Improving health through enhanced data linkage to UK SARS-CoV-2 genomes

Professor Sharon Peacock, 23 June 2021
Importance of sequencing during the pandemic

SARS-CoV-2 genome sequencing provides actionable information:

• Reveals patterns of SARS-CoV-2 introduction and transmission
• Detects emergence of Variants of Concern and Variants of Interest
• Maps the distribution of variants to inform policy and interventions
• Monitors effectiveness of vaccines/non-pharmaceutical interventions
• Enables variant-informed development of diagnostics, vaccines and therapeutics
COG-UK: who we are and how we work together

Belfast, Birmingham, Cardiff (PHW), Cambridge, Edinburgh, Exeter, Glasgow, Liverpool, Newcastle, Norwich, Nottingham, Oxford, Portsmouth, London (UCL), London (PHE), Sheffield

16 regional sequencing sites

Project administration

Funders providing £20M

Central sequencing hub and cloud infrastructure

Four public health agencies

Belfast, Birmingham, Cardiff (PHW), Cambridge, Edinburgh, Exeter, Glasgow, Liverpool, Newcastle, Norwich, Nottingham, Oxford, Portsmouth, London (UCL), London (PHE), Sheffield
COG-UK objectives, outputs & who we support

• >560,000 viral genomes sequenced
• ~10% of reported positive cases in the UK
• Data used by PHA’s in variant horizon scanning, surveillance and public health interventions

Sequence allocation

Random community and hospital genomic surveillance

National studies
• Surveillance (ONS & REACT)
• Vaccine trials
• Transmission (care homes, prisons, hospitals)
• GenOMICC (host genome)
• SIREN (reinfection, vaccines)

Public health
• Severe disease
• Vaccine failure
• Reinfection
• Importations
• Surge testing
COG-UK focus in 2021-2022

A refocusing of efforts around research and expertise

Data linkage across the UK science ecosystem

Internal funding release to capitalize on data linkage

COG International
Linking sequencing to other health record data

- COG-UK
  - SARS-CoV-2 genome data
- Sample Data
  - Genome data linked to COG-ID (anonymous sample ID)
- Public Health Agencies
  - COG-ID linkage to NHS numbers
- Sequencing data linked to TRE-ID
- UK Trusted Research Environments (TREs)
  - NHS numbers of individuals linked to TRE-ID

Analysis of variants
- Host genetics
- Demographic data
- Electronic Health Record data

Severity of Disease
Comorbidities

Electronic Health Record data
Genomics
SAIL DATABANK
Joining it all up

- SARS-CoV-2 mutations
- Physiological measurements
- Host genetics
- Treatment
- Immunological status
- Co-morbidities

UK Trusted Research Environments (TREs)

Determinants of COVID-19 susceptibility and outcomes
Thank you