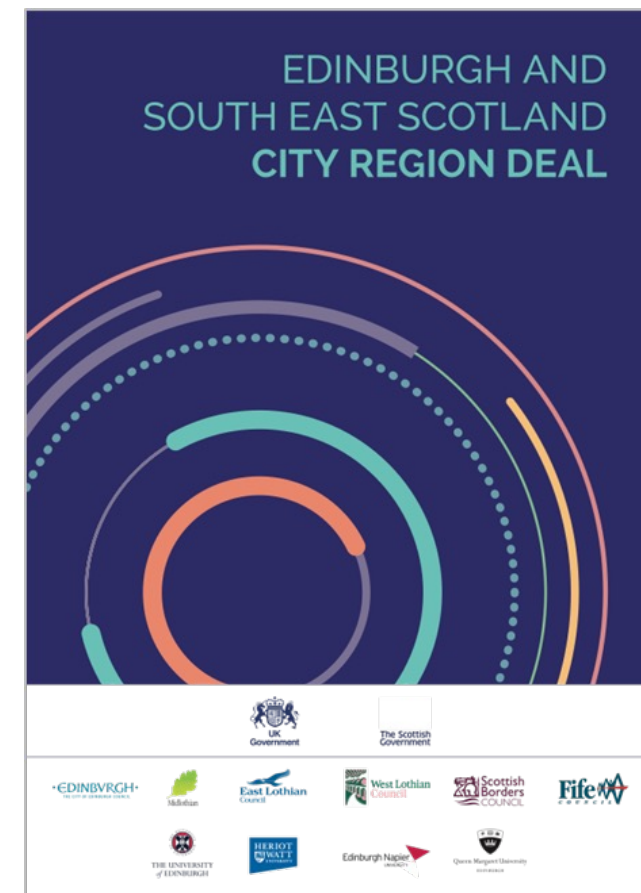# Data-Driven Innovation in South East Scotland

Dr Atul Anand
Consultant Geriatrician & Senior Clinical Research Fellow, University of Edinburgh
Clinical Lead, DataLoch

East Region Innovation Event
8th June 2023

Establish a network of Innovation Hubs across the region supported by the Edinburgh International Data Facility

Create a world-leading innovation hub where the public, private and not-for-profit sectors collaborate to enable data-driven advances in the delivery of health and social care

The Data-Driven Innovation Health and Social Care Programme

VISION

Create an innovation hub where the public, private and third sectors collaborate to enable data-driven advances in the delivery of health and social care.

DELIVERY THEMES

TALENT	RESEARCH	ADOPTION	ENTREPRENEURS
Enable health & care professionals to realise the value of data	Inter-disciplinary research to transform health & care delivery	Partnerships to address major challenges in health & care	New businesses that improve the delivery of health & care to our citizens

UNDERPINNING CAPABILITY
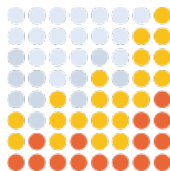
DataLoch

Harness Scotland's health care data and expertise to improve health and social care outcomes in our region and beyond

Quality, well-structured routine data is essential to healthcare innovation

Integrated data infrastructure

Established network of regional and national data Safe Havens to support linkage and analysis of de-identified data.

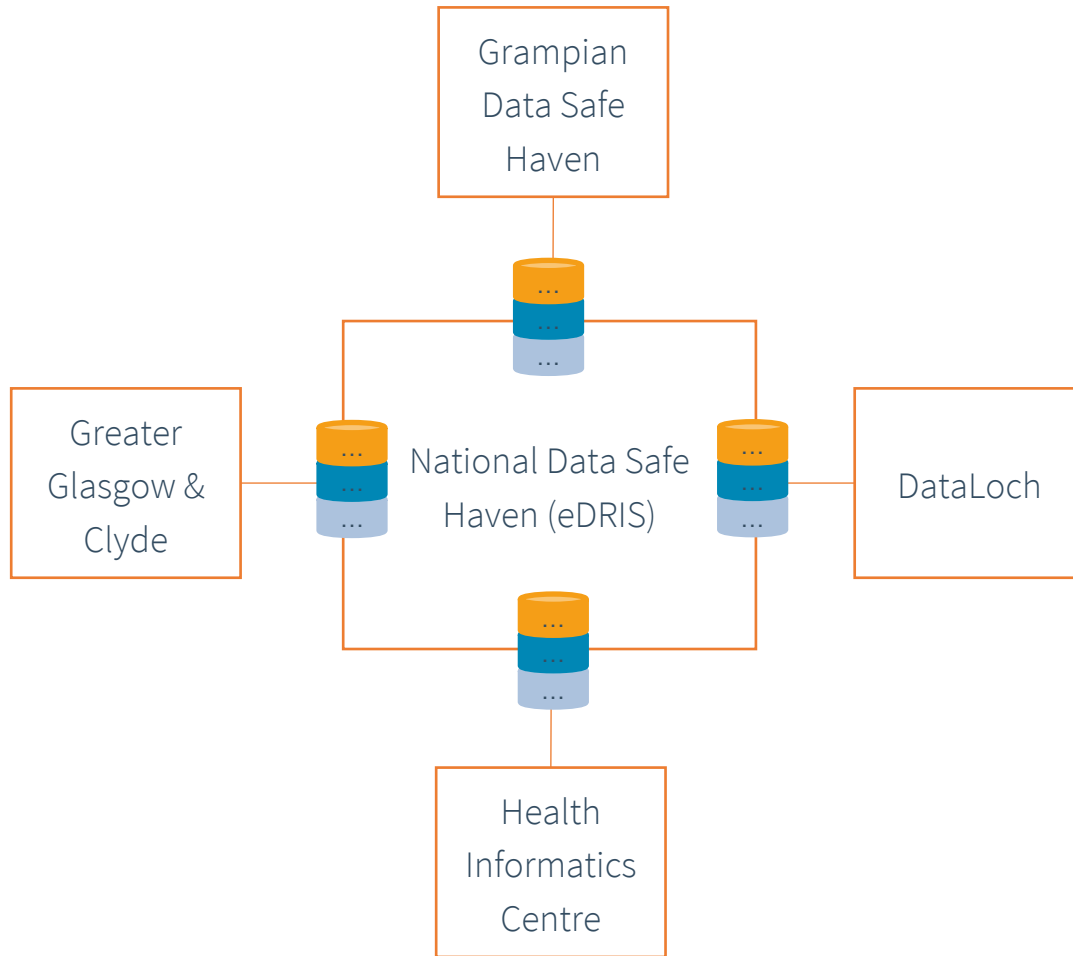# DataLoch: health care data

~1 million persons

106 GP practices

20 data sources

200,000 annual visits

Conditions
- Conditions from GP and hospital records
- Using common definitions from HDR UK code libraries
- Laboratory test results, X-rays and other radiology

Prescribing
- Prescriptions dispensed in the community
- Inpatient prescribing (coming soon)

Encounters
- Hospital admissions and discharges
- GP visits and hospital outpatient activity

Observations
- Alcohol consumption
- eFrailty
- BMI, blood pressure, smoking

Outcomes
- Critical care visits
- Procedures
- Deaths

Demographics to address inequalities
- Age
- SIMD
- Ethnicity

https://www.wiki.ed.ac.uk/display/DMCatalogue

Circular chart labels

Infections / ID: ID-Other organisms 614, ID-Bacterial 604, LRTI 414, UTI 659 (+PA) +DI, URTI 364, UTI 428, ID-Other organs 220, ID-Skin 218, PID 99

Skin: 1738 Dermatitis, 758 Acne, 287 Psoriasis, 243 Urticaria, 207 Rosacea, 147 Seborrheic Dermatitis, 87 Actinic keratosis

Musculoskeletal: 865 Osteoarthritis, 776 Enthesopathy, 373 Osteoporosis, 290 Spondylosis, 285 Fracture - Wrist, 252 Carpal Tunnel Syndrome, 242 Intervertebral Disc Disorder, 95 Rheumatoid Arthritis, 81 Fracture - Hip, 78 Scoliosis

Respiratory: 1316 Asthma, 1046 Allergic/chronic Rhinitis, 264 COPD, 245 Chronic Sinusitis, 82 Sleep apnoea

Genitourinary: 692 Menorrhagia, 344 Urinary Incontinence, 335 Dysmenorrhoea, 302 Uterovaginal Prolapse, 218 Postmenopausal Bleeding, 200 Endometriosis, 159 Female Infertility, 147 Urolithiasis, 138 AKI, 106 Neuropathic Bladder, 91 Postcoital Bleeding, 78 Obstruct/reflux uropathy

Cardiovascular: 1273 Hypertension, 242 CHD_nos, 137 Stable Angina, 132 Atrial Fibrillation, 114 TIA, 107 Myocardial Infarction, 97 Raynauds Disease, 91 VTE (Excl PE), 86 Heart Failure

Endocrine: 844 Obesity, 650 Diabetes, 162 Thyroid Disease

Neurological: 956 Migraine, 399 Chronic Fatigue Syndrome, 199 Epilepsy, 162 Peripheral Neuropathy, 117 Leiomyoma, 134 ...

Benign Neo: 356 Benign Neo - Ovary, 128 Benign Neo - Uterus, 106 Benign Neo - Colon

Haem/Imm: 524 Iron def Anaemia, 272 Anaemia - other, 226 B12 def anaemia

Cancers: Pri Ca - Skin 172, Pri Ca - Breast 222

Perinatal: Premature Delivery 91

Psychiatric: Depression 1917, Anxiety 1534, Alcohol Misuse 478, Substance Misuse 194, Personality Disorder 103, Dementia 99, Delirium 79, Eating Disorders 79

Digestive: GORD 631, IBS 630, Cholelithiasis 488, Appendicitis 472, Gastritis 429, Diverticular Disease 358, Diaphragmatic Hernia 328, Oesophageal Disease 250, Abdominal Hernia 244, Cholecystitis 187, Peptic Ulcer 152, Anal Fistula 134, Fatty Liver 94

Eye: Cataract 506, Diabetic Eye Disease 168, Macular Degeneration 116, Glaucoma 96

Ear: Deafness 493, Tinnitus 142

CIN 106

DataLoch Respiratory Registry

o South-East Scotland residents with COPD, asthma and ILD.

o COPD cohort includes 52,500 patients with COPD, 3,800 patients with ILD, and 2400 patients with both.

o Data harmonised with BREATHE funded registries in England (CPRD) and Wales (SAIL Databank) to enable UK-wide studies
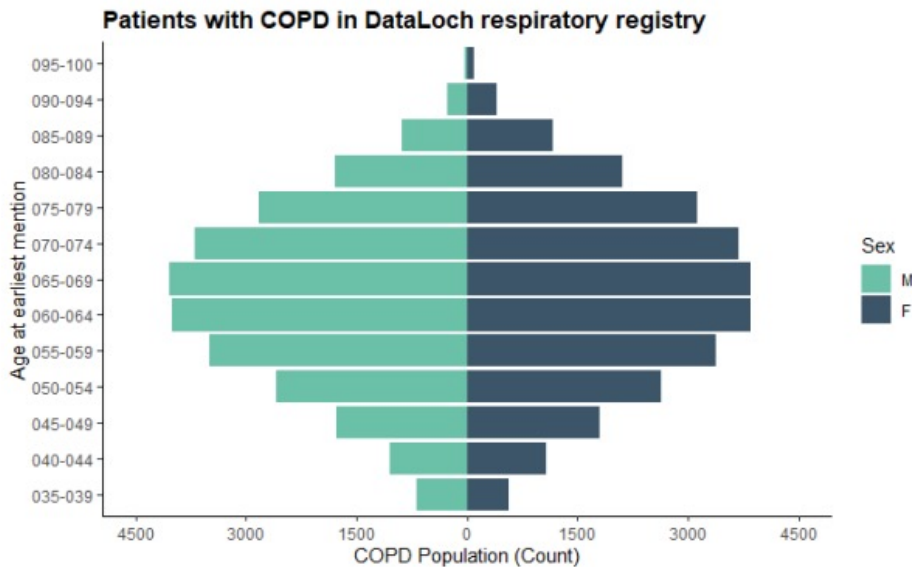

Patients with COPD in DataLoch respiratory registry

Fig 5. Population pyramid by age range and sex for patients with COPD in the DataLoch Respiratory Registry.

We aim to transform COPD service provision in the region from a reactive, high cost approach to one focused on prevention, anticipation and co-management with the objective of reducing COPD hospitalisations by 30%.

The project uses linked, routine health data and aims to use machine learning/AI approaches to:

Automate patient identification, describe incidence, characterise stage and severity, and report regional distribution and trends in COPD over time.

Understand healthcare utilisation by this population including Emergency Department (ED) attendances, hospitalisations and occupied bed days, readmissions and outpatient activity.

Develop risk models to automate identification of patients at risk of hospitalisation and/or high resource use utilising rich data including social determinants of health.

Automate patient flagging for evidence based interventions an pathways.

DataLoch

leap[w]

Clear problem to be solved? ☑
Scientific advances required? ☑

Objective: to reduce 30-day reattendance in patients presenting with suspected acute coronary syndrome by a fifth using artificial intelligence tools to augment clinical decisions.

Build a cardiology registry

Develop an adjudication console for clinical data validation

Create Safe Setting for AI development

Handover to NHS for live implementation

nature medicine

Article   https://doi.org/10.1038/s41591-023-02325-4

Machine learning for diagnosis of myocardial infarction using cardiac troponin concentrations

Dimitrios Doudesis [1,2,32], Kuan Ken Lee [1,32], Jasper Boeddinghaus [1,3,32], Anda Bularga[1], Amy V. Ferry [1], Chris Tuck [1], Matthew T. H. Lowry [1], Pedro Lopez-Ayala [3], Thomas Nestelberger[3], Luca Koechlin[3,4], Miguel O. Bernabeu [2,5], Lis Neubeck[6], Atul Anand [1], Karen Schulz [7], Fred S. Apple[8], William Parsonage[9], Jaimi H. Greenslade [10,11,12], Louise Cullen [10,11,12], John W. Pickering [13,14], Martin P. Than[13], Alasdair Gray[15], Christian Mueller[3], Nicholas L. Mills [1,2] & CoDE-ACS Investigators*

Informing the governance: views of the local population

Public consultation on"non-traditional" user access to health care data.

Survey – March 2022
o   595 respondents from City Region Deal area (Lothians, Fife, Borders)
o   Report published in June 2022

Followed by deliberative workshops with 40 participants

Detailed report available on the DataLoch website

When asked what health researchers should focus their efforts on in future, the most popular priorities were:

➢ Making health services more efficient (40%)

➢ Developing new medicines and treatments (39%)

➢ Improving patient care to bring about better health outcomes (36%)

➢ Preventing ill health (35%)

Thank you for your attention

DDI Data-Driven Innovation
Part of the Edinburgh & South East Scotland City Region Deal

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