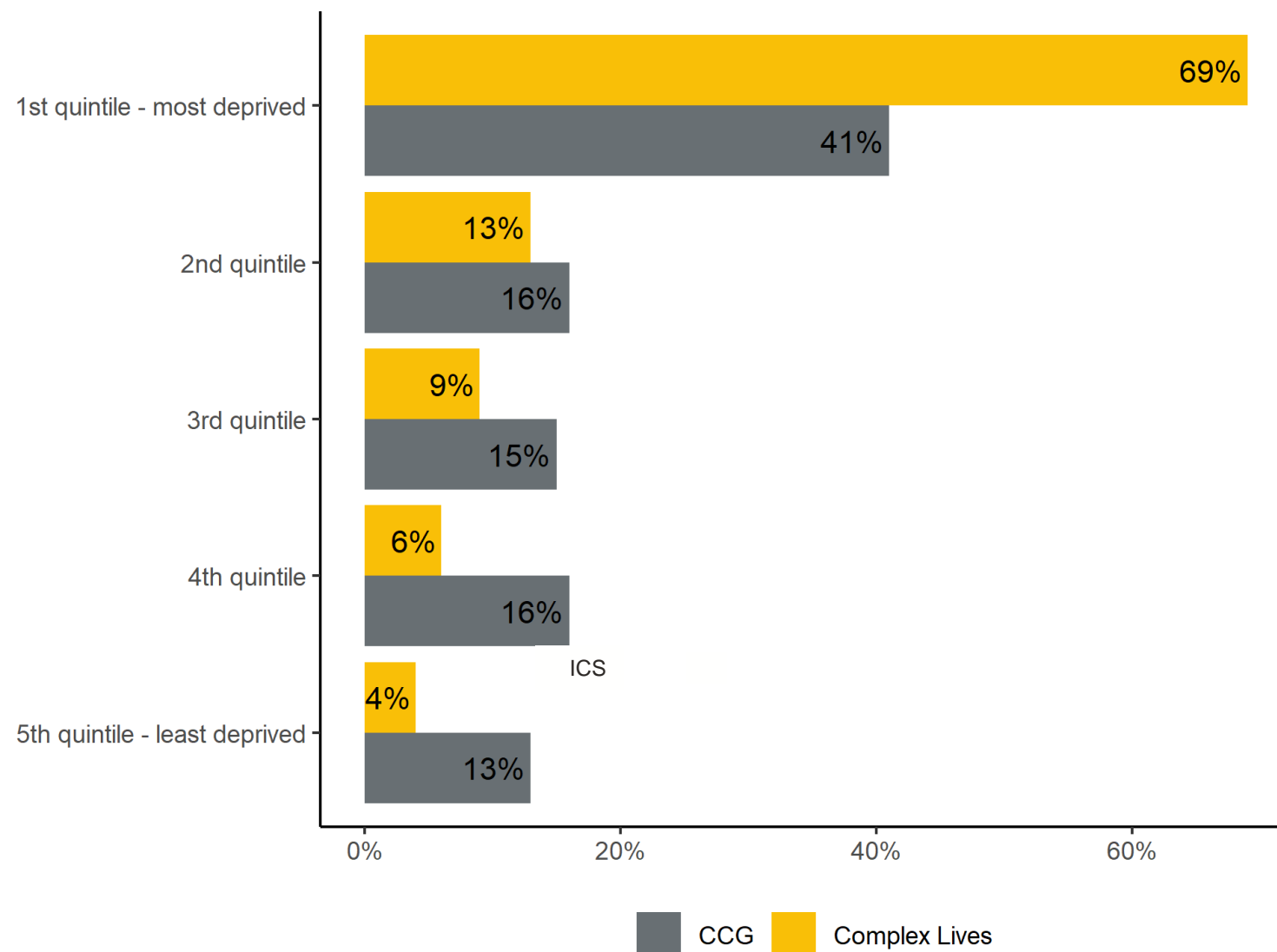
Patient Characteristics: Living Arrangements

Those in the Complex Lives segment are found to be living with, on average, 1.6 other people. Therefore, beyond the Complex Lives individuals already identified, an additional estimated 18,473 people are also affected by Complex Lives. A number of these will be children.

For the Complex Lives segment 2,424 people (22%) are identified as living in a household with someone under 18.

5% of the segment have experienced homelessness in the last 2 years and 1% have caring responsibilities.

44 people were found with a status of asylum seeker.
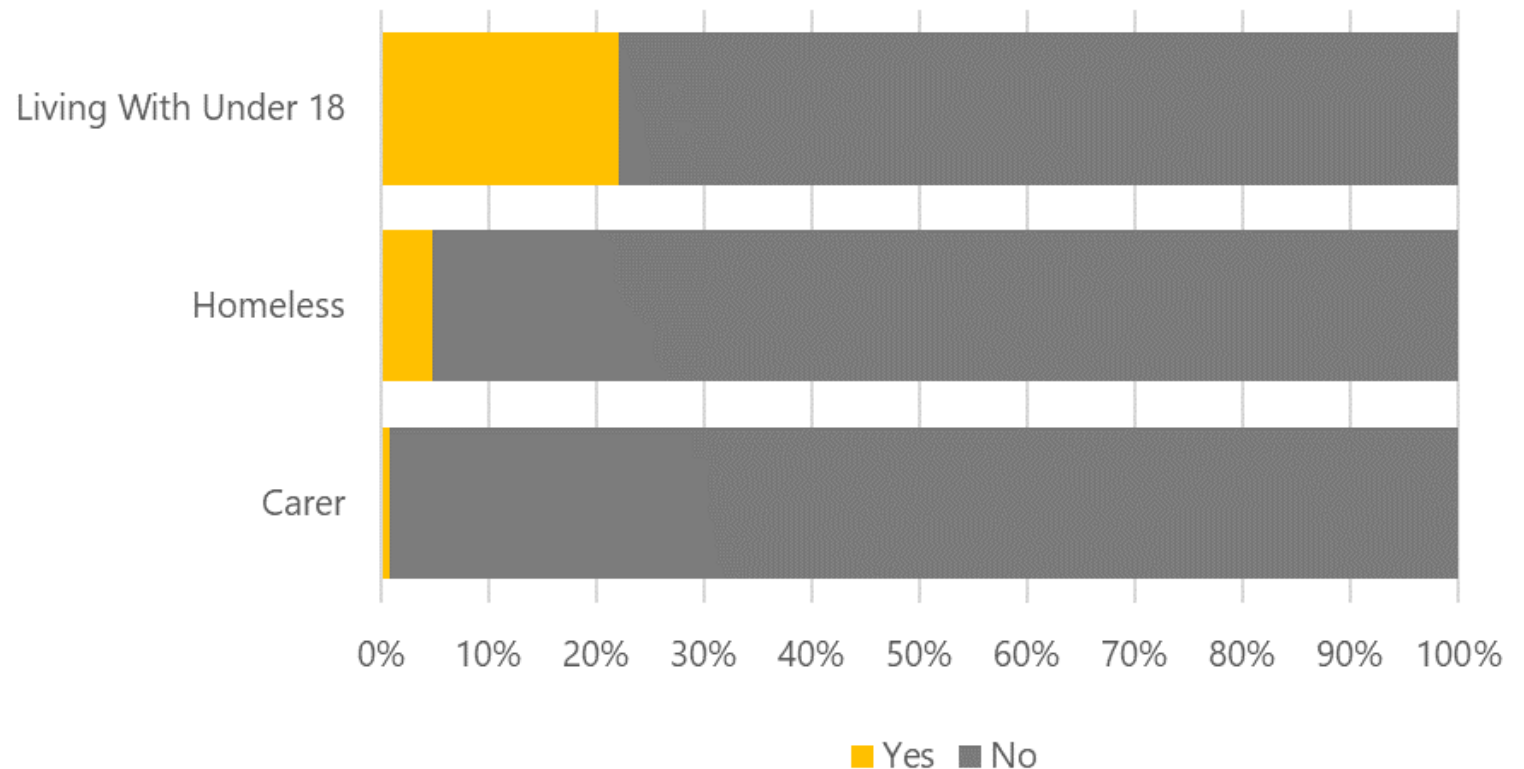
Patient Characteristics: Geography

The map shows, for wards within the ICS, The rate of Complex Lives individuals per 1,000 population.
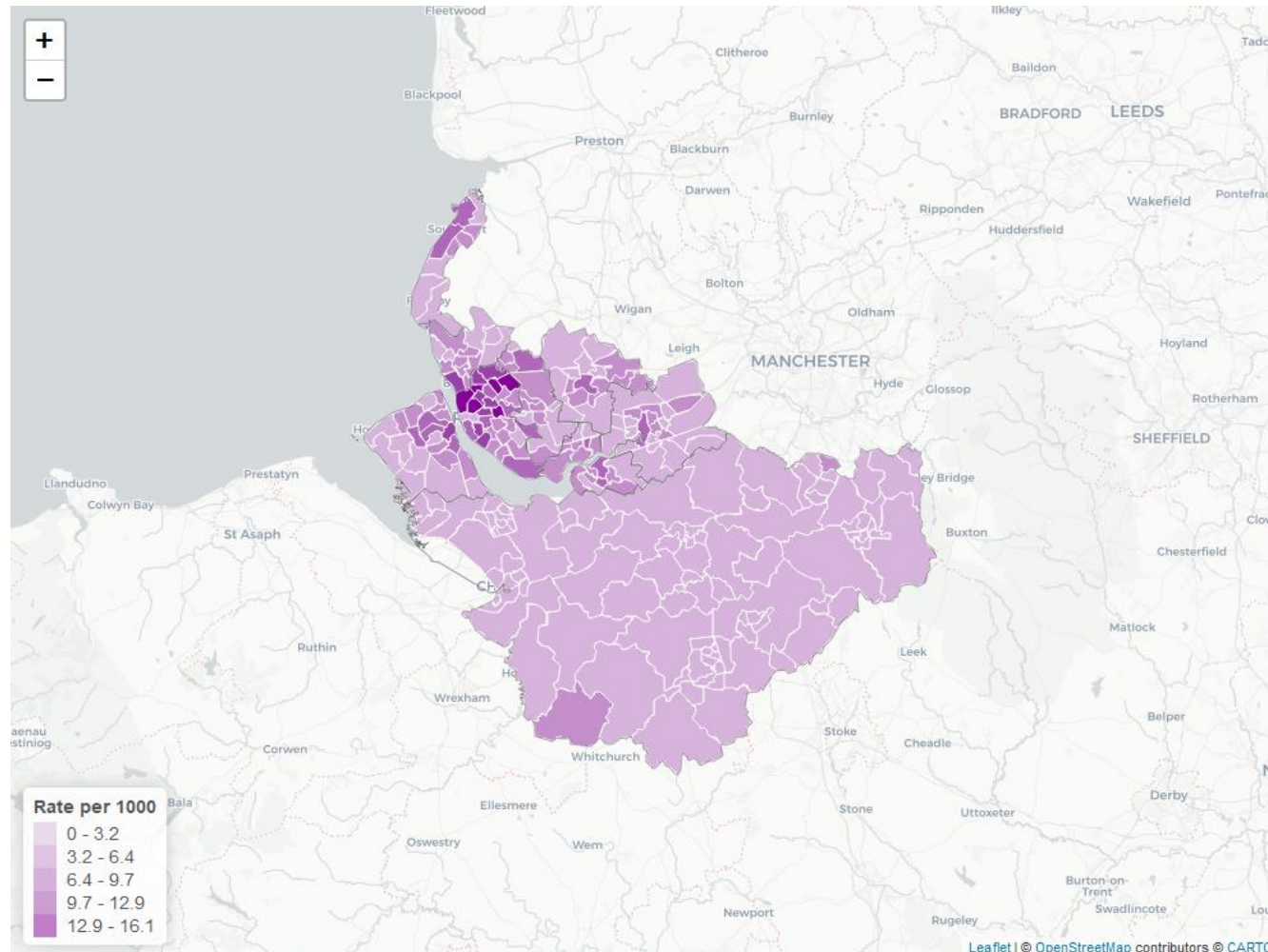
Areas with some of the highest density for Complex Lives are:

- Norris Green (Liverpool)

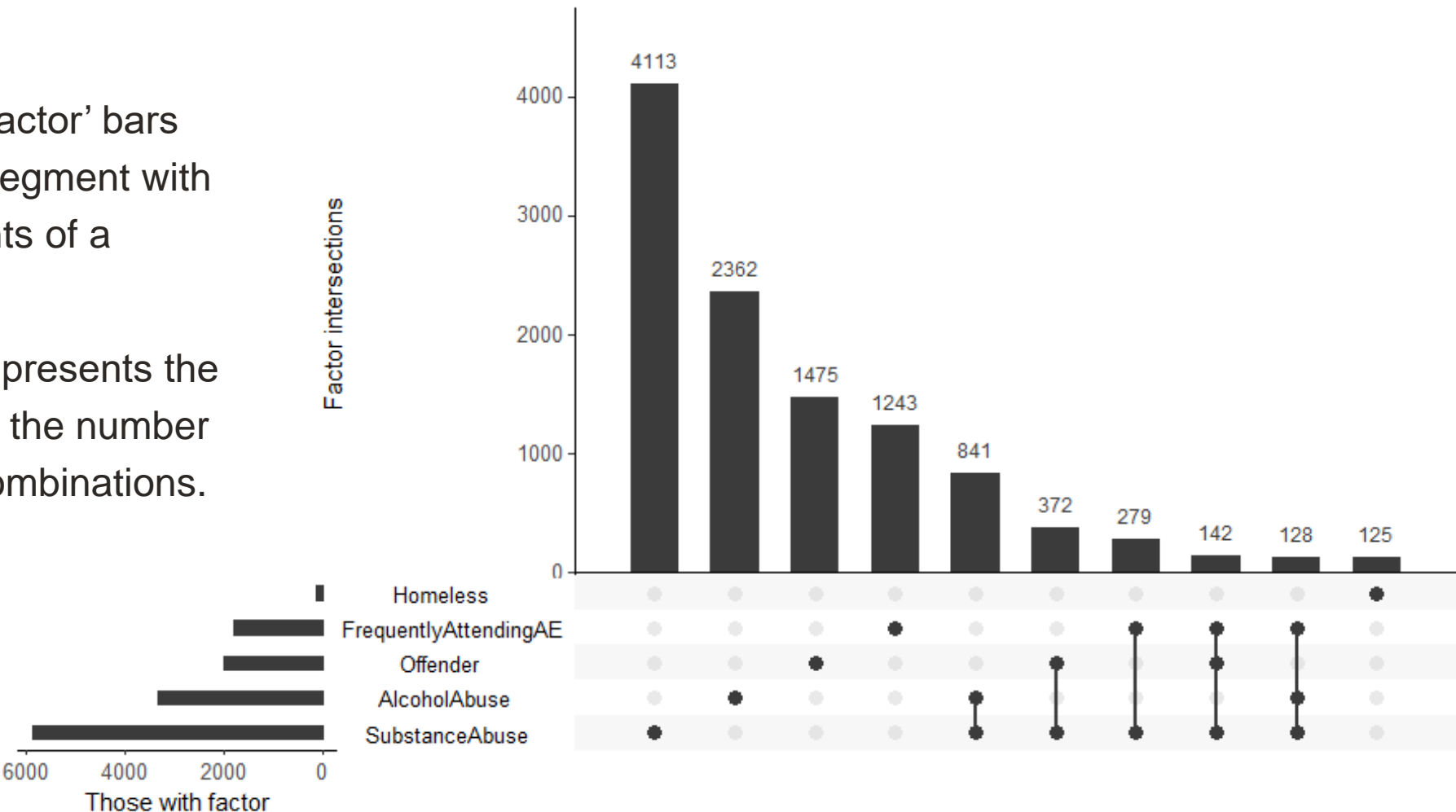- Everton (Liverpool)

- Kirkdale (Liverpool)

Rate per 1000
- 0 - 3.2
- 3.2 - 6.4
- 6.4 - 9.7
- 9.7 - 12.9
- 12.9 - 16.1

Leaflet | © OpenStreetMap contributors © CARTO

Due to the low sign up of practices in Cheshire CCG rates in this area will be artificially low.

Patient Characteristics: Complex Factors

The definition for an individual to be assigned to the Complex Lives segment relates to certain factors about that person. For those in the Complex Lives segment the largest factor is substance abuse.
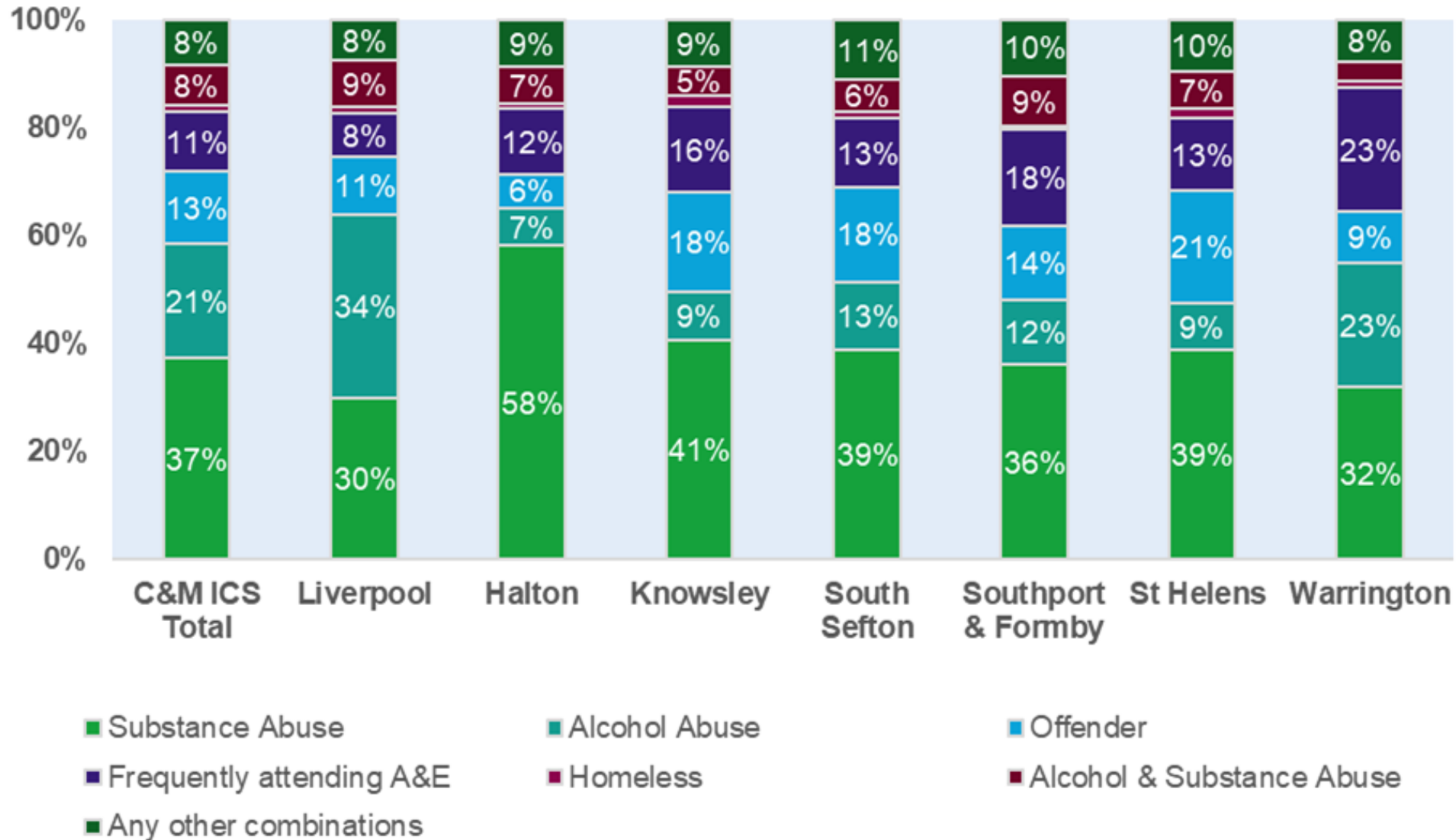
The 'Those with complex factor' bars represent all those in the segment with those factors or components of a 'complex life'.

The 'Factor intersection' represents the combination of factors and the number of individuals with those combinations.

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Characteristics: Contributing Factors

Factors Contributing to a Complex Life

	C&M ICS Total	Liverpool	Halton	Knowsley	South Sefton	Southport & Formby	St Helens	Warrington
Any other combinations	8%	8%	9%	9%	11%	10%	10%	8%
Alcohol & Substance Abuse	8%	9%	7%	5%	6%	9%	7%	
Frequently attending A&E	11%	8%	12%	16%	13%	18%	13%	23%
Offender	13%	11%	6%	18%	18%	14%	21%	9%
Alcohol Abuse	21%	34%	7%	9%	13%	12%	9%	23%
Substance Abuse	37%	30%	58%	41%	39%	36%	39%	32%

Legend:
- Substance Abuse
- Alcohol Abuse
- Offender
- Frequently attending A&E
- Homeless
- Alcohol & Substance Abuse
- Any other combinations

Long Term Conditions in the Population

For the specified long term conditions a comparison of prevalence rates is made between those in the Complex Lives segment and the total population (aged 15+). This indicates the scale of the difference in these disease areas between the segment and the total population.

The scale shows the rate per person so 0.5 represents prevalence of 50% of people.

Proportion of LTC prevalence in cohort compared to overall ICS population
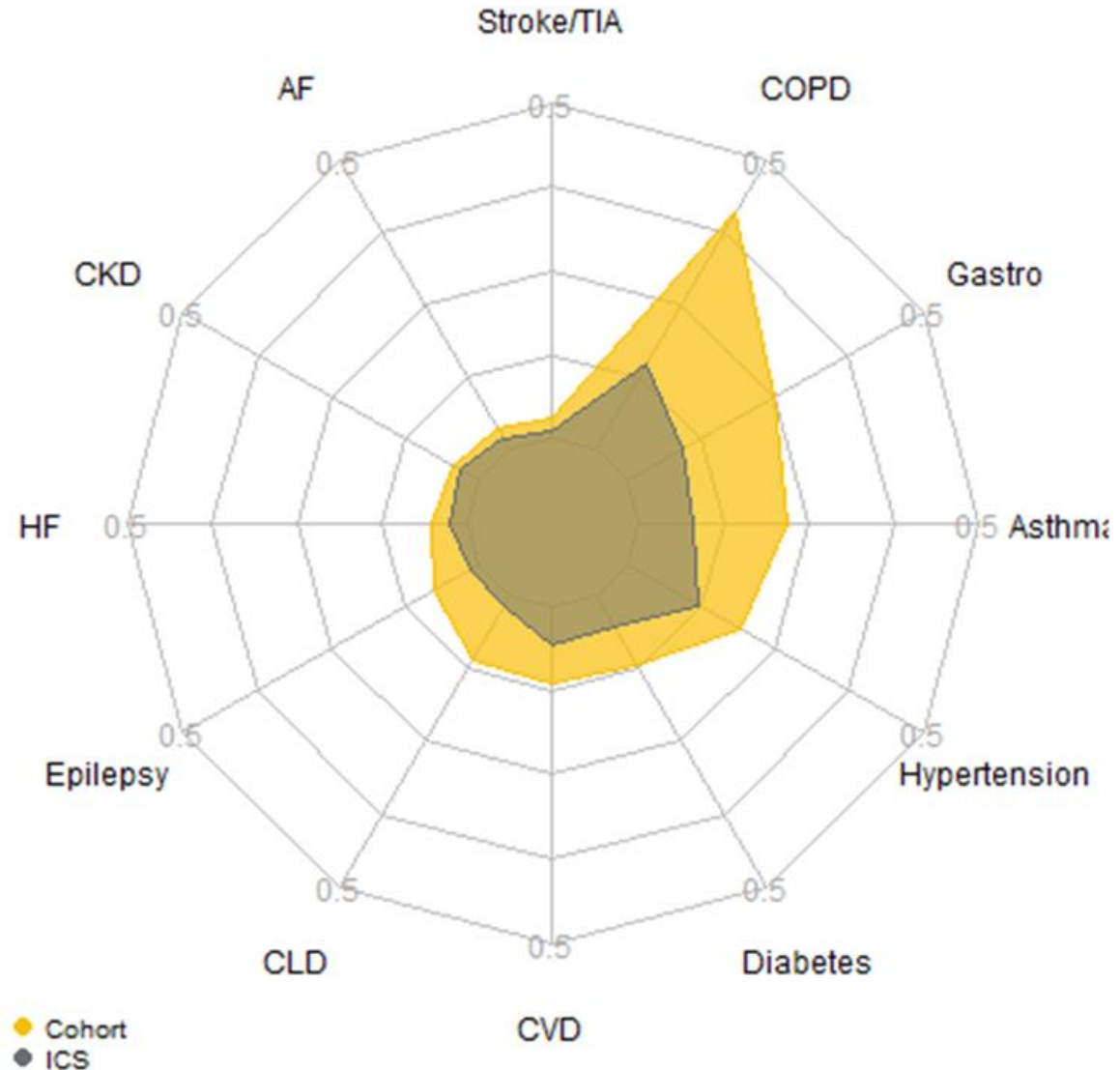
Health & Care Use: A&E Services

Those in the Complex Lives segment attend A&E services on average **2.9** times per person, per year. This is much higher than the total population who attend A&E services **0.4** times per person, per year. Emergency Departments are the most used A&E service and also the service where there is the greatest disparity in use between segment and total population. In a year **61%** of people in the Complex Lives segment attend an A&E service. For the total population the same figure is **22%**.

When attending A&E services the average cost per attendance is **£153** for those in the Complex Lives segment. This is **10%** higher than the average cost per attendance for the total population.

Where a clinical reason for attending A&E has been recorded this identifies that for the Complex Lives segment common reasons for attending A&E relate to *Trauma / musculoskeletal* or *Psychosocial / Behaviour change* problems.

Cost information is derived from 21/22 national prices. Activity without a national price is excluded when calculating average costs. There is no national price for Walk in centre attendances.

Health & Care Use: Emergency Admissions

On average those in the Complex Lives segment have 1.1 emergency admissions per person, per year. This is again much higher than the total population who have on average **0.1** emergency admissions per year.

40% of people in Complex Lives segment have an emergency admission in a year. For the total population the same figure is lower at **7%**.

The average emergency admission cost is **£2,152** for Complex Lives compared to **£2,141** for the total population.

When those in the Complex Lives segment are admitted as an emergency common reasons for admission relate to *Poisoning Toxic Effects Special Examinations Screening and Other Healthcare Contacts* and *Treatment of Mental Health Patients by Non-Mental Health Service Providers*.

Health & Care Use: Planned Care

Those in the Complex Lives segment use more planned admissions, both as electives and as daycases, on average per person, per year. They also use more outpatient attendances.

In a year **15%** of people in Complex Lives segment have a planned admission. For the total population the same figure is **7%**. For outpatient attendances **63%** of those in the Complex Lives segment attended at least one outpatient appointment in a year compared to **35%** for the total population.

For elective planned care the Complex Lives segment are often admitted with a reason of *Orthopaedic Non-Trauma Procedures* . In daycase admissions their main reason for admission is related to *Digestive System Endoscopic Procedures*. For outpatients their most common clinical specialty is *Gastroenterology* (first attendances) and also *Gastroenterology* (follow-up attendances).

Planned admissions are elective admissions with an overnight stay. Daycase admissions are planned admissions with admission and discharge on the same day. Regular Attenders are excluded from this analysis due to inconsistent coding. Cost information is derived from 21/22 national prices. Activity without a national price is excluded when calculating average costs.

Health & Care Use: Mental Health

On average those in the Complex Lives segment have **7.7** mental health contacts per person, per year. This is much higher than the total population who on average have **0.3** contacts with mental health services per year.

53% of people in the Complex Lives segment have an contact with mental health services in a year. For the total population the same figure is only **4%**.

When those in the Complex Lives segment are in contact with mental health this most commonly involves contacts with *Community Mental Health Team – Functional* or *Crisis Resolution Team/Home Treatment Service* teams.

No cost information is available for mental health data.

Health & Care Use: Community Services

On average those in the Complex Lives segment have **7.2** contacts with community services per person, per year. This is higher than the total population who, on the same basis, have **1.7**.

30% of people in the Complex Lives segment are in contact with community services in a year. For the total population the figure is **21%**.

The most used community service for the Complex Lives segment is *District Nursing Service*.

Health and Care Use: Social Care

From available data there were on average **0.15** of the Complex Lives segment known to social services in the last year. More than the total population where the same figure is **0.02**. However, social services data should be viewed as indicative and treated with caution. A recent review of the data indicated concerns with the data and further work is already underway to improve the consistency and quality of social care data.

Social services data includes information collected by councils and does not include services purchased directly by patients or provided by the voluntary sector.

The CIPHA platform gives us the opportunity to network intelligence consistently across C&M.

System P provides the methodology and approach to using this practically to effect change.

Each year C&M ICS, we spend c.£295m to support c.11,857 people with complex lives

350

Housing

300 £7m
Police
£24m
250 £34m MoJ

NHS
£44m
200

150 £88m LA

£295m per year

100

50 £98m DWP

0

Complex Lives
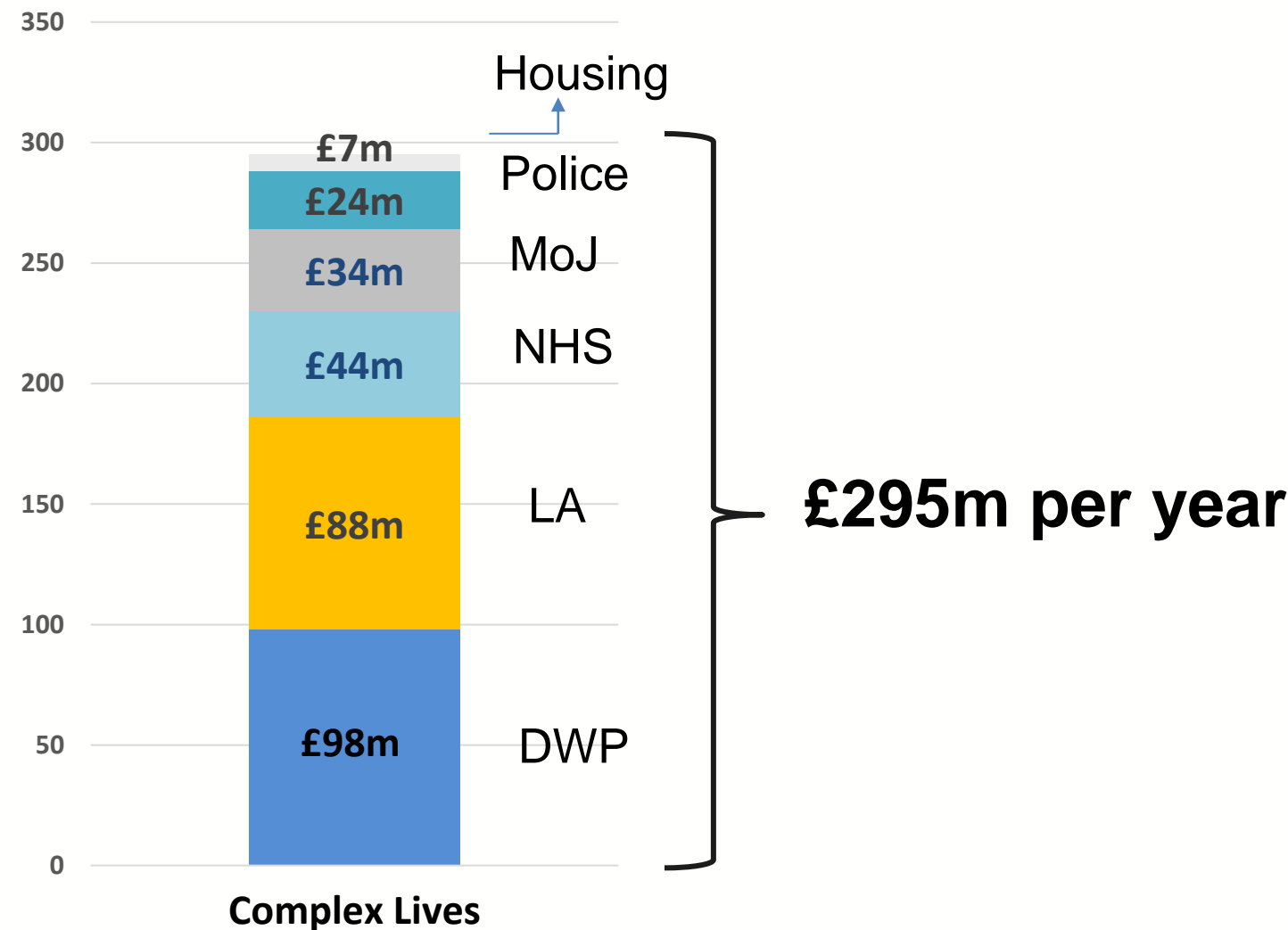
Data source: New Economy Manchester Unit Cost Database.

Frailty & Dementia Segment Definition

People are defined as belonging to the Frailty and Dementia segment if they have:
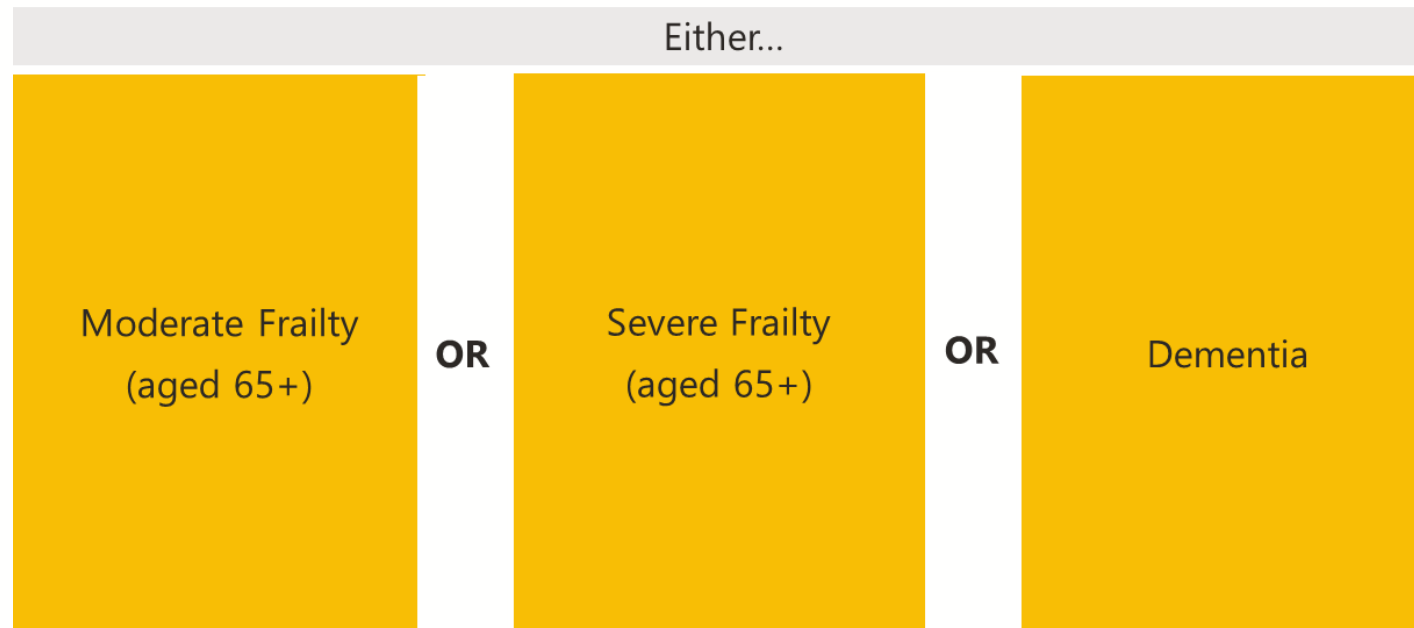
In Cheshire & Merseyside ICS 117,243 individuals (5.6% of the population) were identified as belonging to the Frailty and Dementia segment. In this pack we describe the characteristics of people in this segment, before moving on to describe their other healthcare issues and how they use services.

Patient Characteristics: Age & Gender

For the Frailty and Dementia segment the mean average age of these individuals is 79 (interquartile range from 73 to 85).

Gender splits within the segment are 41% male and 59% female.
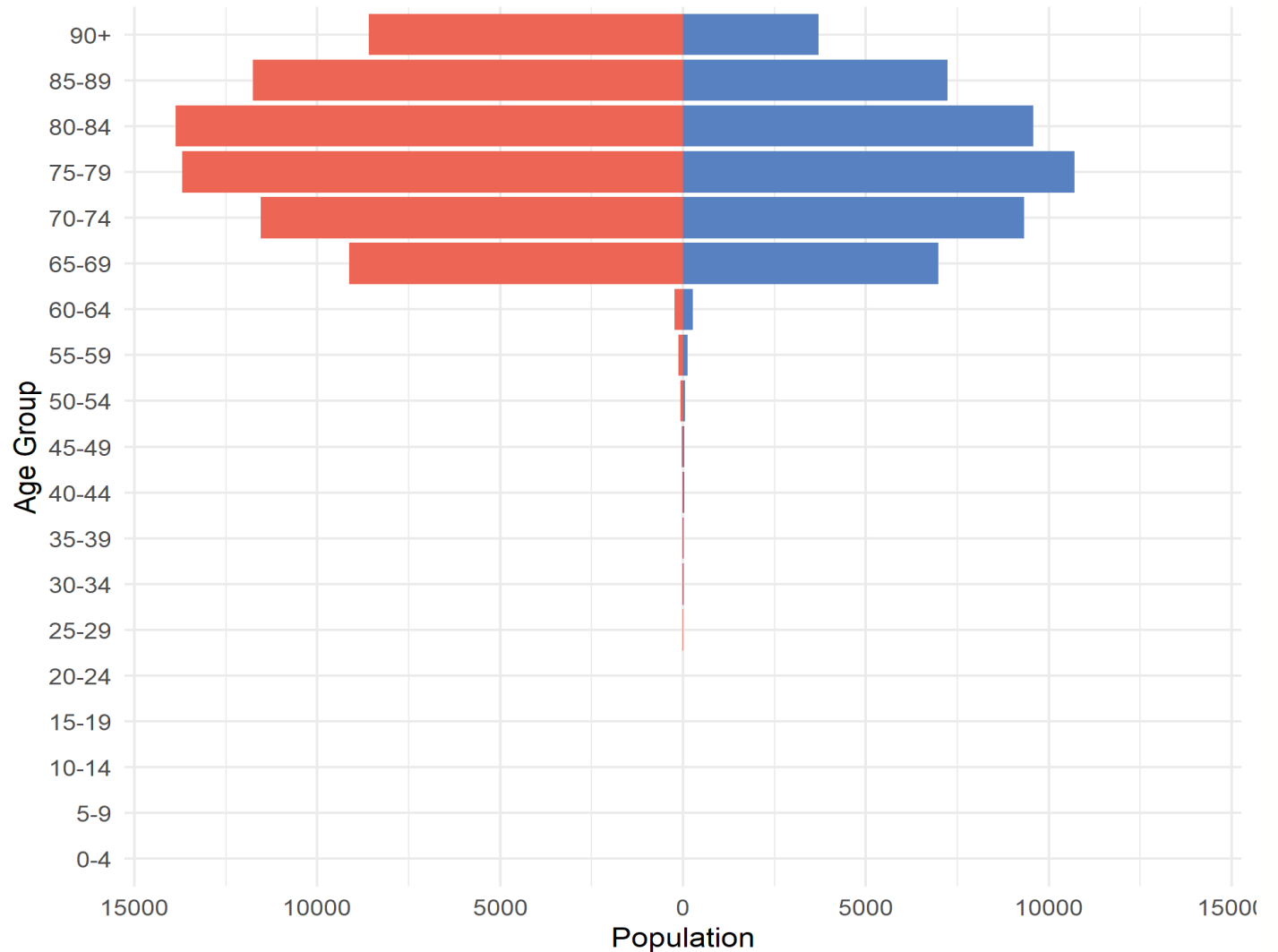
Patient Characteristics: Deprivation

Those with Frailty and Dementia are more likely to reside in areas of higher deprivation. 40% of the segment live in the most deprived quintile.
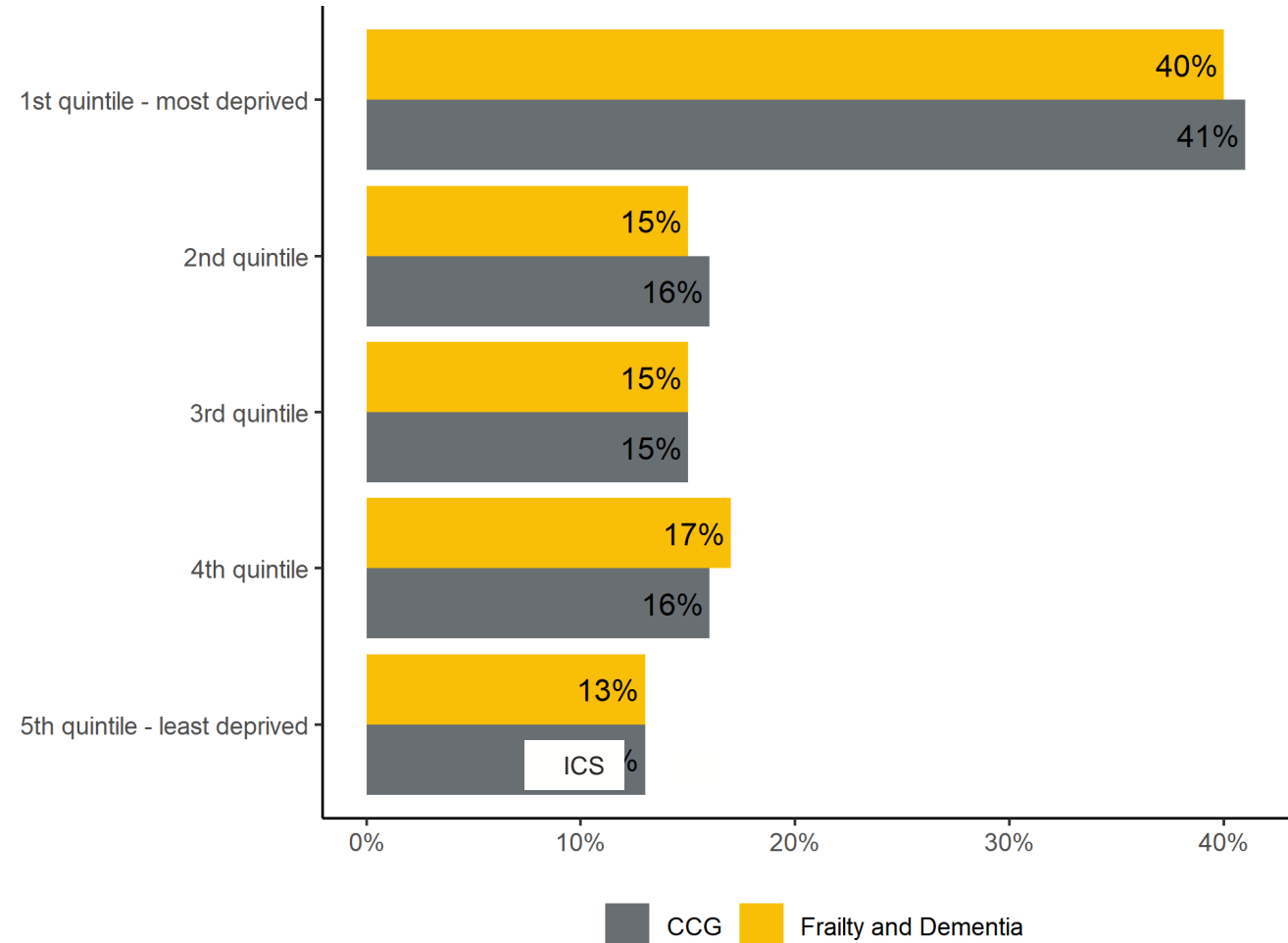
This analysis excludes a small number of people for whom no deprivation was recorded. ICS figures based on practices with signed DSA.

Patient Characteristics: Geography

The map shows, for wards within the ICS, the rate of Frailty and Dementia individuals per 1,000 population.

per 1000
- 0 - 26
- 26 - 52
- 52 - 78
- 78 - 104
- 104 - 130

Leaflet | © OpenStreetMap contributors © CARTO
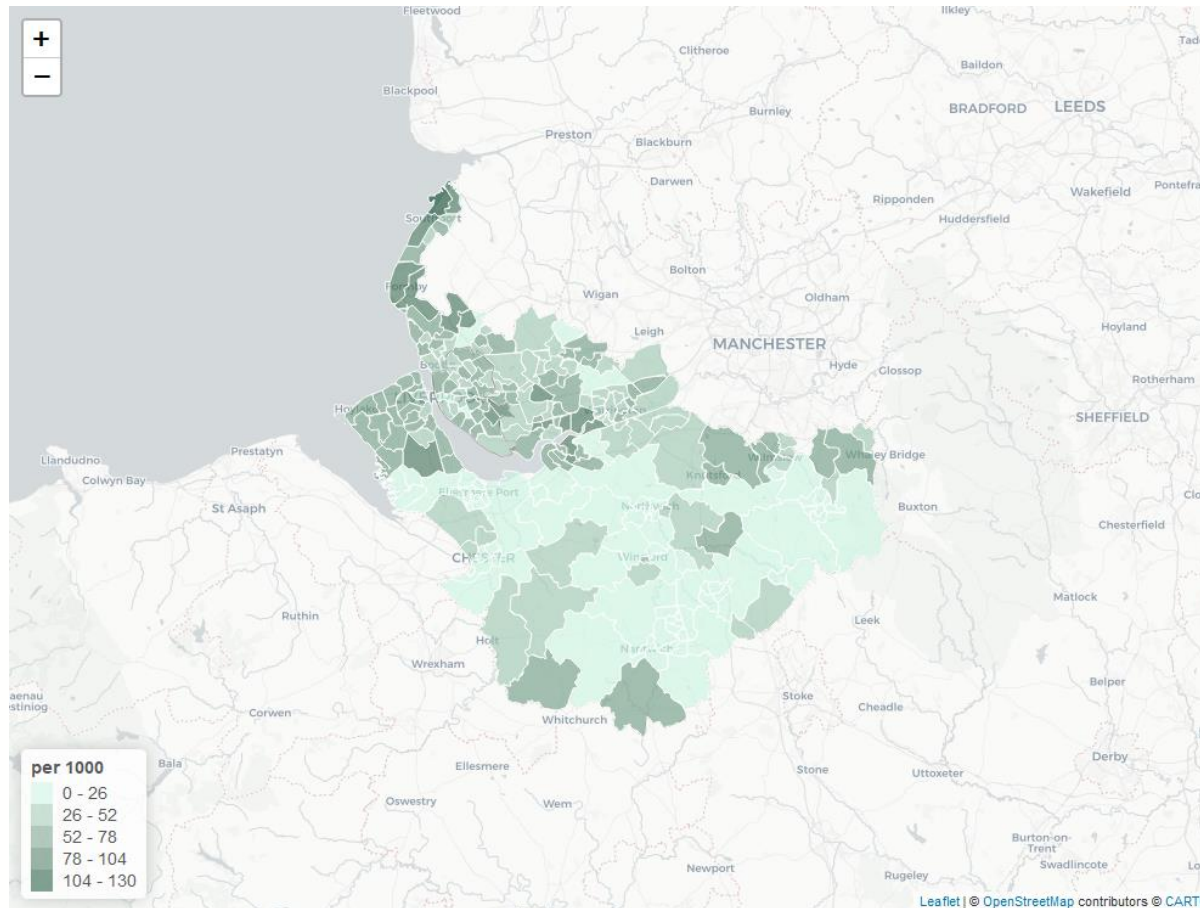
Areas with some of the highest density for Frailty and Dementia are:

- Bankfield (Halton)
- Duke's (Southport & Formby)
- Cambridge (Southport & Formby)

Due to the low sign up of practices in Cheshire CCG rates in this area will be artificially low.

Long-term Conditions in the Population

For the specified long term conditions a comparison of prevalence rates is made between those in the Frailty and Dementia segment and the total population (aged 15+). This indicates the scale of the difference in these disease areas between the segment and the general population.

The scale shows the rate per person so 0.6 represents prevalence of 60% of people.

Proportion of LTC prevalence in cohort compared to overall ICS population

- Cohort
- ICS
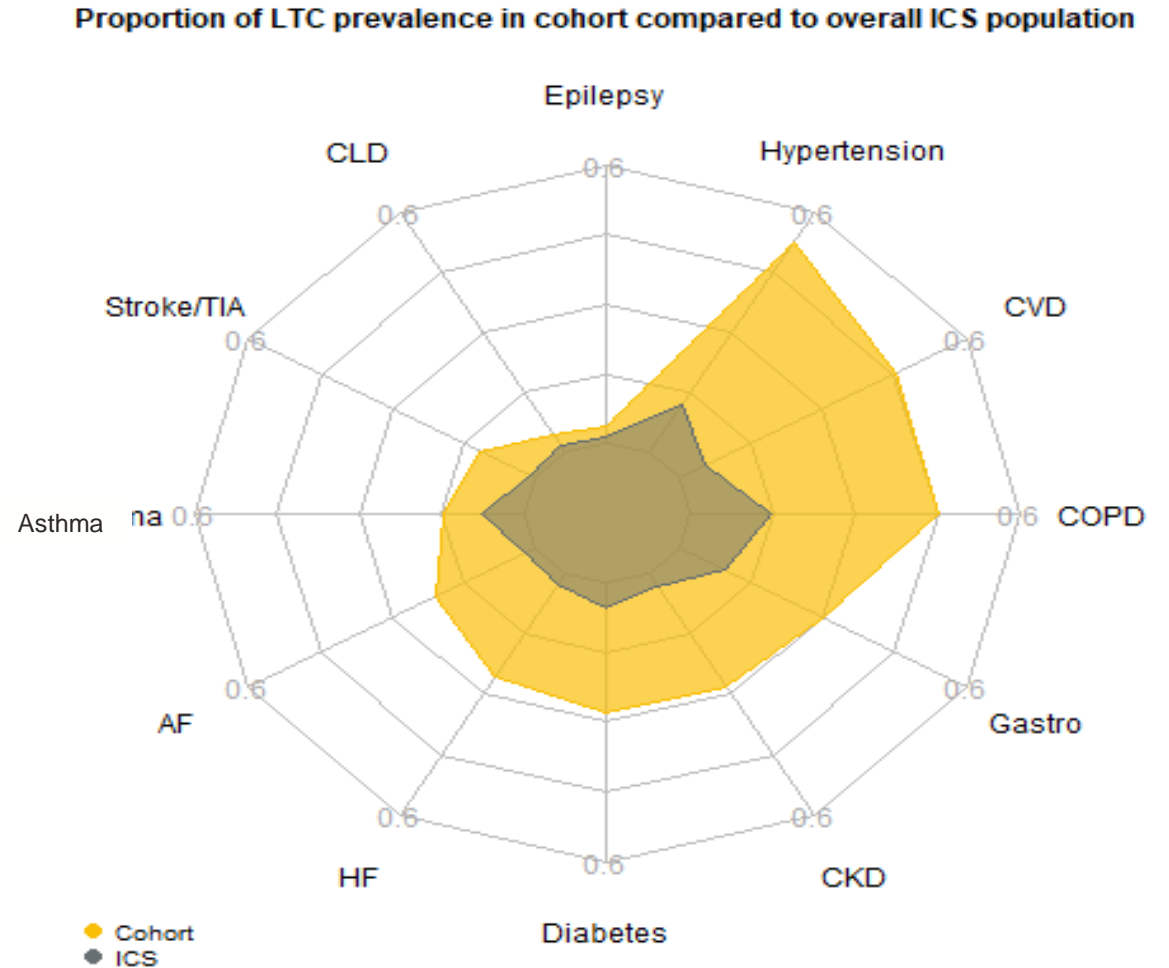
Patient Characteristics: Factors

For an individual to be assigned to the Frailty and Dementia segment depends on factors for the level of frailty (moderate or severe) or a clinical code for dementia. Numbers are larger frailty alone but some individuals do have both frailty and dementia.

The 'Those with factor' bars represent all those in the segment with those factors. The 'Factor intersection' represents the combination of factors and the number of individuals with those combinations.
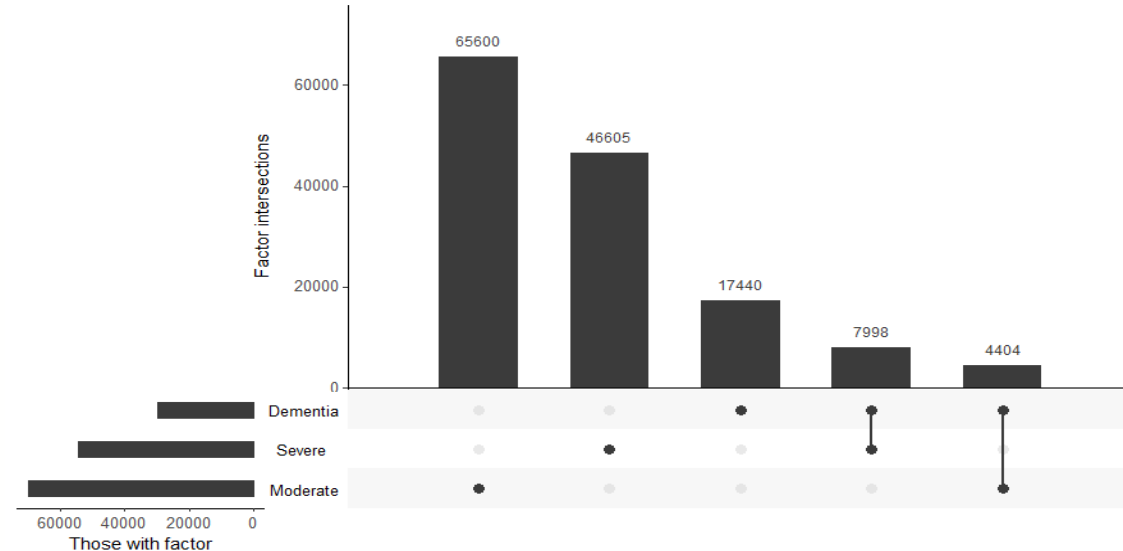
Although not a factor, there was interest in identifying those prescribed an anticholinergic. In the last year 80% of those in the segment were prescribed these at least once, and where prescribed there were on average 2.4 different types.

Frailty & Dementia: Anticholinergic Burden

The cumulative effect of taking one or more medicine with anticholinergic properties (anticholinergic burden) increases the risk of:

Delirium and falls (short-term adverse outcomes)

Hospitalisation

Dementia, loss of physical function, loss of independence (long-term adverse outcomes)

Mortality

System-P Action-research

Many researchers are highly-motivated by NHS problem-solving,
and new AI solutions need careful academic partnership to make the most of
ICS integrated care records

'Big Data' is Not Enough for Big Insight

Explaining Variation ← Big Enough Data → Understanding Mechanisms
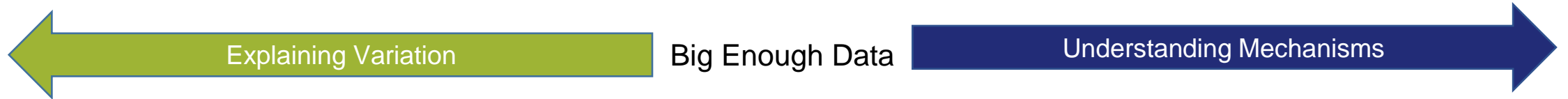
Causal inference and counterfactual prediction in machine learning for actionable healthcare | Nature Machine Intelligence

Essay

Why Most Published Research Findings Are False

John P. A. Ioannidis

Big data * small research → noise

Biology ∪ Behaviour ∪ Environment

**Interactions may be emergent
(don't rely on simulated biology)**

Actions → Insights → Questions

**Sparse observational datasets (the norm),
with many data-generating processes unknown,
cannot auto-couple intervention and prediction**

Mechanism knowledge
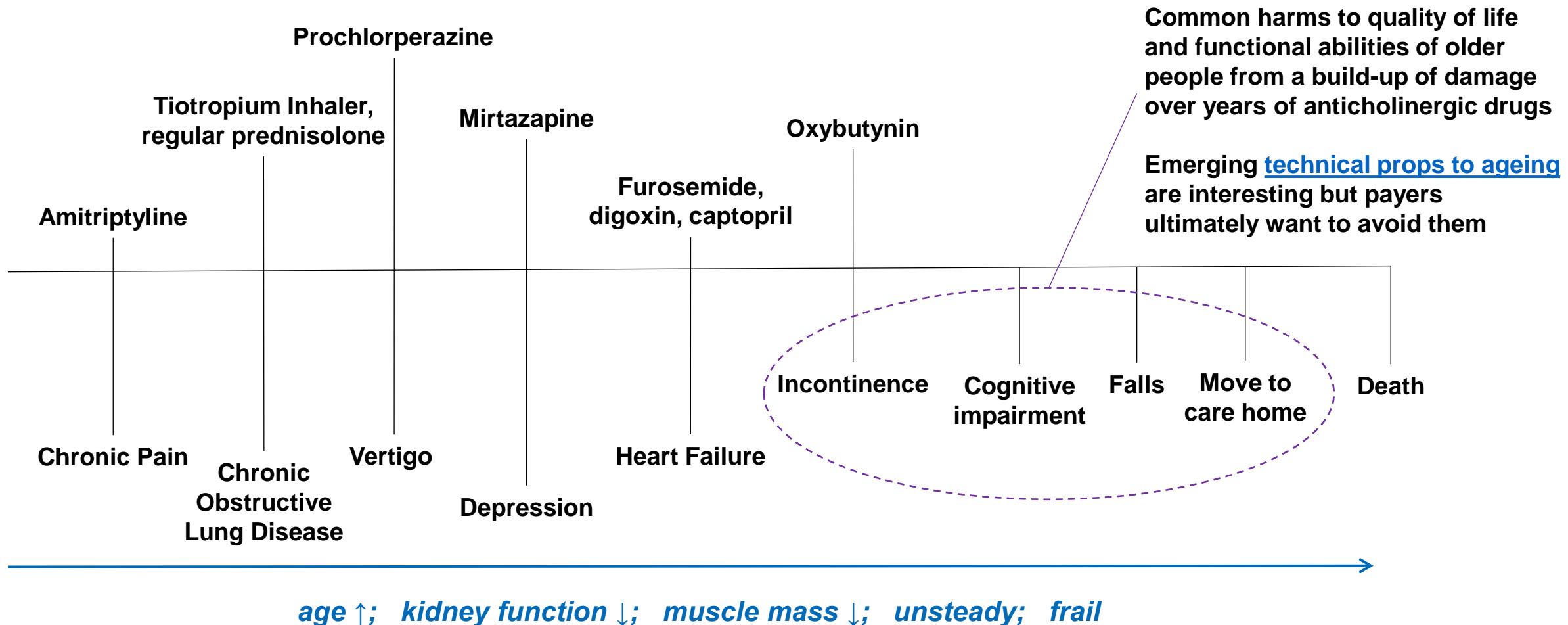
Missingness

Measurement Error
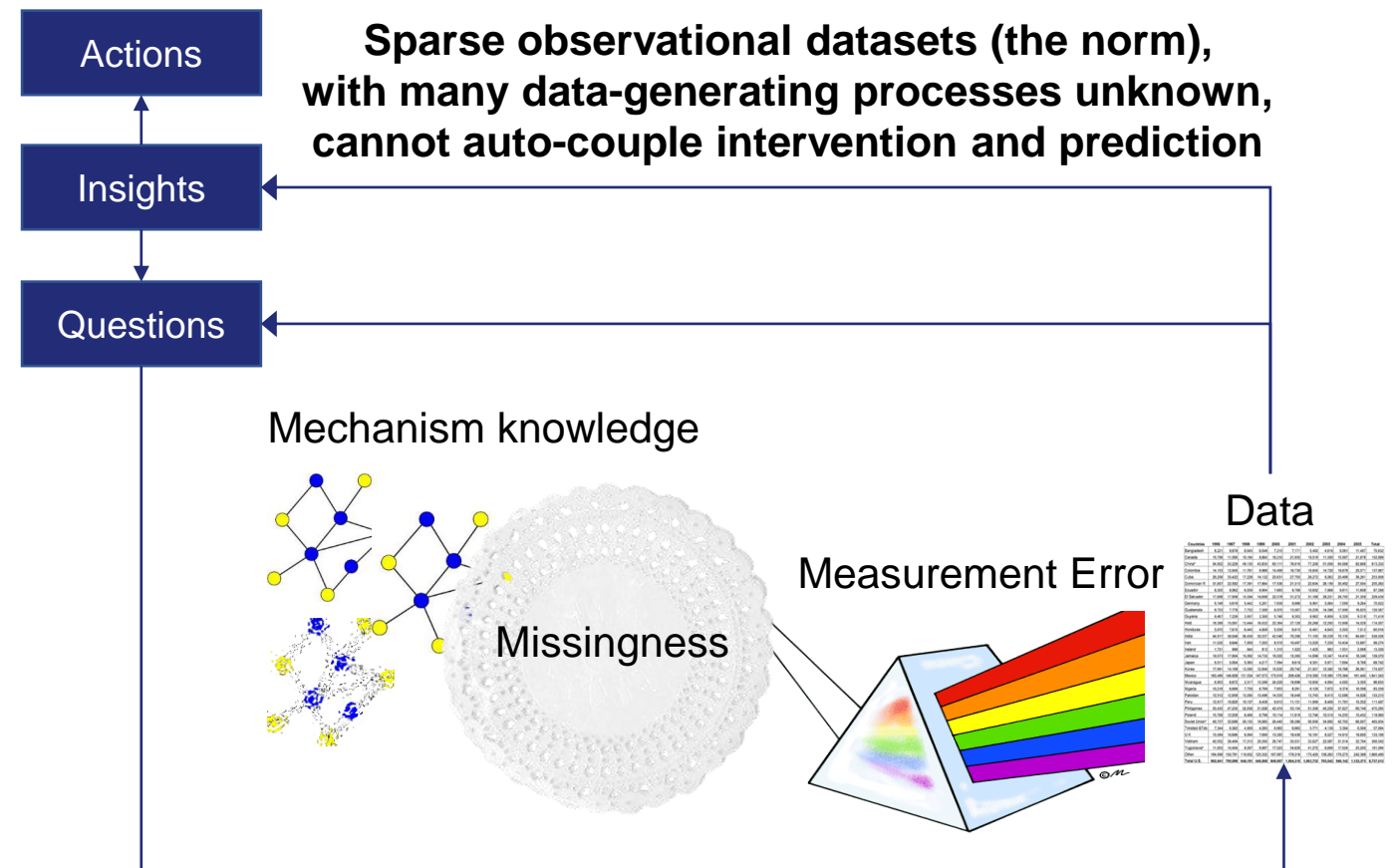
Data

Computers Will Soon Learn to 'See' High-risk Patient Journeys Early

Some machine learning methods are becoming very useful for discovering causes of diseases and seeing 'statistical structure' in data in very high definition – especially when there are multiple observations over time per individual:

- TARNET (estimating individual treatment effects)
- CEVAE (autoencoders with causal structure)
- Dragonnet (doubly robust counterfactual prediction of treatment effects)
- PSSAM-GAN (generating synthetically balanced case-control populations)
- DCN-PD (deep counterfactual learning on propensity scores)
- To watch: treatment effects with dynamic regimens (~ g-estimation)
- Transformers: e.g. GatorTron (8.9bn parameter model: mining clinical text)

From Risk-stratification to Integrated Actions

Mental vs physical healthcare dissonance is pervasive, however, neither research nor care are integrated across conditions, disciplines and the life-course. Consider anti-cholinergic chaos…

Common harms to quality of life and functional abilities of older people from a build-up of damage over years of anticholinergic drugs

Emerging technical props to ageing are interesting but payers ultimately want to avoid them

age ↑;   kidney function ↓;   muscle mass ↓;   unsteady;   frail

Reducing Valproate Harms
Population Insight to Patient Action on CIPHA

Valproate poses significant risk to the unborn child throughout pregnancy, including:
- 10% risk of major malformations on average and 25% at higher doses
- 30-40% of significant reduction in IQ

Withdrawal of valproate from the market would be harmful as it:
- Is the most effective treatment for idiopathic generalised epilepsy (about a third of epilepsy ~50,000 in Cheshire & Merseyside). Withdrawal would result in otherwise avoidable deaths and morbidity.
- Is an effective treatment in bipolar disorder. Withdrawal of valproate would deny access to an effective treatment.

System-P action on CIPHA being explored:
- Identify women of childbearing age taking valproate (and not attending secondary care)
- Provide secondary care with dashboards to invite affected women not seen recently to clinic
- Provide GPs with prescribing audit and feedback on women not receiving annual counselling
- Provide patients with the option of awareness raising text messages / reminders

Questions?