Long COVID and the implications for the future of healthcare

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Long COVID

- Definitions
- Clinical picture
- Prevalence
- Predictors
- Impact

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Long COVID

Organ systems

Endocrine

- New or worsening control of diabetes
- Subacute thyroiditis
- Bone mineral thinning

Neuropsychiatric

- Fatigue
- Sleep disturbances
- Myalgia
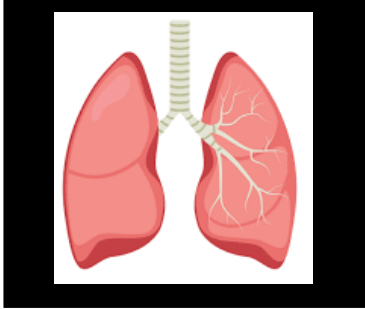- Headache
- Brain fog
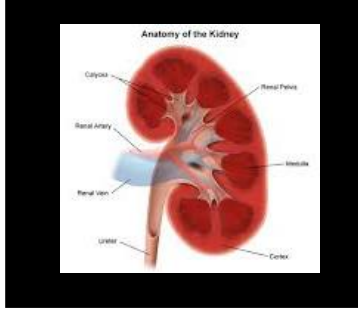- PTSD

Haematologic

Thromboembolic events

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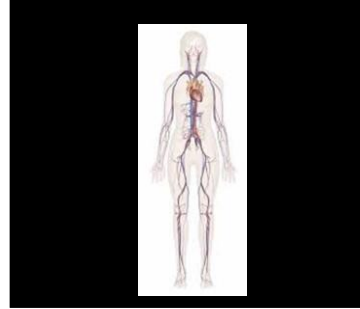of Actuaries

Organ systems

Respiratory

- Pulmonary fibrosis
- Reduced pulmonary function

Renal

- Acute kidney injury
- Chronic kidney disease

Cardiovascular

- Myocarditis
- Myocardial fibrosis

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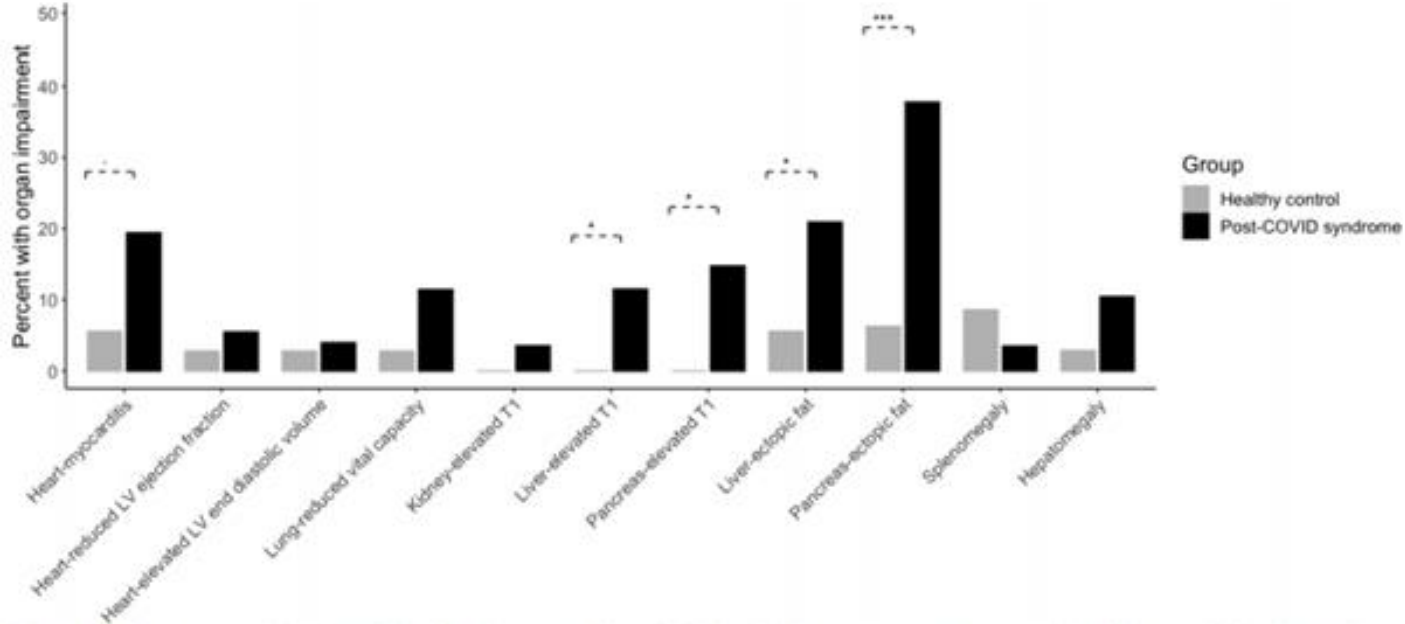
COVERSCAN Study

Figure 2 Percentage of patients (black) and controls (grey) with individual organ measures outside of the predefined normal range. Lines represent significant difference in the proportions between the two groups, with *p<0.05, **p<0.01, ***p<0.001. LV, left ventricular.

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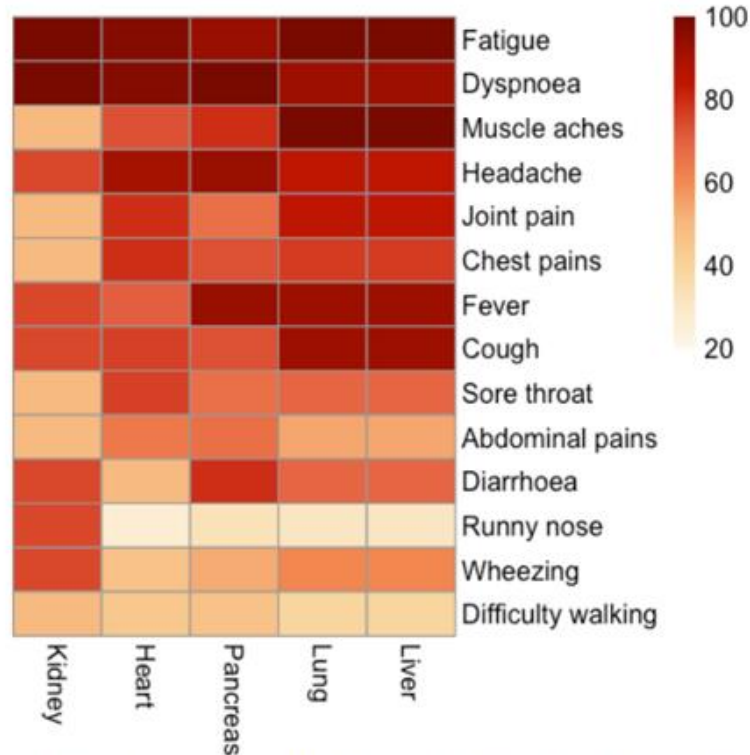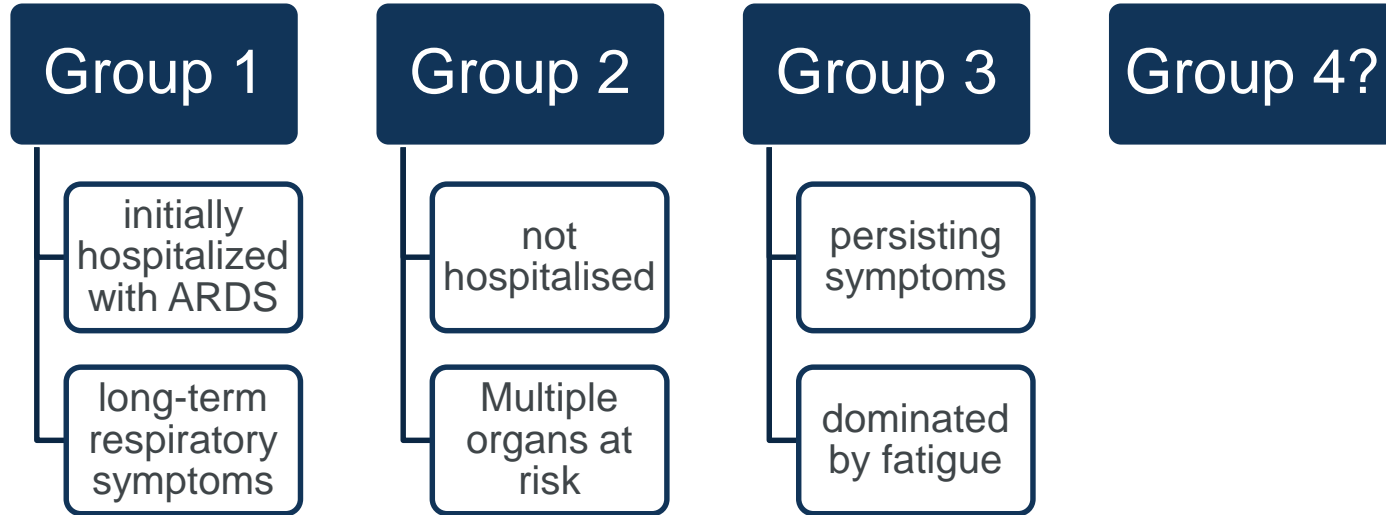
COVERSCAN Study

Figure 4 Percentage of reported symptoms during the acute phases of the illness within those with evidence of organ impairment for each organ separately. Darker red indicates higher percentage of reported symptoms per impaired organ. There are no distinct patterns of symptoms relating to each impaired organ, but a high burden of symptoms in individuals is highlighted.

Categories of long COVID

Group 1
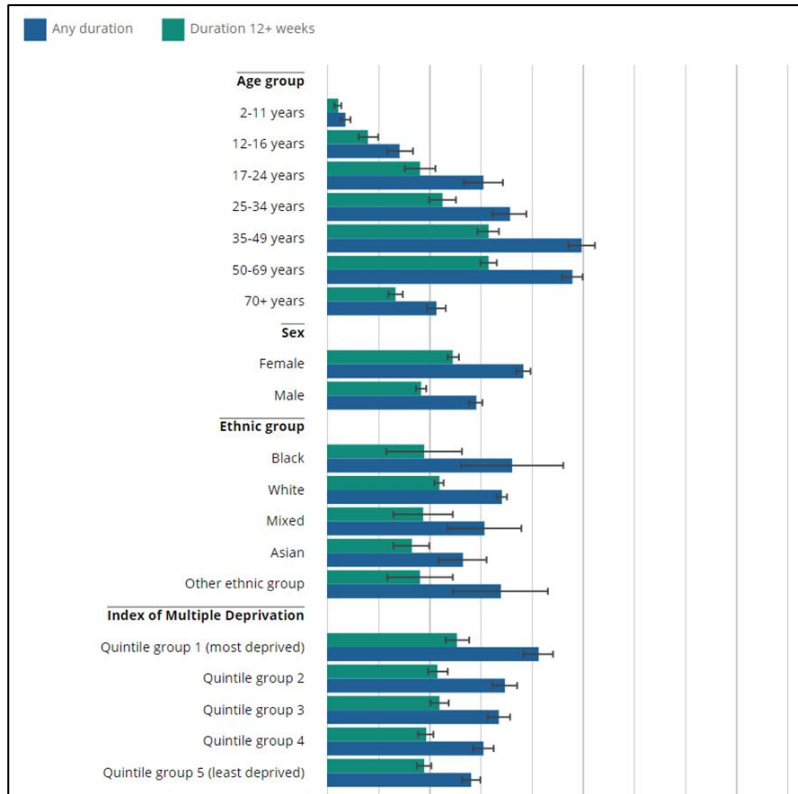- initially hospitalized with ARDS
- long-term respiratory symptoms

Group 2
- not hospitalised
- Multiple organs at risk

Group 3
- persisting symptoms
- dominated by fatigue

Group 4?

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Office for National Statistics - I (ONS)

Period post infection	Estimate	Lower 95% confidence interval limit	Upper 95% confidence interval limit
Any duration	1094	1060	1128
Duration at least 12 weeks	697	671	723

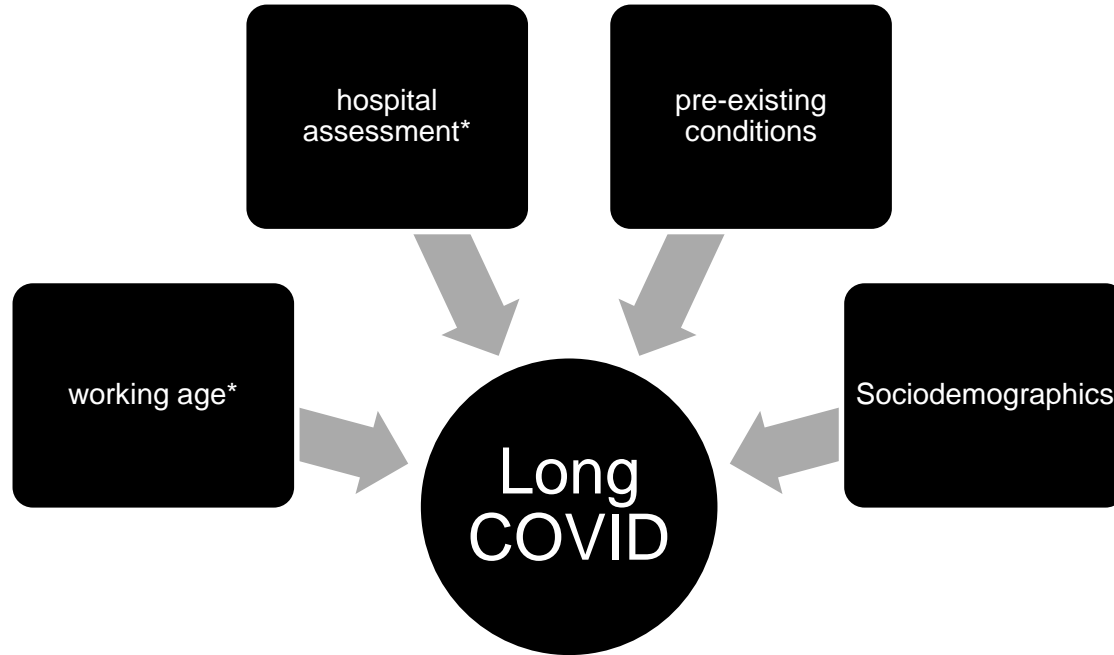Number of people (thousands), four-week period ending 6 March 2021, UK, reporting COVID symptoms

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ONS prevalence - II

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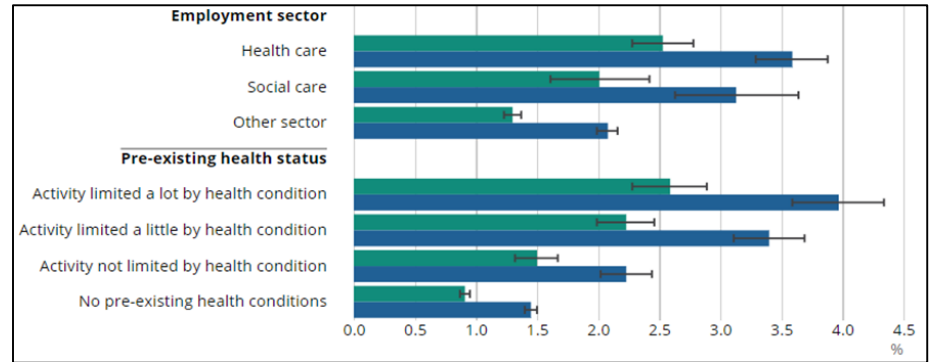
Predictors of risk

Predictors - I

hospital assessment*

pre-existing conditions

working age*

Sociodemographics

Long COVID

COVID Symptom Study I

DE = delirium

AP = Abdominal pain

HV = hoarse voice

DI = diarrhoea

CP = chest pain

SM = skipped meals

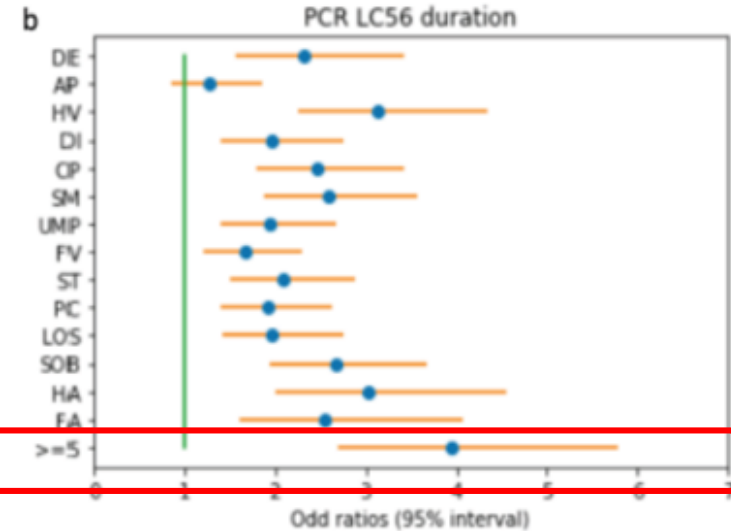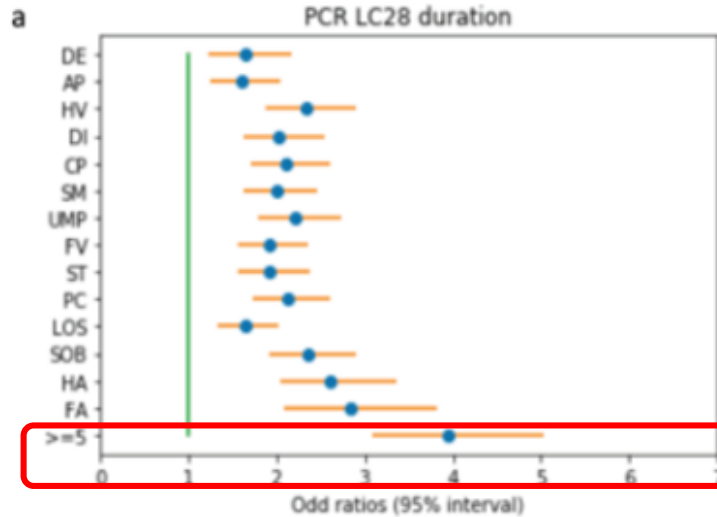UMP = unusual muscle pains

FV = fever

ST = sore throat
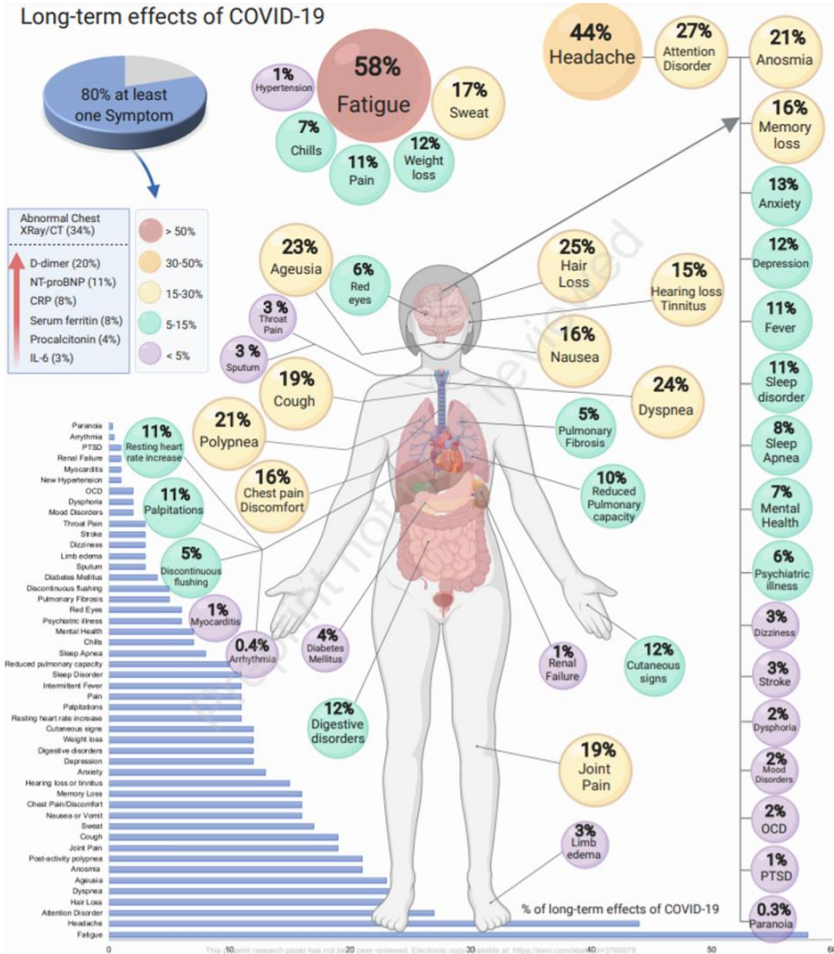
PC = persistent cough

LOS = loss of smell

SOB = shortness of breath

HA = headache

FA = fatigue

Long-term effects of COVID-19

Impact

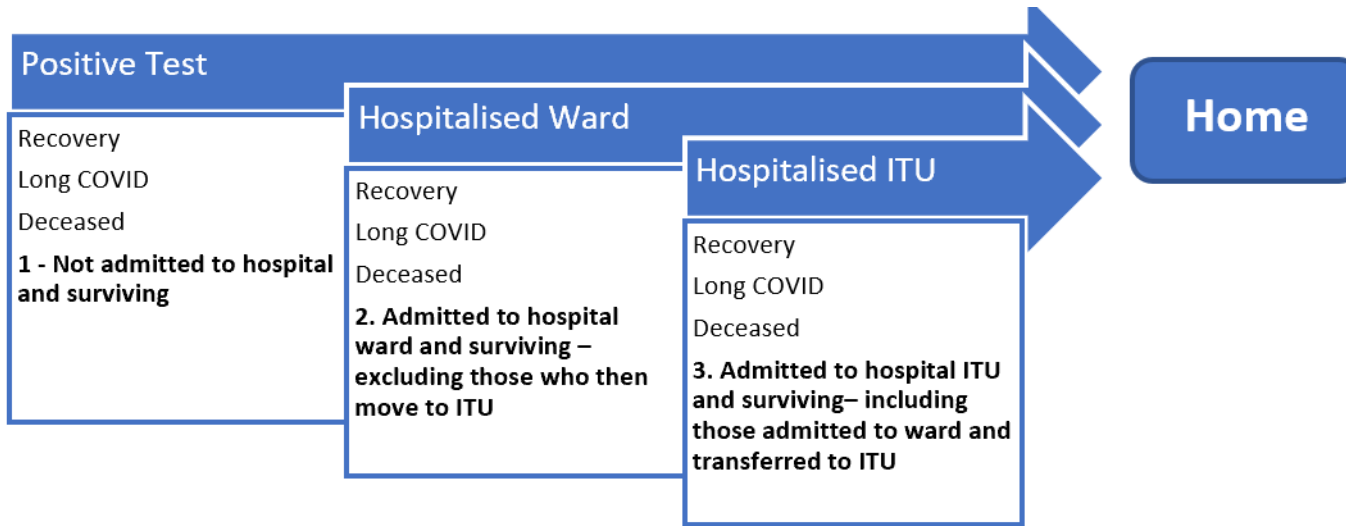# Josephine Robertson

Modelling long COVID

Modelling Long COVID

A model framework for projecting the prevalence and impact of Long-COVID in the UK

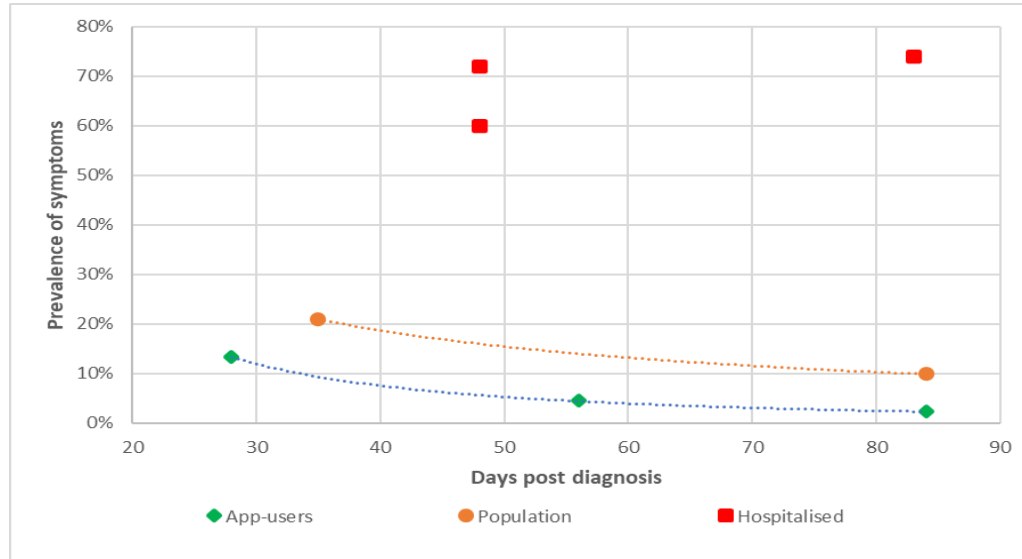*Possible pathways of care where long COVID can emerge*

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Modelling Long COVID

Estimating prevalence of symptoms

Symptomatic Long COVID

- Group 2 & 3
- Hospitalised and Non

COVID injured

- Group 1
- Long tail of permanent injury
- Hospitalised

Symptom prevalence across studies identified in the UK by duration and severity groups

Modelling Long COVID

Estimating the QALY impact

Equation 1

$$\Delta Q_{COVID} = \sum_{\substack{Cohort=(symptomatic\ COVID,\\ COVID\ injured)}} \left(\sum_{t=0}^{t=time\ horizon} \frac{T_I * P_{Cohort,t} * (1 - U_{Cohort})}{365.25 * (1+d)^{\frac{t}{365.25}}} \right)$$

Symptom prevalence across studies identified in the UK by duration and severity groups

Where:

- ΔQ_{COVID} is the number of lost QALYs across the population as a result of COVID infection;
- t is the day with respect to time zero;
- T_I is the total number of people infected;
- $P_{Cohort,t}$ is the proportion of all infections that are symptomatic on day t;
- U_{Cohort} is the change in utility based on the quality-of-life index for a person who is symptomatic in each cohort; and
- d is the annual discount rate.

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Modelling Long COVID

A model framework for projecting the prevalence and impact of Long-COVID in the UK
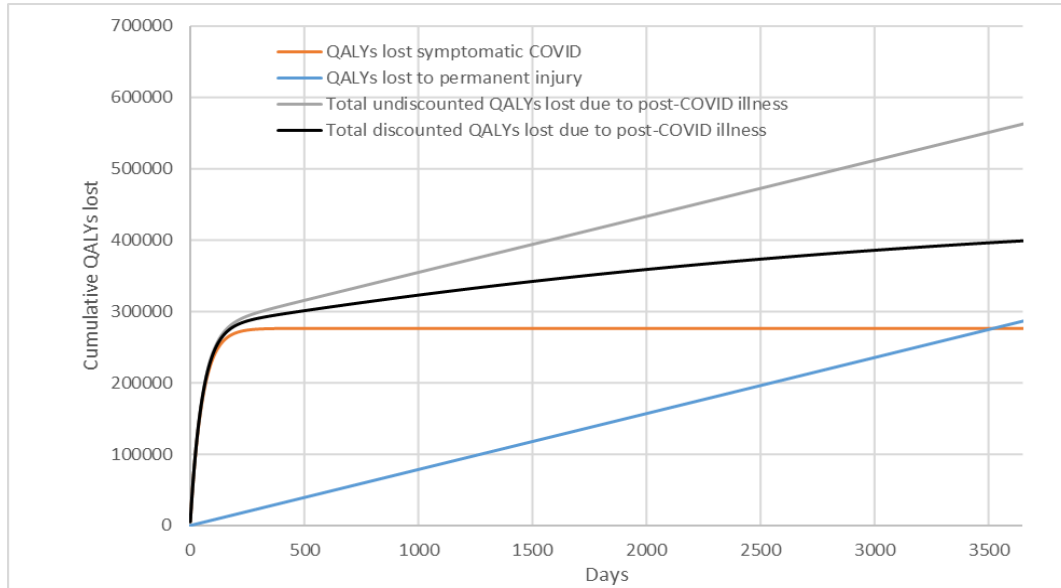
Cumulative lost QALYs for symptomatic COVID and permanent injury due to COVID

Long COVID Burden

- Rates of COVID and Long COVID
  - Disproportionately affected communities, occupations
  - Ability to accommodate lasting symptoms
- Cascade of poor outcomes
  - Employment
  - Income
- Direct and indirect affects
  - Health and Care Services
  - Societal and Economic

"to manage these symptoms appropriately and maximise the functional return of COVID-19 survivors" (Halpin et al.)

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Questions

Comments

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