Edge Hill University

Unlocking health and care data for research and analytics

Prof Greg Irving

EPIC Research Centre

Edge Hill University | Health Research Institute

North West SECURE DATA ENVIRONMENT

NHS Cheshire and Merseyside

What is a Secure Data Environment (SDE) for research?

SDEs are **data and research analysis platforms.**

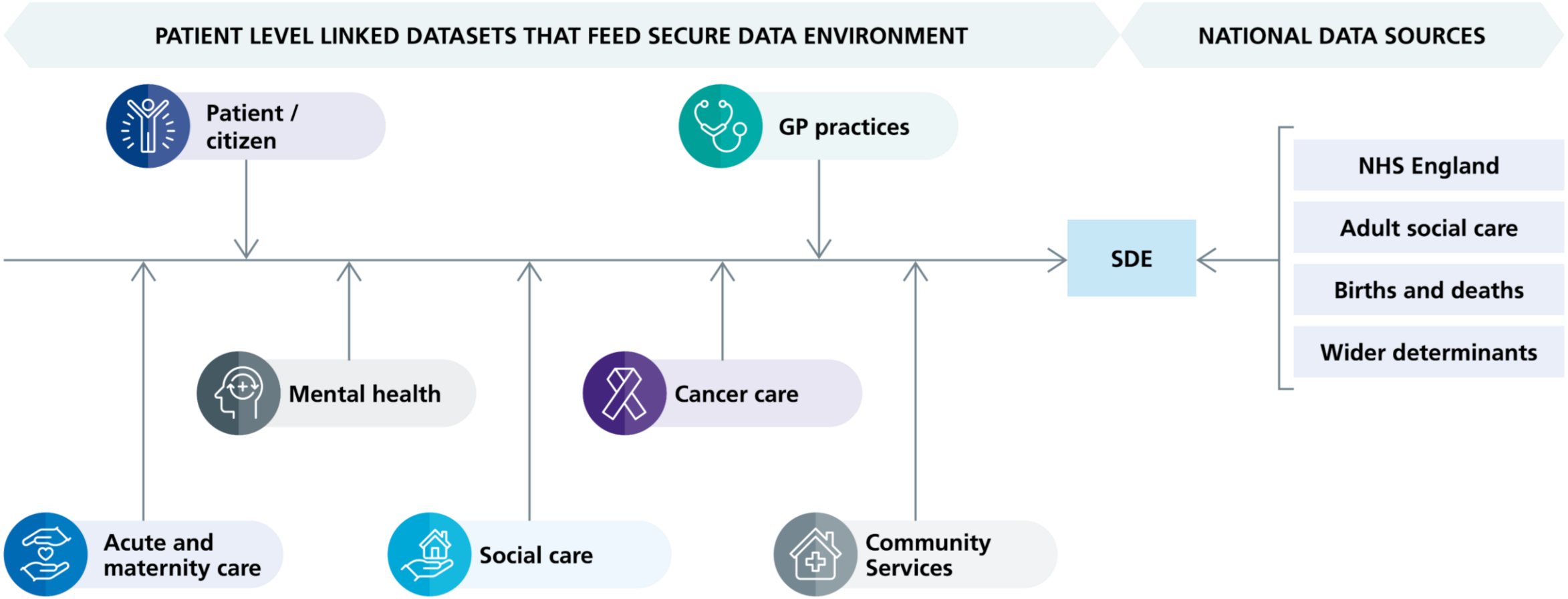
They store **de-identified health and care data.** Personal information, such as names, addresses or NHS numbers, are replaced with artificial, or ‘pseudo’, information.

Approved researchers will be able to use technical tools to analyse de-identified data on the platform without receiving a copy.

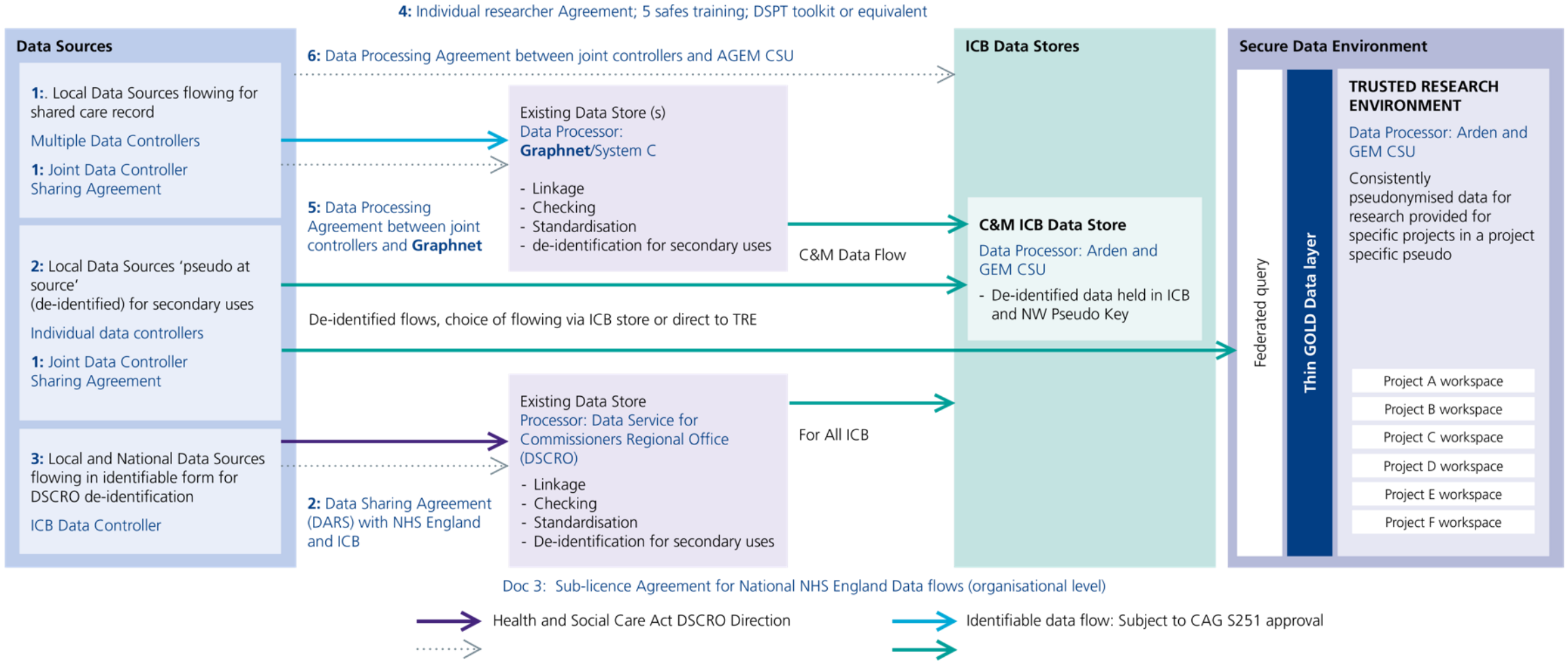
SDEs control:

- who can be a user
- what users can do
- what findings can be removed.

Where the data comes from



Cheshire and Mersey Secure Data Environment: Data Flow Diagram



What controls apply to the Cheshire and Merseyside SDE?

The SDE follows the Five Safes Framework to ensure data is accessed and used in a secure and responsible way. All researchers must complete Five Safes training.

Safe data: data is treated to protect any confidentiality concerns.

Safe projects: research projects are approved by data owners for the public good.

Safe people: researchers are trained and authorised to use data safely.

Safe settings: a SecureLab environment prevents unauthorised use.

Safe outputs: screened and approved outputs that are non-disclosive.

North West SECURE DATA ENVIRONMENT

NHS Cheshire and Merseyside

What controls apply to the Cheshire and Merseyside SDE?

- **All data is de-identified and pseudonymised.** Researchers cannot access identifiable data.
- **Organisational sharing agreements** will be established between the research organisation and the data controllers.
- **Individual data sharing contracts** with researchers will be established, with set parameters.
- Approved researchers can **only access the specific data** they have requested – data is minimised.
- An **'airlock' system** will be in place, meaning information can't be removed without approval.
- All organisations accessing data must be **certified** under the Data Security and Protection Toolkit.
- The Data Asset and Access Group (DAAG) must **approve access** against set criteria.

North West SECURE DATA ENVIRONMENT

NHS Cheshire and Merseyside

Data access approval

A Data Access and Asset Group (DAAG) for Cheshire and Merseyside will:

- include members from the NHS, local authorities, universities and the public
- provide oversight and approval on all data access requests – including making sure organisations meet required conditions for access
- ensure information governance requirements are met – including adequate patient and public involvement and engagement
- check that this process is developed in line with any changes to national policy and escalate the Information Governance sub-committee when changes need to happen.

North West SECURE DATA ENVIRONMENT

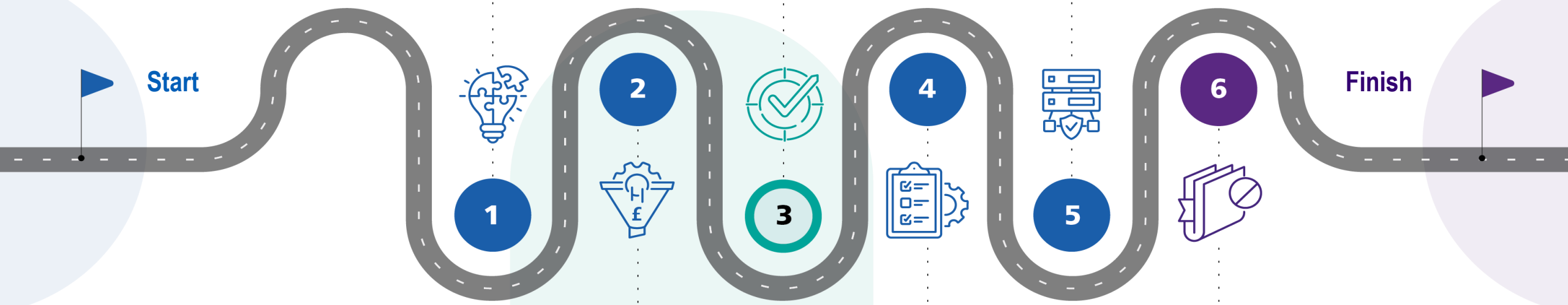
NHS Cheshire and Merseyside

Data access approval process

1. Interest
Researcher has a project idea and registers this interest.

3. Approval
Researcher ensures governance requirements are met, applies for ethics and completes DAAG application.

5. Live
Researcher works on the data in the Secure Data Environment with airlock in place to prevent data extraction.



2. Planning
Researcher reviews data catalogue and prepares a funding application.

Work begins to map data flows / sources.

4. Access granted
Once checks are completed access is granted.

6. Closed
SDE access is closed once study finishes.

CHIL Civic Health Innovation Labs

Data Into Action – Core Areas

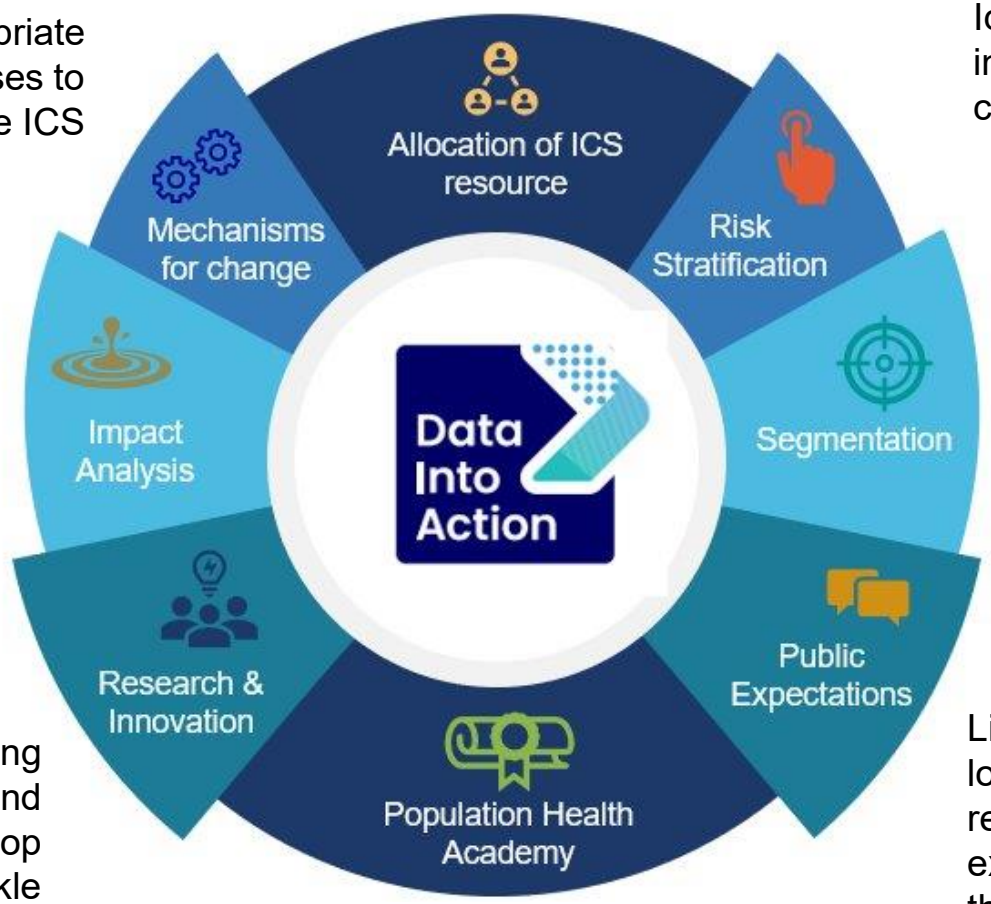
Our Data Into Action (DIA) programme plays an integral role in supporting innovation and research.

The programme brings together the activities and projects that access and use the Cheshire and Merseyside data asset – the CM Secure Data Environment (SDE), previously CIPHA - with the aim of delivering data into action through a unified programme.

Working with programmes, place leads and teams across the ICS to align capacity to DIA outputs

Creating the appropriate systems and processes to embed DIA into the ICS

Identifying health inequalities and at-risk cohorts



Using consistent methodologies to measure the impact of new interventions on the local population

Looking at the system from a person perspective. Accounting for multifactorial issues across different sectors, settings and services

Creating/utilising rigorous evidence and research to develop solutions which tackle modifiable risk factors

Listening to the voice of local people and responding to their expectations in relation to the optimisation of linked data

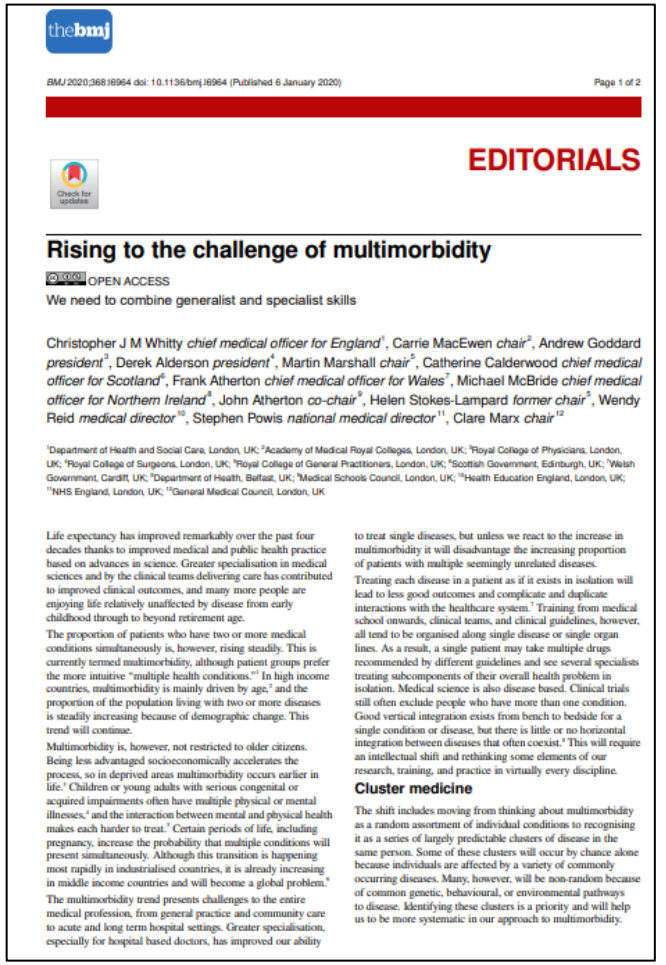
An accredited Population Health Academy to equip people with the knowledge and skills to lead transformation at scale

Multimorbidity and its Effect on Health and Social Care Use :

A retrospective cross-sectional Study with latent class analysis using the Combined Intelligence for Population Health Data (CIPHA)

Lucy Kaluvu, Paola Dey, Rowan Pritchard Jones, Greg Irving

Background



thebmj

BMJ 2020;368:l6964 doi: 10.1136/bmj.l6964 (Published 6 January 2020)

EDITORIALS

Rising to the challenge of multimorbidity

OPEN ACCESS

We need to combine generalist and specialist skills

Christopher J M Whitty *chief medical officer for England*[1], Carrie MacEwen *chair*[2], Andrew Goddard *president*[3], Derek Alderson *president*[4], Martin Marshall *chair*[5], Catherine Calderwood *chief medical officer for Scotland*[6], Frank Atherton *chief medical officer for Wales*[7], Michael McBride *chief medical officer for Northern Ireland*[8], John Atherton *co-chair*[9], Helen Stokes-Lampard *former chair*[5], Wendy Reid *medical director*[10], Stephen Powis *national medical director*[11], Clare Marx *chair*[12]

[1]Department of Health and Social Care, London, UK; [2]Academy of Medical Royal Colleges, London, UK; [3]Royal College of Physicians, London, UK; [4]Royal College of Surgeons, London, UK; [5]Royal College of General Practitioners, London, UK; [6]Scottish Government, Edinburgh, UK; [7]Welsh Government, Cardiff, UK; [8]Department of Health, Belfast, UK; [9]Medical Schools Council, London, UK; [10]Health Education England, London, UK; [11]NHS England, London, UK; [12]General Medical Council, London, UK

Life expectancy has improved remarkably over the past four decades thanks to improved medical and public health practice based on advances in science. Greater specialisation in medical sciences and by the clinical teams delivering care has contributed to improved clinical outcomes, and many more people are enjoying life relatively unaffected by disease from early childhood through to beyond retirement age.

The proportion of patients who have two or more medical conditions simultaneously is, however, rising steadily. This is currently termed multimorbidity, although patient groups prefer the more intuitive "multiple health conditions."[1] In high income countries, multimorbidity is mainly driven by age,[2] and the proportion of the population living with two or more diseases is steadily increasing because of demographic change. This trend will continue.

Multimorbidity is, however, not restricted to older citizens. Being less advantaged socioeconomically accelerates the process, so in deprived areas multimorbidity occurs earlier in life.[3] Children or young adults with serious congenital or acquired impairments often have multiple physical or mental illnesses,[4] and the interaction between mental and physical health makes each harder to treat.[5] Certain periods of life, including pregnancy, increase the probability that multiple conditions will present simultaneously. Although this transition is happening most rapidly in industrialised countries, it is already increasing in middle income countries and will become a global problem.[6]

The multimorbidity trend presents challenges to the entire medical profession, from general practice and community care to acute and long term hospital settings. Greater specialisation, especially for hospital based doctors, has improved our ability to treat single diseases, but unless we react to the increase in multimorbidity it will disadvantage the increasing proportion of patients with multiple seemingly unrelated diseases.

Treating each disease in a patient as if it exists in isolation will lead to less good outcomes and complicate and duplicate interactions with the healthcare system.[7] Training from medical school onwards, clinical teams, and clinical guidelines, however, all tend to be organised along single disease or single organ lines. As a result, a single patient may take multiple drugs recommended by different guidelines and see several specialists treating subcomponents of their overall health problem in isolation. Medical science is also disease based. Clinical trials still often exclude people who have more than one condition. Good vertical integration exists from bench to bedside for a single condition or disease, but there is little or no horizontal integration between diseases that often coexist.[8] This will require an intellectual shift and rethinking some elements of our research, training, and practice in virtually every discipline.

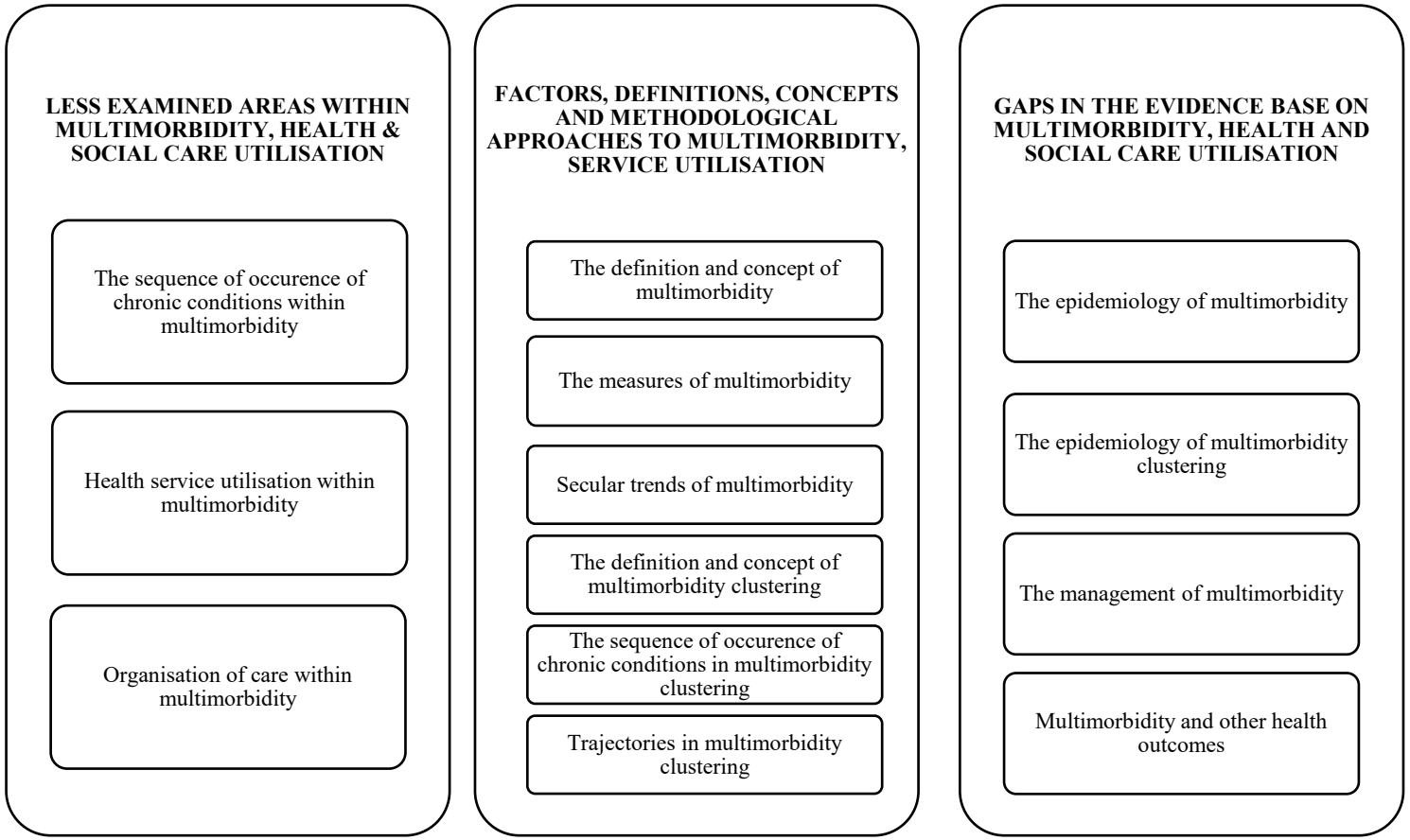
Cluster medicine

The shift includes moving from thinking about multimorbidity as a random assortment of individual conditions to recognising it as a series of largely predictable clusters of disease in the same person. Some of these clusters will occur by chance alone because individuals are affected by a variety of commonly occurring diseases. Many, however, will be non-random because of common genetic, behavioural, or environmental pathways to disease. Identifying these clusters is a priority and will help us to be more systematic in our approach to multimorbidity.

Cluster medicine

"The shift includes moving from thinking about multimorbidity as a random assortment of individual conditions to recognising it as a series of largely predictable clusters of disease in the same person…..Identifying these clusters is a priority and will help us to be more systematic in our approach to multimorbidity."

Evidence gaps



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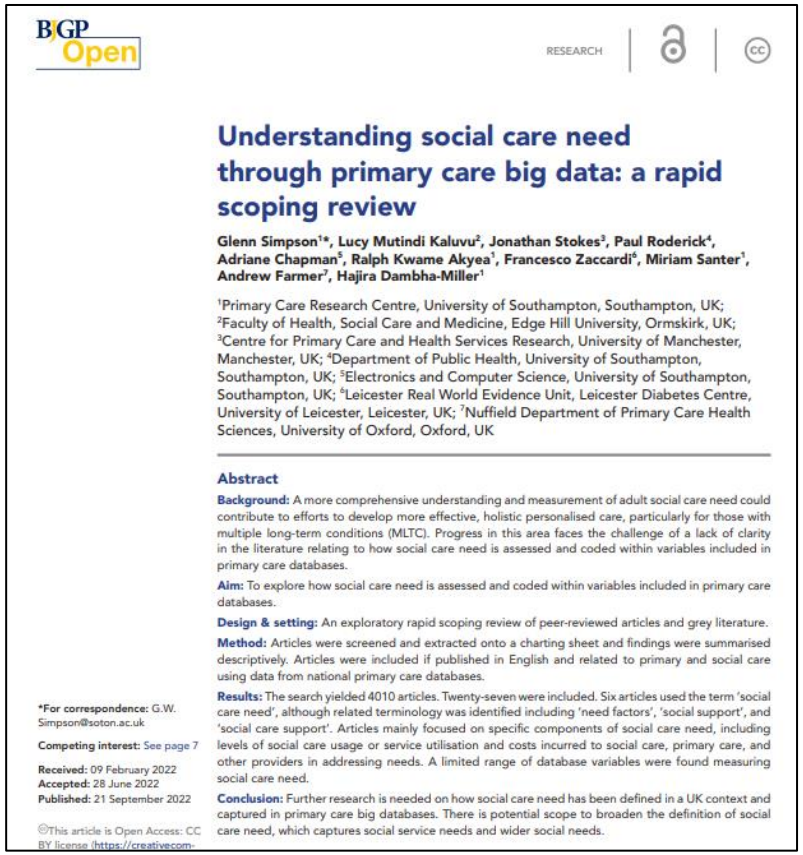
Background



BJGP Open

RESEARCH

Understanding social care need through primary care big data: a rapid scoping review

Glenn Simpson[1]*, Lucy Mutindi Kaluvu[2], Jonathan Stokes[3], Paul Roderick[4], Adriane Chapman[5], Ralph Kwame Akyea[1], Francesco Zaccardi[6], Miriam Santer[1], Andrew Farmer[7], Hajira Dambha-Miller[1]

[1]Primary Care Research Centre, University of Southampton, Southampton, UK; [2]Faculty of Health, Social Care and Medicine, Edge Hill University, Ormskirk, UK; [3]Centre for Primary Care and Health Services Research, University of Manchester, Manchester, UK; [4]Department of Public Health, University of Southampton, Southampton, UK; [5]Electronics and Computer Science, University of Southampton, Southampton, UK; [6]Leicester Real World Evidence Unit, Leicester Diabetes Centre, University of Leicester, Leicester, UK; [7]Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK

Abstract

Background: A more comprehensive understanding and measurement of adult social care need could contribute to efforts to develop more effective, holistic personalised care, particularly for those with multiple long-term conditions (MLTC). Progress in this area faces the challenge of a lack of clarity in the literature relating to how social care need is assessed and coded within variables included in primary care databases.

Aim: To explore how social care need is assessed and coded within variables included in primary care databases.

Design & setting: An exploratory rapid scoping review of peer-reviewed articles and grey literature.

Method: Articles were screened and extracted onto a charting sheet and findings were summarised descriptively. Articles were included if published in English and related to primary and social care using data from national primary care databases.

Results: The search yielded 4010 articles. Twenty-seven were included. Six articles used the term 'social care need', although related terminology was identified including 'need factors', 'social support', and 'social care support'. Articles mainly focused on specific components of social care need, including levels of social care usage or service utilisation and costs incurred to social care, primary care, and other providers in addressing needs. A limited range of database variables were found measuring social care need.

Conclusion: Further research is needed on how social care need has been defined in a UK context and captured in primary care big databases. There is potential scope to broaden the definition of social care need, which captures social service needs and wider social needs.

***For correspondence:** G.W. Simpson@soton.ac.uk

Competing interest: See page 7

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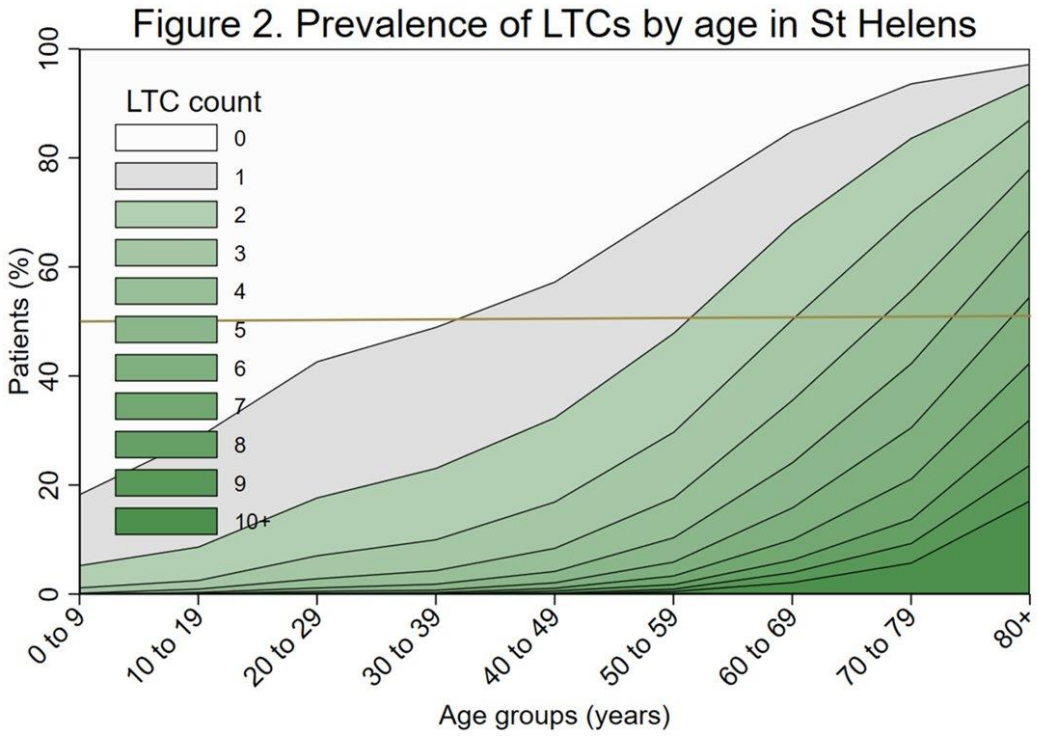
Background



		National	St Helens
Overall population	Individuals aged 18 years and above	403985	147913
Overall prevalence %	Multimorbidity	27.2	29.1
Sex	Females	30.0	31.1
	Males	24.4	27.1
Deprivation	Most deprived group	30.0	30.7
	Least deprived group	25.8	7.0
Age groups	18-24 years (National)	3.8	9.1
	18-29 years (St Helens)		
	75-84 years (National)	74.0	58.1
	70-79 years (St Helens)		

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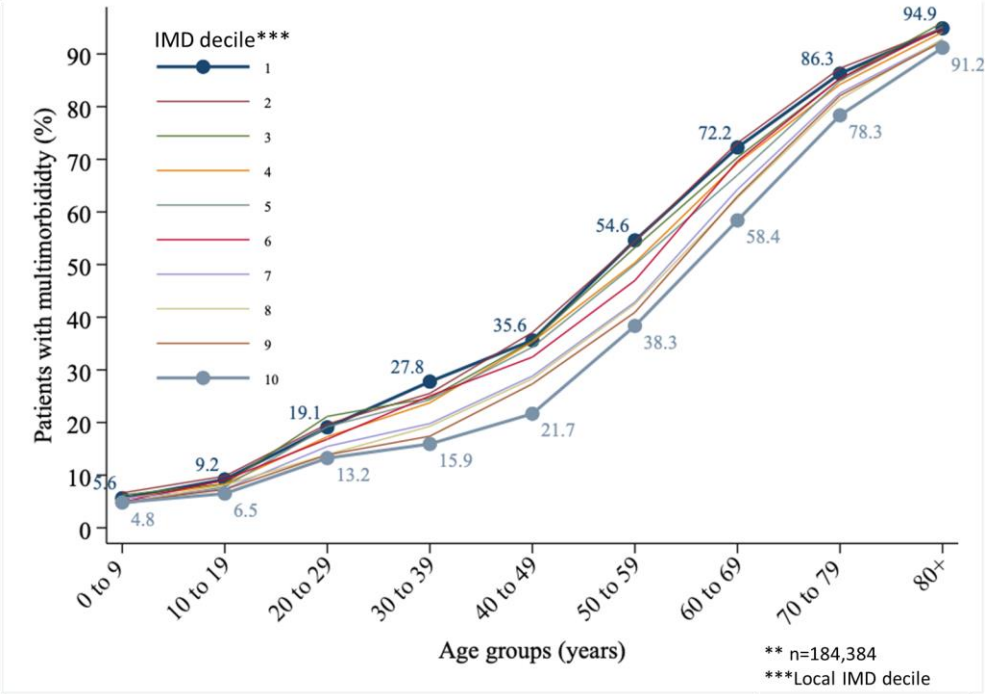
Background

Figure 3. Prevalence of LTCs by age and socio-economic status in St Helens**



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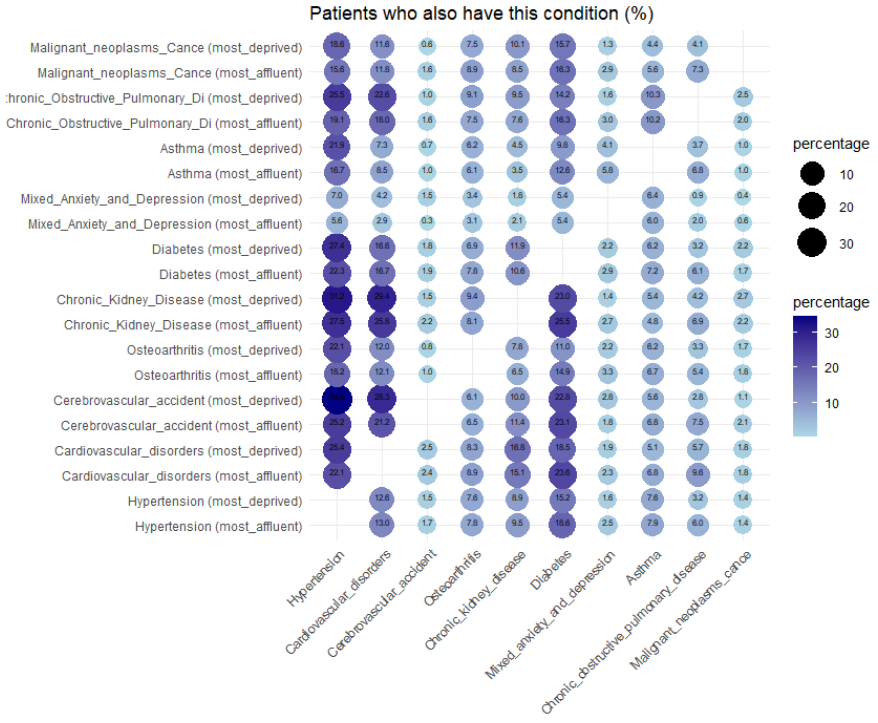
Background



Objectives

- ✓ To identify and compare the utilisation of health and social care services among the different multimorbidity clusters.
- ✓ To establish how the sequence in which LTCs are diagnosed influences the formation of multimorbidity clusters.
- ✓ To compare the synergistic effect of SES and lifestyle behavioural factors on the utilisation of health and social care services among the different multimorbidity clusters.

Method

- ✓ The Cheshire & Mersey ICB CIPHA dataset was utilised focusing on the St Helens Place (147,913) adult population.

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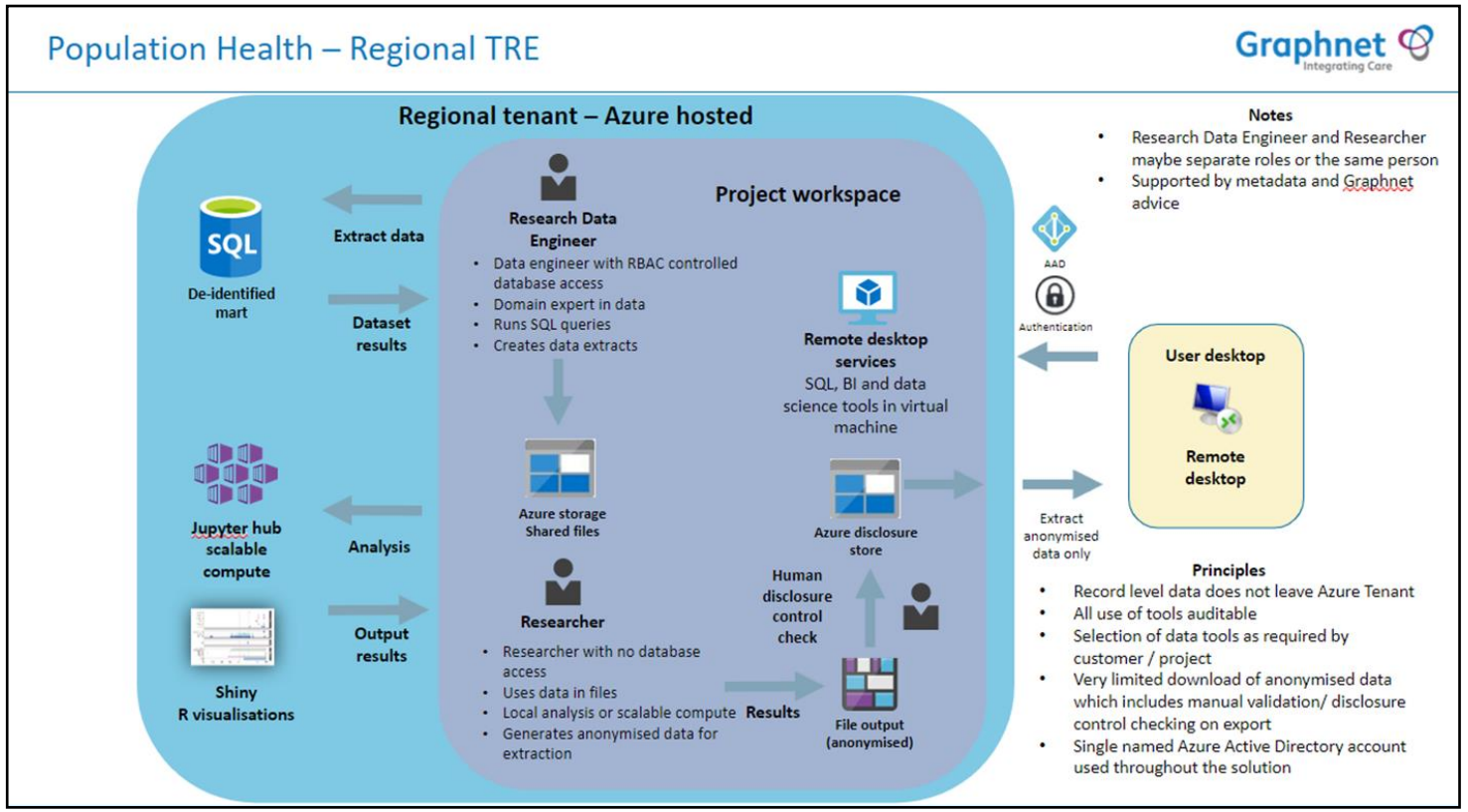
Trusted Research Environment



General Practitioner Events

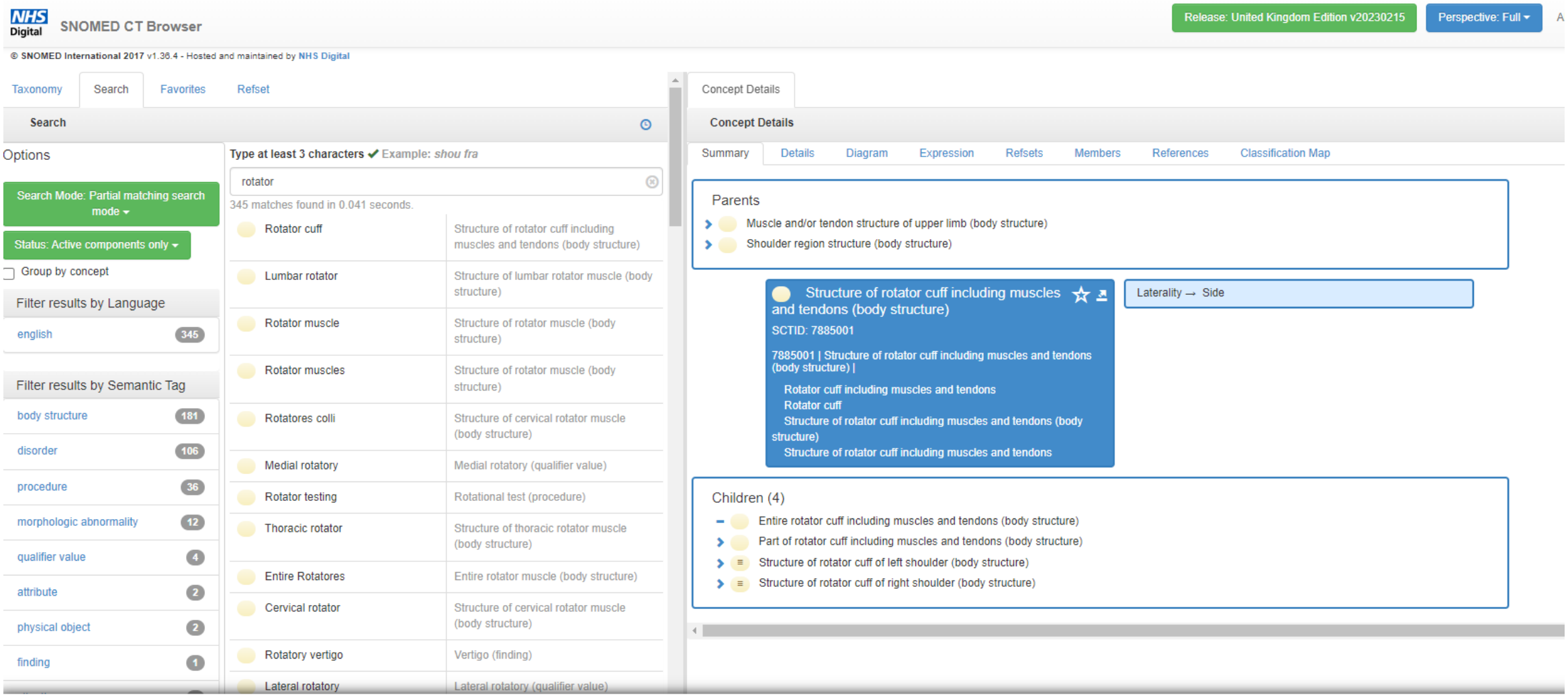
One record for each Patient GP event, this data is sourced from multiple tables within the CareCentric database. An event is generally a coded activity associated with a patient. Examples include advice, a diagnosis or procedure.

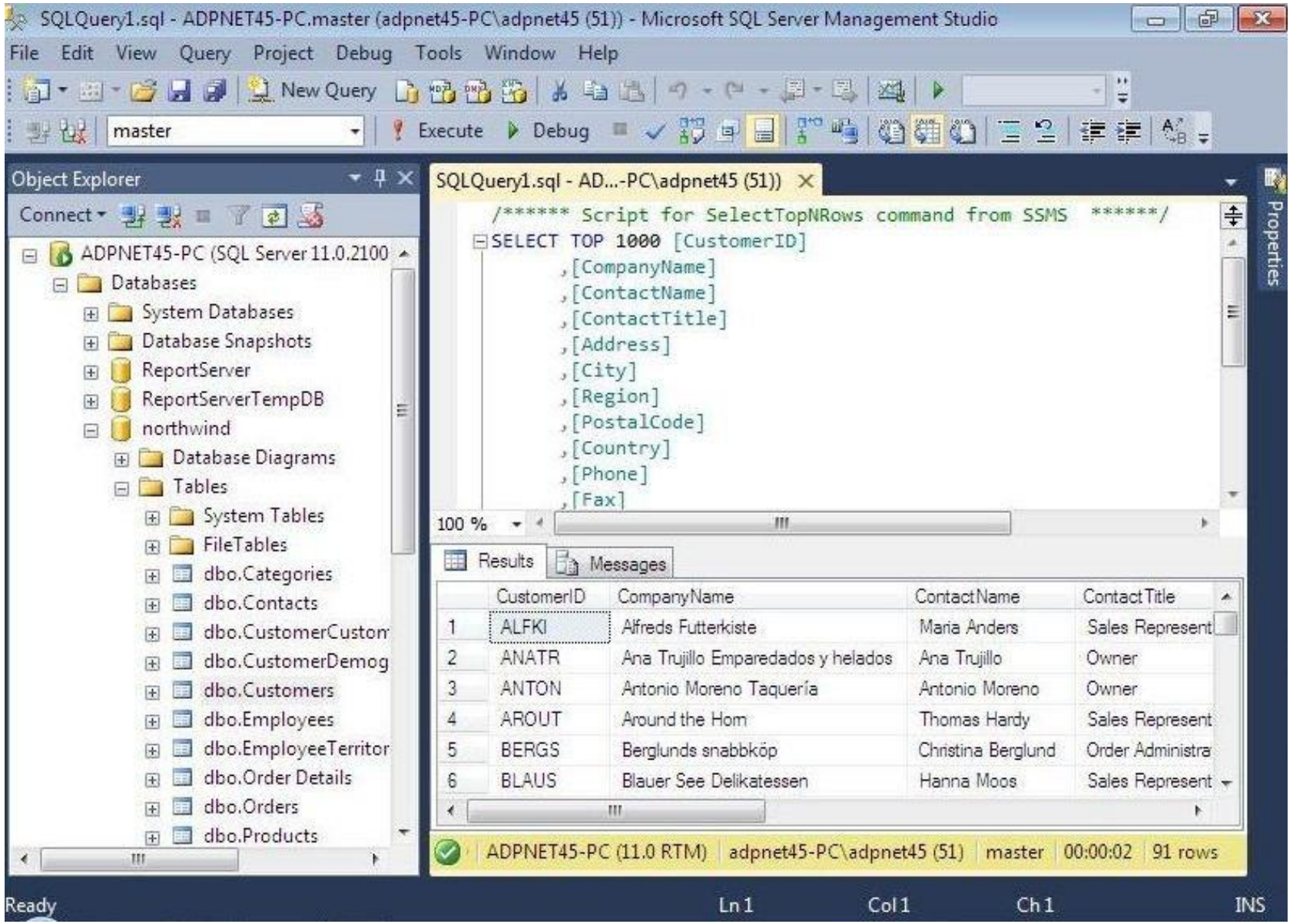
Database Table name:	SharedCare.GP Events
Data load:	GP_Events.dtsx
Dependant upon:	Reference Coding and Patient
RLS SQL View	RLS.vw_GP_Events

Fields:

Field Name	Description	Database Field Name	Foreign Key?	Foreign key table	Data Type	Comments / Notes
GP Events Primary Key	Primary Key for the table	PK_GP_Events_ID			INTEGER	
GP Events External ID	External Identifier for the GP Events	GP_Events_ID			NVARCHAR (64)	
Record Created Date and Time	Date the record was created	CreateDate			DATETIME2	Not updated once created
Record Modified Date and Time	Date the record was last modified	ModifDate			DATETIME2	
Load Number	his is a unique identifier which identifies which load the row was processed under. It is the Execution ID within the Microsoft SQL Server Integration Services database. Used for support purposes	LoadID			BIGINT	
Deleted?	Flag to indicate if row has been archived or not	Deleted			NCHAR(1)	
HDM_Modified Date and Time	Date and Time the database table was updated with this record	HDMModifDate			DATETIME2	
Patient Identifier	Unique identifier of patient link	FK_Patient_ID	Y	Patient	INTEGER	Join through PatientNumber table
Tenancy Identifier	Unique identifier of tenancy	FK_Reference_Tenancy_ID	Y	Reference_Tenancy	INTEGER	
General Practitioner Code	General Practitioner national GP code	GPCode			NVARCHAR (12)	
Registered GP	General Practitioner Registered national GP code	RegisteredGP			NVARCHAR (12)	
GP Practice Code	General Practitioner national practice code	GPPracticeCode			NVARCHAR (12)	Can be used to link to Reference_GP_Practice


```
SELECT
    DISTINCT NC.[FK_Patient_Link_ID]
    ,NC.[Units]
    ,NC.[Value]
    ,RSC.ConceptID
    ,D.[Age]
    ,D.[AgeBand]
    ,D.[Sex]
    ,D.[EthnicMainGroup]
    ,D.[EthnicGroupDescription]
    ,D.[PatientPostcode]
    ,D.[PracticePostcode]
    ,P.[IMD_Score]
    ,P.[FrailtyScore]
    ,P.[QOFRegisters]
    ,NC.[SnomedConceptID]
--Optional
    ,RC.[Term30]
    ,RC[ICD10Code] ,

--Congestive Heart Failure
(CASE WHEN RC.[ICD10Code] LIKE 'I50%' THEN '1'
WHEN NC.[SnomedCT_ConceptID] = '84114007' OR NC.[SnomedCT_ConceptID] =
'89555002' OR NC.[SnomedCT_ConceptID] = '71892000' OR NC.[SnomedCT_ConceptID] =
'88805009' OR NC.[SnomedCT_ConceptID] = '195114002' THEN '1'
ELSE '0'
END) AS Heart failure ,
--Hypertension
(CASE WHEN RC.[ICD10Code] LIKE 'I10%' THEN '1'
WHEN NC.[SnomedCT_ConceptID] = '1201005' OR NC.[SnomedCT_ConceptID] =
'48146000' OR NC.[SnomedCT_ConceptID] = '161501007' OR NC.[SnomedCT_ConceptID] =
'843821000000102' OR NC.[SnomedCT_ConceptID] =
'843821000000109' OR NC.[SnomedCT_ConceptID] = '70272006' OR NC.[SnomedCT_ConceptID] =
'38341003' OR NC.[SnomedCT_ConceptID] = '59621000' OR NC.[SnomedCT_ConceptID] =
'78975002' OR NC.[SnomedCT_ConceptID] = '31992008' OR NC.[SnomedCT_ConceptID] =
'194785008' OR NC.[SnomedCT_ConceptID] = '89242004' OR NC.[SnomedCT_ConceptID] =
'56218007' THEN '1'
ELSE '0'
END) AS Hypertension ,
--Diabetes Mellitus
(CASE WHEN RC.[ICD10Code] LIKE 'E10%' THEN '1'
OR RC.[ICD10Code] LIKE 'E11%' THEN '1'
WHEN NC.[SnomedCT_ConceptID] = '7321009' OR NC.[SnomedCT_ConceptID] =
'421075007' OR NC.[SnomedCT_ConceptID] = '721283000' OR NC.[SnomedCT_ConceptID] =
'190368000' OR NC.[SnomedCT_ConceptID] = '190418009'  OR NC.[SnomedCT_ConceptID] =
'422228004' OR NC.[SnomedCT_ConceptID] = '658081000000106' OR NC.[SnomedCT_ConceptID] =
'11530004' OR NC.[SnomedCT_ConceptID] = '421847006'  OR NC.[SnomedCT_ConceptID] =
'721284006'  OR NC.[SnomedCT_ConceptID] = '190389009'  OR NC.[SnomedCT_ConceptID] =
'658031000000107'  OR NC.[SnomedCT_ConceptID] = '190388001'  OR NC.[SnomedCT_ConceptID]
= '190424003' OR NC.[SnomedCT_ConceptID] = '44054006'  THEN '1'
ELSE '0'
END) AS Diabetes

FROM [SharedCare].[Patient_Link] PL WITH(NOLOCK)
INNER JOIN [SharedCare].[Patient] P WITH(NOLOCK)
 ON PL.[OneLinks_FK_Patient_ID] = P.[PK_Patient_ID]
INNER JOIN [SharedCare].[Normalised_Coding] NC WITH(NOLOCK)
   ON NC.FK_Patient_Link_ID = PL.PK_Patient_Link_ID
INNER JOIN [SharedCare].[Reference_SnomedCT] RSC WITH(NOLOCK)
   ON [NC].[FK_Reference_SnomedCT_ID] = [RSC].[PK_Reference_SnomedCT_ID]
INNER JOIN [SharedCare].[vw_Patient_Demographics] D WITH(NOLOCK)
   ON [PL].[PK_Patient_Link_ID] = D.[FK_Patient_Link_ID]
INNER JOIN [SharedCare].[Reference_Coding] RC WITH(NOLOCK)
   ON NC.[FK_Reference_Coding_ID] = RC.[PK_Reference_Coding_ID]

 --Joins to deal with patient merges (all use cases)

WHERE
   PL.[Merged] = 'N'
   AND P.[FK_Reference_Tenancy_ID] = 2

   --Removing deleted / test records (all use cases)
   AND PL.[Deleted] = 'N'
   AND P.[Deleted] = 'N'
   AND P.[FK_Patient_Link_ID] <> -1
   AND P.[TestPatientFlag] = 'N'

   --Removing deceased patients (if necessary, applies to most use cases)
   AND PL.[Deceased] = 'N'

   --Removing GDPR opt outs (all use cases)
   AND (
     PL.[OptedOut] = 'N'
     OR EXISTS (
       SELECT 1
       FROM [Config].[Config_Site]
       WHERE [Config_Name] = 'GDPR Objection Demographics'
       AND [Config_Value] = 'N'
     )
   )

AND RSC.Deleted = 'N'
AND NC.Deleted = 'N'
AND D.[Age] >= 18
AND NC.[FK_Patient_Link_ID] <> -1
AND NC.[PK_Normalised_Coding_ID] != -1
AND RC.[Term30] NOT LIKE '%atrial fibrillation%'
AND RC.[Term30] NOT LIKE '%atrial flutter%'
AND RC.[ICD10Code] NOT LIKE 'I48%'
AND RC.[ConceptID] <> '719008003'
AND [NC].[ActivityDate] < '2020-09-01 00:00:00.0000000'
ORDER BY NC.[FK_Patient_Link_ID] DESC;
```


NHS Digital
SNOMED CT Browser
Release: United Kingdom Edition v20230215
Perspective: Full
© SNOMED International 2017 v1.36.4 - Hosted and maintained by NHS Digital
Taxonomy
Search
Favorites
Refset
Search
Options
Search Mode: Partial matching search mode
Status: Active components only
Group by concept
Filter results by Language
english 345
Filter results by Semantic Tag
body structure 181
disorder 106
procedure 36
morphologic abnormality 12
qualifier value 4
attribute 2
physical object 2
finding 1
Type at least 3 characters ✔ Example: shou fra
rotator
345 matches found in 0.041 seconds.
Rotator cuff
Structure of rotator cuff including muscles and tendons (body structure)
Lumbar rotator
Structure of lumbar rotator muscle (body structure)
Rotator muscle
Structure of rotator muscle (body structure)
Rotator muscles
Structure of rotator muscle (body structure)
Rotatores colli
Structure of cervical rotator muscle (body structure)
Medial rotatory
Medial rotatory (qualifier value)
Rotator testing
Rotational test (procedure)
Thoracic rotator
Structure of thoracic rotator muscle (body structure)
Entire Rotatores
Entire rotator muscle (body structure)
Cervical rotator
Structure of cervical rotator muscle (body structure)
Rotatory vertigo
Vertigo (finding)
Lateral rotatory
Lateral rotatory (qualifier value)
Concept Details
Concept Details
Summary
Details
Diagram
Expression
Refsets
Members
References
Classification Map
Parents
Muscle and/or tendon structure of upper limb (body structure)
Shoulder region structure (body structure)
Structure of rotator cuff including muscles and tendons (body structure)
SCTID: 7885001
7885001 | Structure of rotator cuff including muscles and tendons (body structure) |
Rotator cuff including muscles and tendons
Rotator cuff
Structure of rotator cuff including muscles and tendons (body structure)
Structure of rotator cuff including muscles and tendons
Laterality → Side
Children (4)
Entire rotator cuff including muscles and tendons (body structure)
Part of rotator cuff including muscles and tendons (body structure)
Structure of rotator cuff of left shoulder (body structure)
Structure of rotator cuff of right shoulder (body structure)


SQLQuery1.sql - ADPNET45-PC.master (adpnet45-PC\adpnet45 (51)) - Microsoft SQL Server Management Studio
File Edit View Query Project Debug Tools Window Help
New Query
master
Execute
Debug
Object Explorer
Connect
ADPNET45-PC (SQL Server 11.0.2100
Databases
System Databases
Database Snapshots
ReportServer
ReportServerTempDB
northwind
Database Diagrams
Tables
System Tables
FileTables
dbo.Categories
dbo.Contacts
dbo.CustomerCustom
dbo.CustomerDemog
dbo.Customers
dbo.Employees
dbo.EmployeeTerritor
dbo.Order Details
dbo.Orders
dbo.Products
SQLQuery1.sql - AD...-PC\adpnet45 (51))
/****** Script for SelectTopNRows command from SSMS ******/
SELECT TOP 1000 [CustomerID]
,[CompanyName]
,[ContactName]
,[ContactTitle]
,[Address]
,[City]
,[Region]
,[PostalCode]
,[Country]
,[Phone]
,[Fax]
100 %
Results
Messages
CustomerID CompanyName ContactName ContactTitle
1 ALFKI Alfreds Futterkiste Maria Anders Sales Represent
2 ANATR Ana Trujillo Emparedados y helados Ana Trujillo Owner
3 ANTON Antonio Moreno Taquería Antonio Moreno Owner
4 AROUT Around the Hom Thomas Hardy Sales Represent
5 BERGS Berglunds snabbköp Christina Berglund Order Administra
6 BLAUS Blauer See Delikatessen Hanna Moos Sales Represent
ADPNET45-PC (11.0 RTM) adpnet45-PC\adpnet45 (51) master 00:00:02 91 rows
Properties
Ready
Ln 1
Col 1
Ch 1
INS

Method

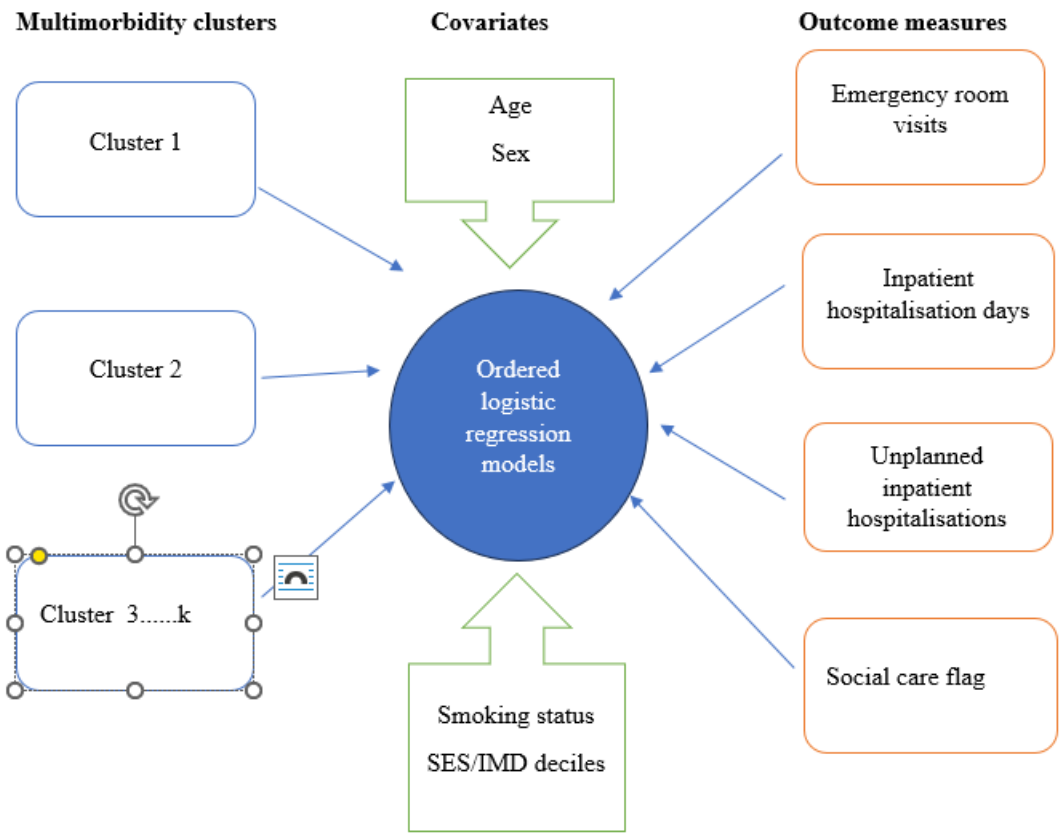
- ✓ The Cheshire & Mersey ICB CIPHA dataset was utilised focusing on the St Helens Place (147,913) population.

- ✓ An approach described by Salisbury et al utilising the Johns Hopkins ACG Extended Diagnostic Clusters was used to identify 48 categories of long term condition.

Method

- ✓ The Cheshire & Mersey ICB CIPHA dataset was utilised focusing on the St Helens Place (147,913) population.
- ✓ An approach described by Salisbury et al utilising the Johns Hopkins ACG Extended Diagnostic Clusters was used to identify 48 categories of long term condition.
- ✓ Latent class analysis was undertaken Model fit and diagnostic criteria for six latent class models was undertaken with the best performing model selected.

Latent class analysis



Method

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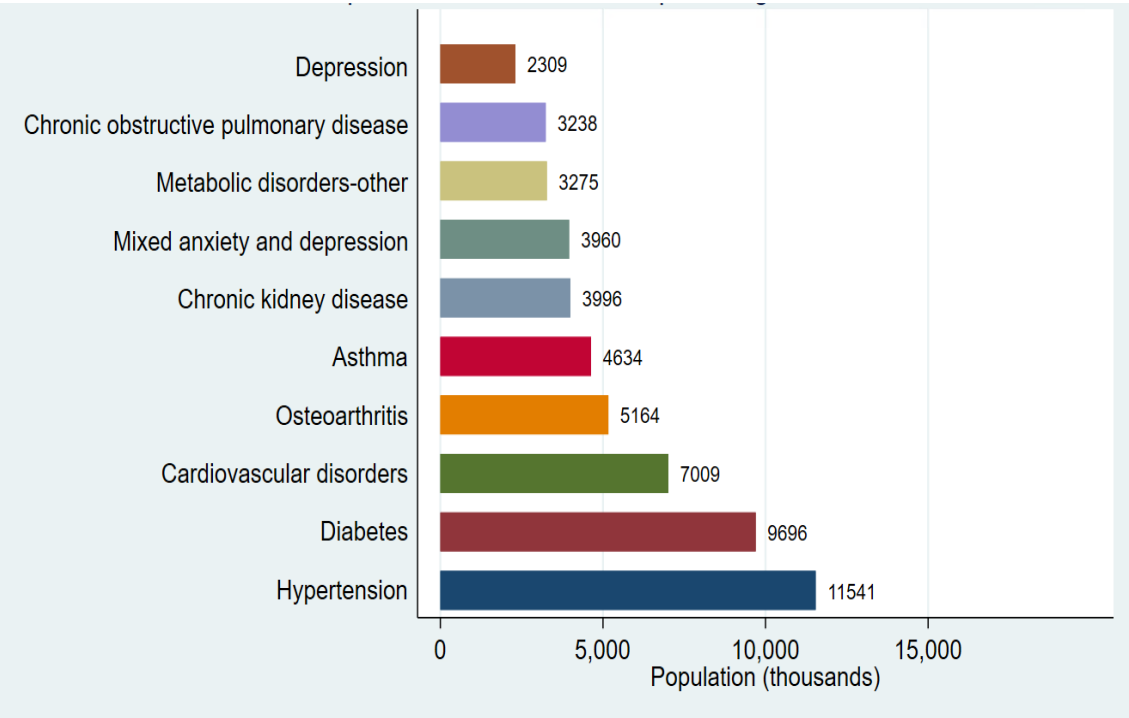
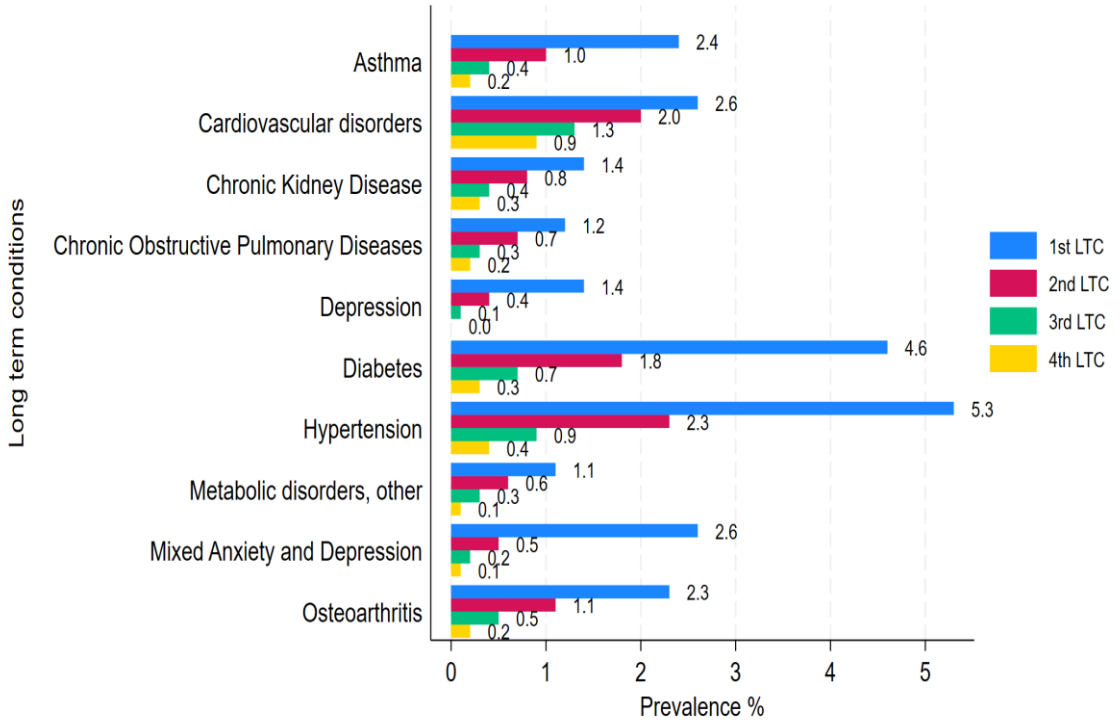
- ✓ Latent class analysis was undertaken Model fit and diagnostic criteria for six latent class models was undertaken with the best performing model selected.
- ✓ An ordered logistic regression model MTLC clusters with covariates (Age, Sex, SES, smoking) and health and social care utilisation outcomes

Top 10 long term conditions



Sequence of Long Term Conditions



Order of diagnosis	Positional probability of the long-term condition
1st LTC	**Hypertension (5.3%)** Diabetes (4.6%) Mixed anxiety and depression (2.6%) Other CVDs (2.6%) Asthma (2.4%)
2nd LTC	**Hypertension (2.3%)** Other CVDs (2.0 %) Diabetes (1.8%) Osteoarthritis (1.1%) Asthma (1.0%)
3rd LTC	**Cardiovascular disorders (1.3%)** Hypertension (0.9%) Diabetes (0.7%) Osteoarthritis (0.5%) CKDs (0.4%)
4th LTC	**Cardiovascular disorders (0.9%)** Hypertension (0.4%) Diabetes or CKDs (0.3%) Asthma, osteoarthritis, or COPD (0.2%)

Multimorbidity clusters

Heart disease and chronic kidney disease (39.1%)

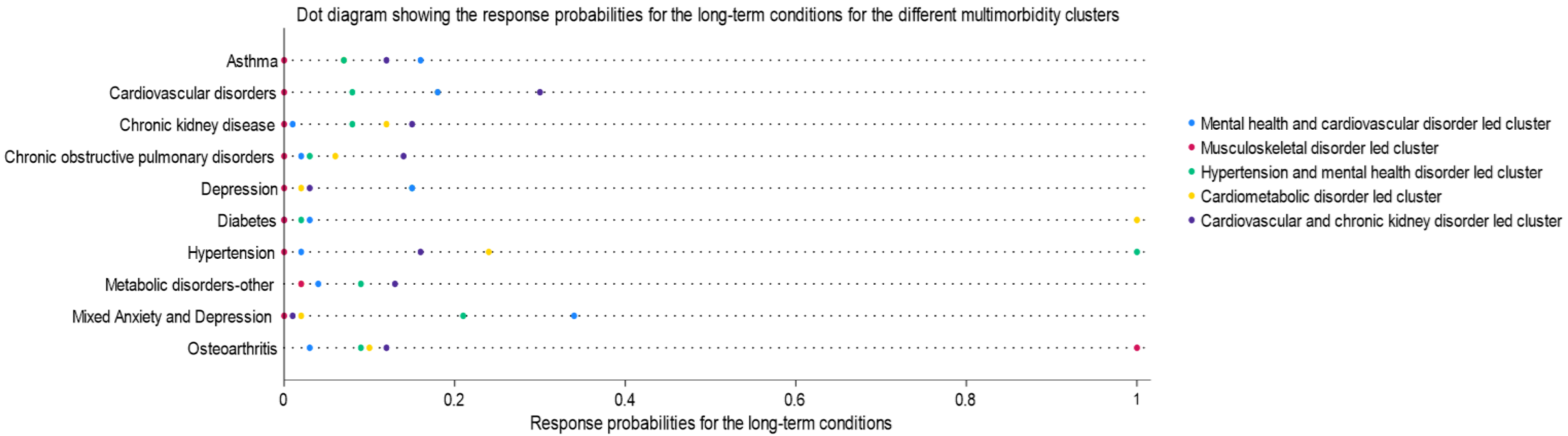
Mental health and cardiovascular disorders (16.4%)

Cardio-metabolic (22.1%)

Musculoskeletal (5%)

Hypertension and mental health (17.4%)

Multimorbidity clusters



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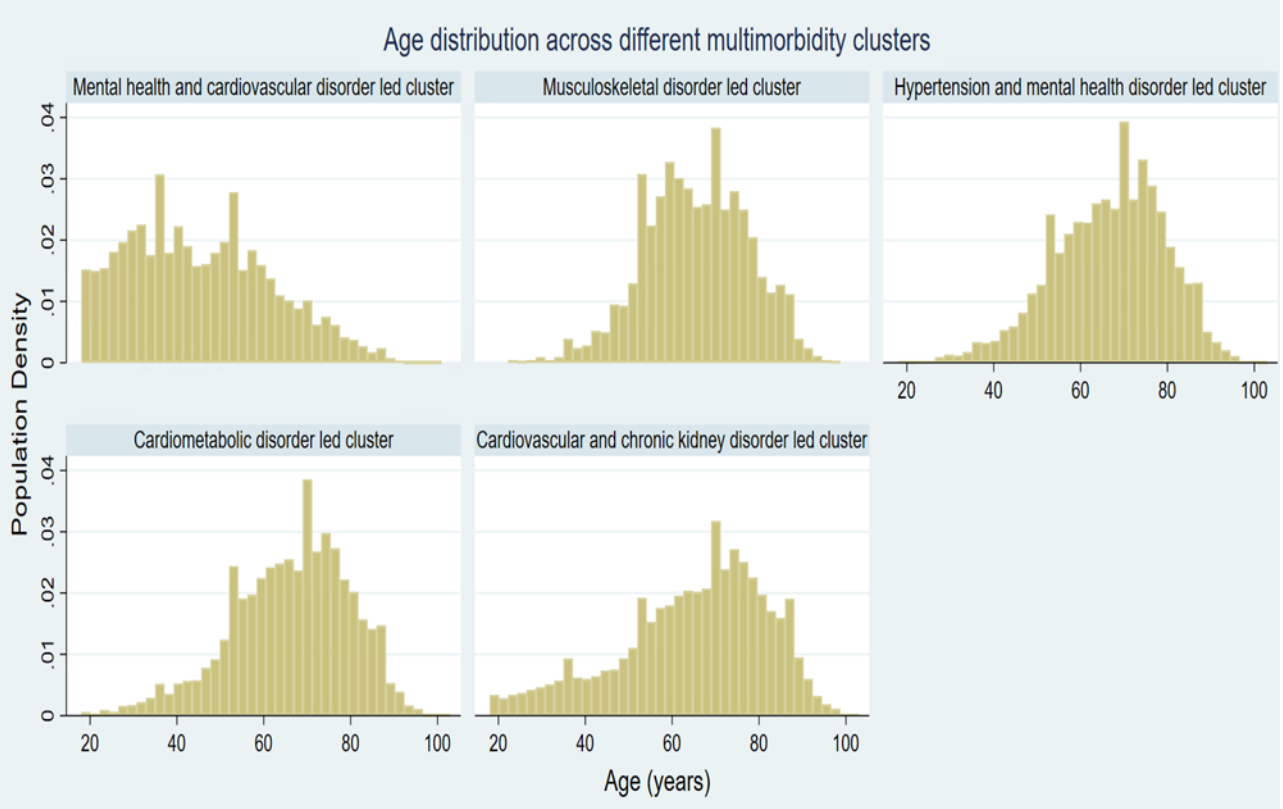
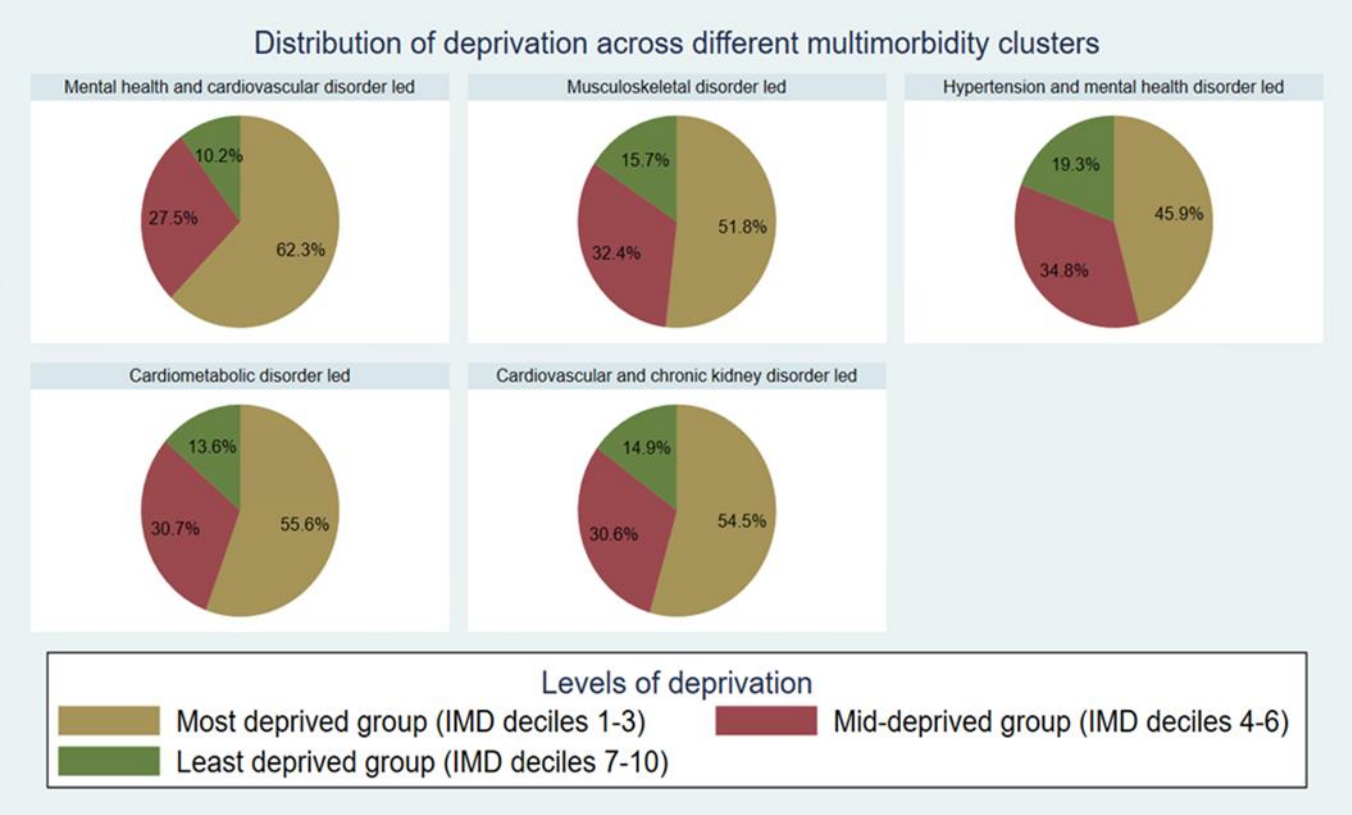
Age distribution across MTLC clusters



Distribution of deprivation across MTLC clusters



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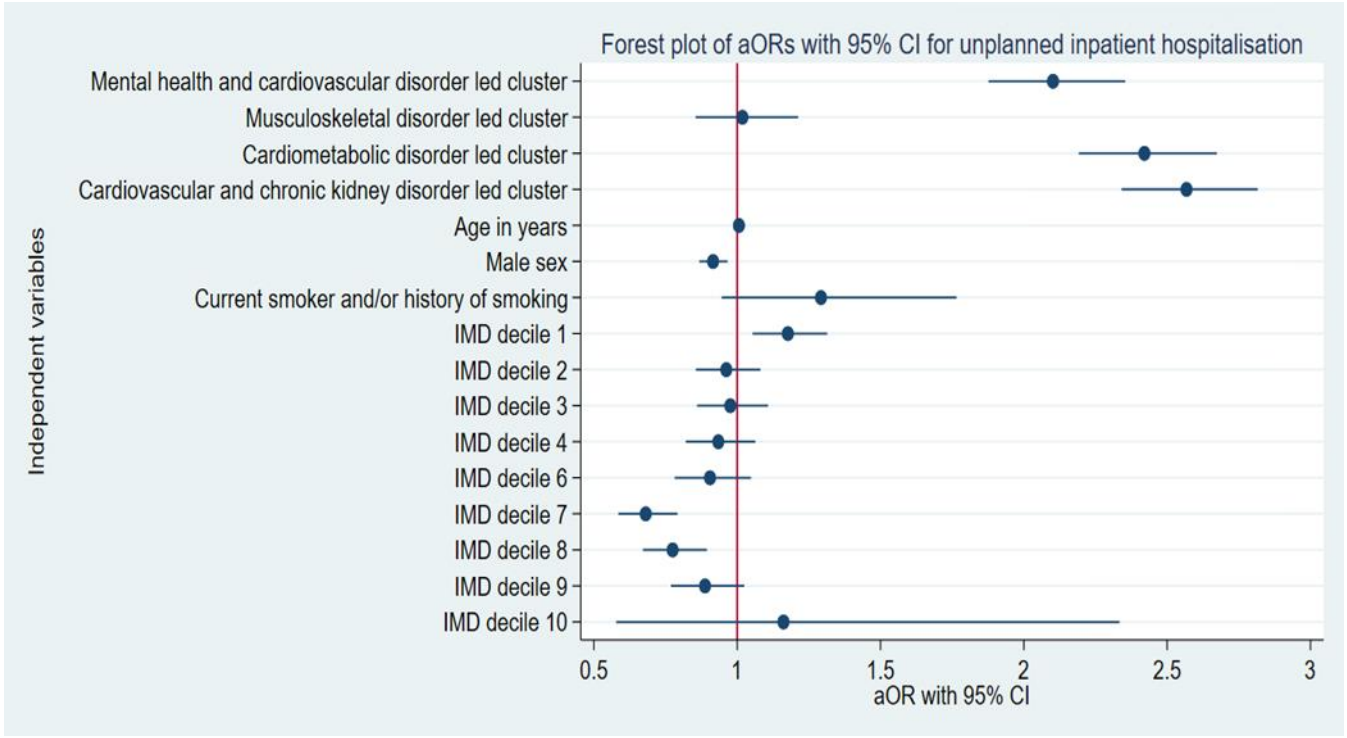
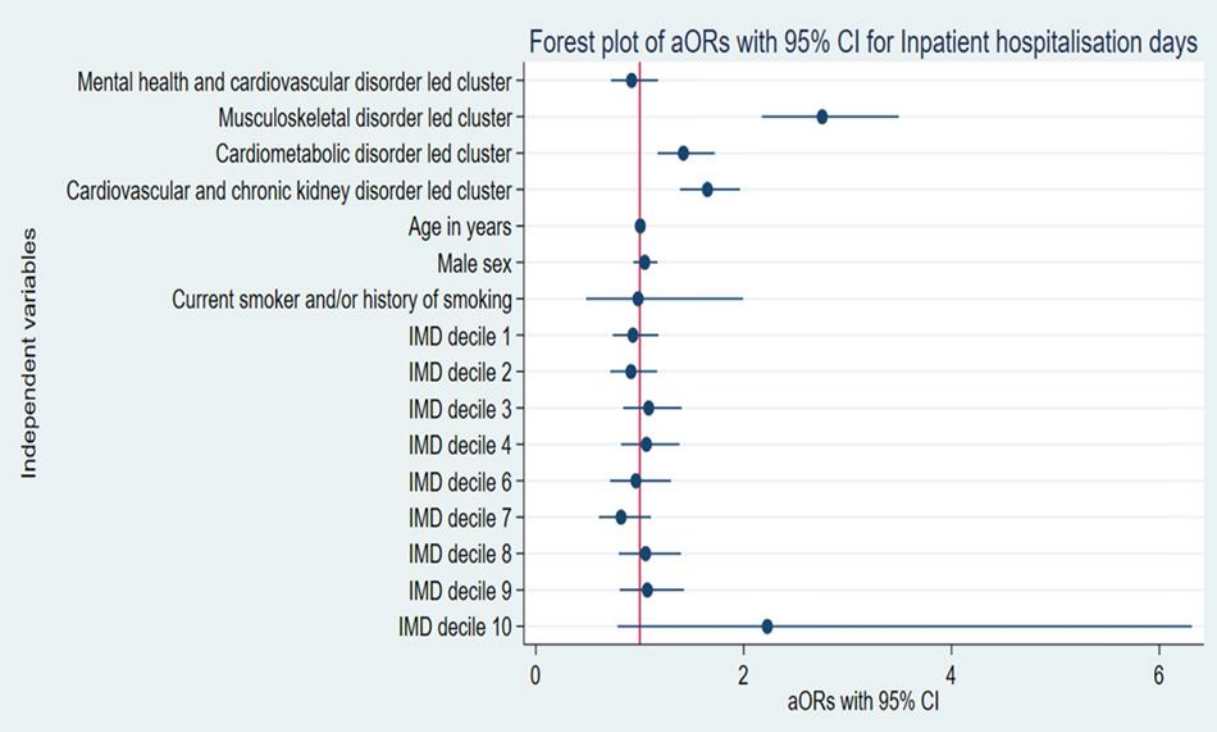
Unplanned inpatient hospitalisation



Inpatient hospital days



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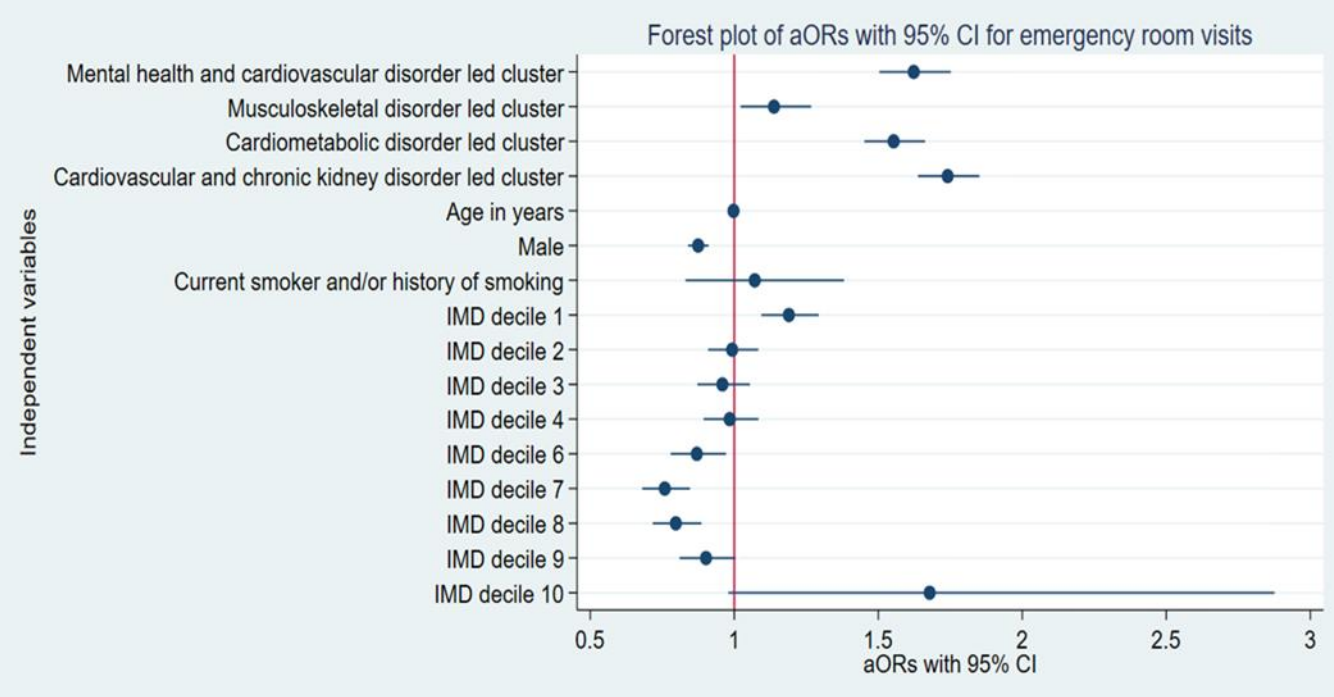
A&E visits



Social care utilisation

	Model 0 (no covariates)		Model 1 (with covariates)	
Categories of MM clusters	ORs	P values	aORs	P values
Hypertension and mental health disorder-led cluster	Reference		Reference	
Mental health and cardiovascular disorder-led cluster	1.05 (0.95-1.16)	0.326	1.95 (1.75-2.18)	0.000
Musculoskeletal disorder-led cluster	1.28 (1.11-1.47)	0.001	1.27 (1.10-1.46)	0.001
Cardiometabolic disorder-led cluster	2.41 (222-2.63)	0.000	2.42 (2.32-2.73)	0.000
Cardiovascular and chronic kidney disorder-led cluster	2.46 (2.28-2.67)	0.000	2.51 (2.31-2.73)	0.000

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Conclusion

- Multimorbidity increases significantly with age, particularly between 40-59 years for 5+ LTCs and over 60 years for 10+ LTCs.
- The most likely initial LTCs to be diagnosed were hypertension (5.3%), diabetes (4.6%), mixed anxiety and depression (2.6%), other CVDs (2.6%), and asthma (2.4%).
- As the multimorbidity cascade progressed, subsequent diagnoses were most often hypertension, other CVDs, diabetes, osteoarthritis, and asthma, with each diagnosis showing a slightly different prevalence rate.
- Conditions like dementia, other mental health disorders, liver disorders, other neurological disorders, and neoplasms were less likely to be among the first four LTCs in the multimorbidity sequence.

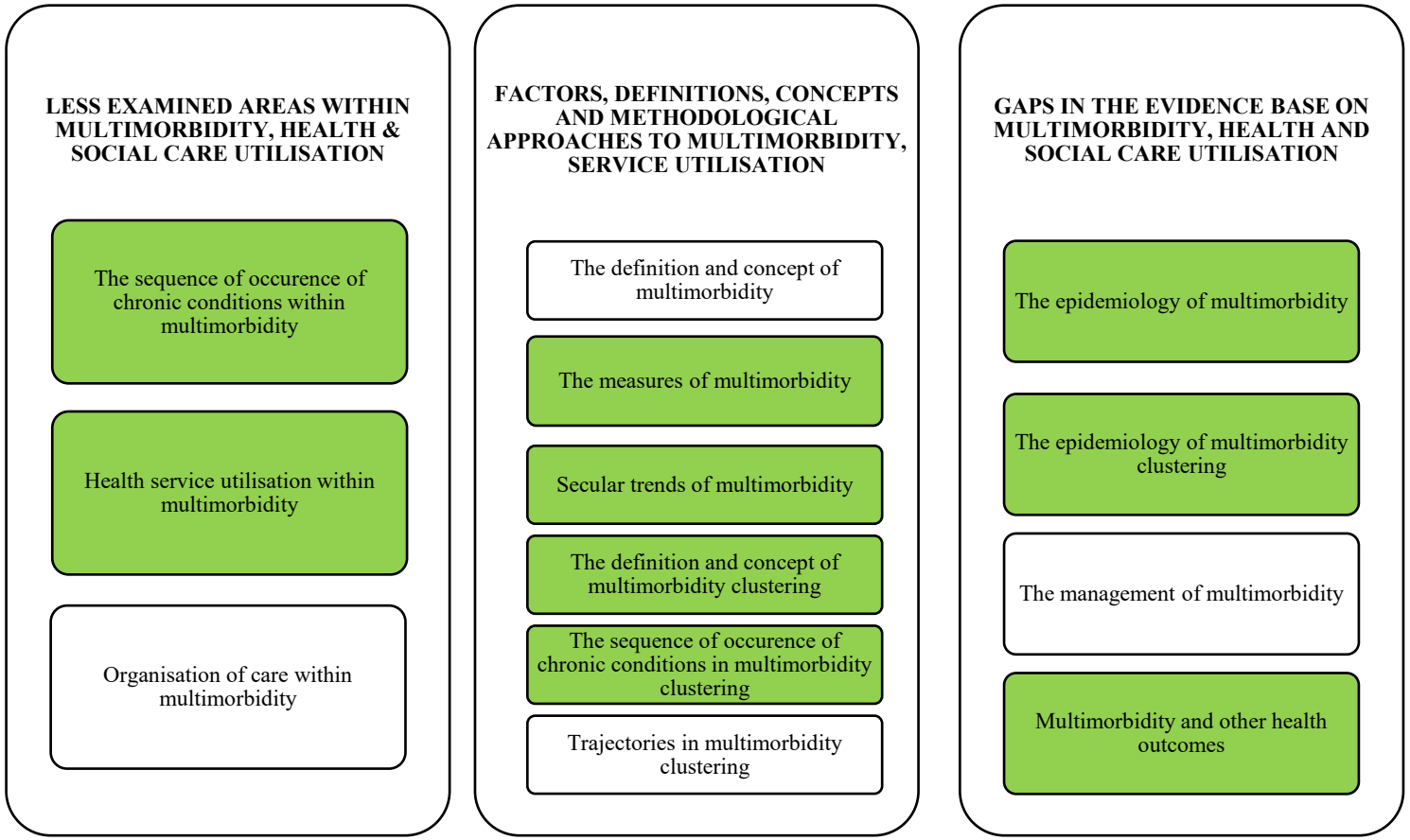
Conclusion

- The CVD and CKD-led cluster, along with the cardiometabolic disorder-led cluster, had higher odds of ER visits, unplanned inpatient hospitalisations, and inpatient hospital days, but lower odds of having a higher social care flag.

- The mental health & CVD-led cluster showed higher odds of ER visits, unplanned inpatient hospitalisations, and social care flags

- Musculoskeletal disorder-led cluster had higher odds of ER visits and inpatient hospital days, but lower odds of social care flags.

Evidence gaps



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Strengths

- ✓ Among the first studies to cross-sectionally report on the sequence of diagnosis of LTCs on multimorbidity cascade using a real-world regional linked health and social care dataset.
- ✓ Among the first studies to identify multimorbidity clusters within the study population using the CIPHA database and how these impact on health and social care utilistation.
- ✓ Demonstrates how Age, Sex, SES, Smoking impact on clusters
- ✓ Co-designed approach with NHS GPs, Patient and Public

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Limitations

- ✓ Finding dependent on population, data and statistical approach used
- ✓ Cluster labelling fallacy
- ✓ Observational versus actional clusters ?

Recommendations

1. Increase Access to Youth Mental Health Services:

Establish dedicated youth mental health services tailored to the needs of young individuals facing multiple health conditions in socioeconomically disadvantaged areas. Utilize digital health support services to empower these individuals in managing their mental health effectively.

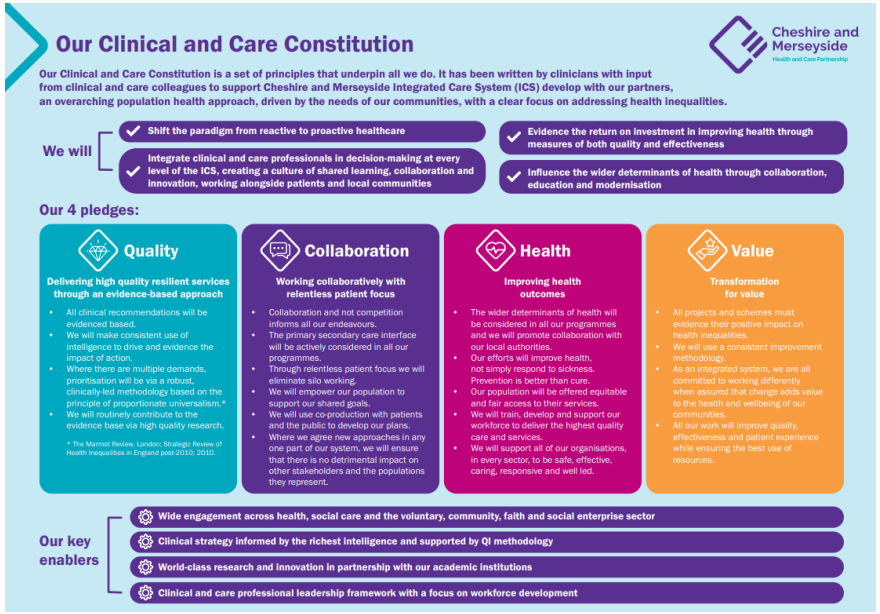
2. Improve Representation in Decision-Making:

Ensure better representation of younger individuals with multiple health conditions from deprived areas in Patient and Public Advisory committees. This initiative aims to engage them actively in decision-making processes within Integrated Care Boards.

3. Promote Community-Based Education Programs:

Implement more community-based education programs to raise awareness about the range of social care services available. These programs should particularly focus on educating individuals living with multiple health conditions on how to access social care services efficiently.

Recommendations



Our Clinical and Care Constitution

Cheshire and Merseyside Health and Care Partnership

Our Clinical and Care Constitution is a set of principles that underpin all we do. It has been written by clinicians with input from clinical and care colleagues to support Cheshire and Merseyside Integrated Care System (ICS) develop with our partners, an overarching population health approach, driven by the needs of our communities, with a clear focus on addressing health inequalities.

We will

- Shift the paradigm from reactive to proactive healthcare
- Integrate clinical and care professionals in decision-making at every level of the ICS, creating a culture of shared learning, collaboration and innovation, working alongside patients and local communities
- Evidence the return on investment in improving health through measures of both quality and effectiveness
- Influence the wider determinants of health through collaboration, education and modernisation

Our 4 pledges:

Quality

Delivering high quality resilient services through an evidence-based approach

- All clinical recommendations will be evidenced based.
- We will make consistent use of intelligence to drive and evidence the impact of action.
- Where there are multiple demands, prioritisation will be via a robust, clinically-led methodology based on the principle of proportionate universalism.*
- We will routinely contribute to the evidence base via high quality research.

* The Marmot Review. London: Strategic Review of Health Inequalities in England post-2010; 2010.

Collaboration

Working collaboratively with relentless patient focus

- Collaboration and not competition informs all our endeavours.
- The primary secondary care interface will be actively considered in all our programmes.
- Through relentless patient focus we will eliminate silo working.
- We will empower our population to support our shared goals.
- We will use co-production with patients and the public to develop our plans.
- Where we agree new approaches in any one part of our system, we will ensure that there is no detrimental impact on other stakeholders and the populations they represent.

Health

Improving health outcomes

- The wider determinants of health will be considered in all our programmes and we will promote collaboration with our local authorities.
- Our efforts will improve health, not simply respond to sickness. Prevention is better than cure.
- Our population will be offered equitable and fair access to their services.
- We will train, develop and support our workforce to deliver the highest quality care and services.
- We will support all of our organisations, in every sector, to be safe, effective, caring, responsive and well led.

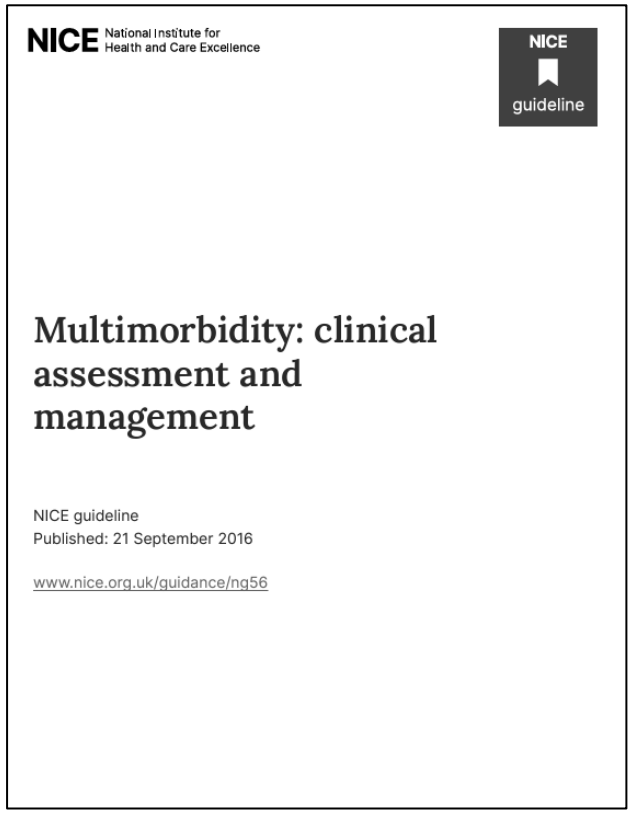
Value

Transformation for value

- All projects and schemes must evidence their positive impact on health inequalities.
- We will use a consistent improvement methodology.
- As an integrated system, we are all committed to working differently when assured that change adds value to the health and wellbeing of our communities.
- All our work will improve quality, effectiveness and patient experience while ensuring the best use of resources.

Our key enablers

- Wide engagement across health, social care and the voluntary, community, faith and social enterprise sector
- Clinical strategy informed by the richest intelligence and supported by QI methodology
- World-class research and innovation in partnership with our academic institutions
- Clinical and care professional leadership framework with a focus on workforce development



NICE National Institute for Health and Care Excellence

NICE guideline

Multimorbidity: clinical assessment and management

NICE guideline
Published: 21 September 2016

www.nice.org.uk/guidance/ng56

News story

Edge Hill University awarded £2.5m to tackle mental health conditions in children and young people

October 10, 2024

Edge Hill University has been awarded £2.5million to expand its expert research into the mental health of children and young people.

'Dramatic' effect of air quality monitors

The air monitors are aimed at children who have asthma or infant wheeze

Aran Dhillon
Local Democracy Reporting Service

30 March 2025

Indoor air quality monitors have been provided for children with asthma or infant wheeze in an initiative in two towns.

Families in St Helens on Merseyside and Warrington in Cheshire have been given the kit to check for air pollution inside their homes.

The Healthy Air for Healthy Lungs programme focuses on households with children aged two to 10 who have respiratory conditions.

St Helens Council said it was having a "dramatic" impact on children's health.

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9.8k viewing

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