ISRCTN53375662 https://doi.org/10.1186/ISRCTN53375662

# The health burden of COVID-19 and healthcare resource utilization in England

**Submission date**
05/10/2021

**Recruitment status**
No longer recruiting

**Registration date**
21/10/2021

**Overall study status**
Completed

**Last Edited**
03/02/2025

**Condition category**
Infections and Infestations

[_] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

**Plain English summary of protocol**
Background and study aims
This study aims to describe the incidence of COVID-19 infection and associated healthcare cost based on the age, severity of COVID infection, and selected comorbidities of patients. This study additionally will describe the populations in England who are potentially ineligible for COVID-19 vaccines or who are at risk of COVID-19 infection following vaccination.

Who can participate?
This study will use a series of de-identified patient datasets in England, accessible through National Health Services (NHS) Digital.

What does the study involve?
The data analyzed will start on 1 September 2015 and end on the time of data extraction (i.e., the latest day of data overlap across required datasets). The period that will be used to identify COVID-19 infections will start on 1 September 2020 and end 90 days prior to the end of the study period. Patient baseline characteristics will be assessed up to a 5-year period immediately before 1 September 2020 (i.e., 1 September 2015 – 31 August 2020). The prevaccination period will be defined as beginning on 1 September 2020 and ending on 7 December 2020. The vaccination period will be defined as beginning on 8 December 2020 and ending on the last day of the study period.

What are the possible benefits and risks of participating?
This study uses de-identified patient data so there is no in-person patient participation or risk for patients. The identity and privacy of the patients are protected since the data does not contain any personal identifiers such as a patient's name, date of birth, address, etc. Benefits from this study include increased knowledge of risk factors for COVID-19 infection, as well as associated costs in treating infection.

Where is the study run from?
This study will be performed electronically through Evidera.

When is the study starting and how long is it expected to run for?
This is a study using pre-collected administrative data (i.e. retrospective, non-interventional

study). All individuals who were alive and registered with a general practitioner in England as of 01 September 2020 will be eligible to be included in this study. This study will use data from 01 September 2015 until the end of the time of data extraction (i.e., the latest date of available data). Patients baseline characteristics will be assessed using data available between 01 September 2015 to 31 August 2020 and the outcomes will be assessed from 01 September 2020 to the end of the time of data extraction (i.e., the latest date of available data). The study is currently applying for data access and the data will be available to the study team for one year. The study is expected to end around November 2025.

Who is funding the study?
AstraZeneca Ltd (UK)

Who is the main contact?
Dr. Lu Yi, Yi.Lu@evidera.com

# Contact information

### Type(s)
Scientific

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Dr Yi Lu

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# Additional identifiers

### Protocol serial number
D8111R00015

# Study information

### Scientific Title
An observational retrospective cohort study describing clinical outcomes and utilization of healthcare resources among persons with COVID-19 in England, stratified by infection severity and selected comorbidities

### Study objectives
This is an observational study. It is anticipated that findings from this study will:
1. Enhance the understanding of the potential impact of COVID-19 vaccines amongst vulnerable populations
2. Help quantify the pre-vaccine health and economic burden of COVID-19 infection, thereby providing the necessary context for any assessment of potential reduction in healthcare burden following vaccination and other clinical interventions

3. Help increase epidemiologic knowledge of the disease in terms of disease severity and prognosis

## Ethics approval required
Old ethics approval format

## Ethics approval(s)
A Research Ethics Committee (REC) application has been submitted to the Health Research Authority (HRA). The HRA has granted us authorization to proceed and stated that no REC reviews are required.

## Primary study design
Observational

## Study design
Observational retrospective cohort study

## Study type(s)
Other

## Health condition(s) or problem(s) studied
COVID-19 (SARS-CoV-2 infection)

## Interventions
Current intervention as of 11/07/2022:
This study will use a series of de-identified patient datasets in England, accessible through National Health Services (NHS) Digital.
The study period will start on 1 September 2015 and end on the time of data extraction (i.e., the latest day of data overlap across required datasets). The period that will be used to identify COVID-19 infections will start on 1 September 2020 and end 90 days prior to the end of the study period. Patient baseline characteristics will be assessed up to a 5-year period immediately before 1 September 2020 (i.e., 1 September 2015 – 31 August 2020). A 5-year period is applied to allow sufficient time for identifying chronic conditions - including the ability to use that information to define risk profiles in otherwise healthy individuals. The pre-vaccination period will be defined as beginning on 1 September 2020 and ending on 07 December 2020. The vaccination period will be defined as beginning on 8 December 2020 and ending on the last day of the study period.

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Previous intervention:
This study will use a series of de-identified patient datasets in England, accessible through National Health Services (NHS) Digital.
The study period will start on 1 September 2017 and end on the time of data extraction (i.e., the latest day of data overlap across required datasets). The period that will be used to identify COVID-19 infections will start on 1 September 2020 and end 12 weeks prior to the end of the study period. Patient baseline characteristics will be assessed up to a 36-month period immediately before 1 September 2020 (i.e., 1 September 2017 – 31 August 2020). A 36-month period is applied to allow sufficient time for identifying chronic conditions - including the ability to use that information to define risk profiles in otherwise healthy individuals. The pre-vaccination period will be defined as beginning on 1 September 2020 and ending on 21

December 2020. The pre-vaccination period will end on 7 December 2020. The vaccination period will be defined as beginning on 8 December 2020 and ending on the last day of the study period.

## Intervention Type
Other

## Primary outcome(s)
Current primary outcome measures as of 11/07/2022:
1. Size of populations (pre-defined) in England who potentially are ineligible for vaccine or are at risk of COVID-19 infection following vaccination. This will be measure using count (N) of those at risk and the proportion (%) at risk over the baseline period.
2. Incidence of COVID-19, by age group, disease severity, and selected comorbidities during the pre-vaccination and vaccination periods of the study. Incidence will be measured in infections per 100 person-months with 95% confidence intervals.
3. Incidence of long COVID-19 syndrome, by age, disease severity, and selected comorbidities. Incidence will be measured in infections per 100 person-months with 95% confidence intervals.
4. Patterns of HCRU and cost associated with an episode of COVID-19, stratified by age, selected comorbidities, disease severity and the occurrence (vs absence) of long COVID-19 syndrome will be calculated per person per COVID-19 episode. HCRU will be measured by total cost incurred during health care visits.

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Previous primary outcome measures:
1. Size of populations (pre-defined) in England who potentially are ineligible for vaccine or are at risk of COVID-19 infection following vaccination. This will be measure using count (N) of those at risk and the proportion (%) at risk over the baseline period.
2. Incidence of COVID-19, by age group, disease severity, and selected comorbidities during the pre-vaccination and vaccination periods of the study (1 September 2020-end of study period). Incidence will be measured in infections per 100 person months with 95% confidence intervals.
3. Incidence of long COVID-19 syndrome, by age, disease severity, and selected comorbidities during the pre-vaccination and vaccination periods of the study (1 September 2020-end of study period). Incidence will be measured in infections per 100 person months with 95% confidence intervals.
4. Patterns of HCRU and cost associated with an episode of COVID-19, stratified by age, selected comorbidities, disease severity and the occurrence (vs absence) of long COVID-19 syndrome will be calculated per person per covid episode. HCRU will be measured by total cost incurred during health care visits.

## Key secondary outcome(s)
Current secondary outcome measures as of 16/12/2022:
Exploratory Outcome Measures
1. Patients who developed a composite outcome of COVID-19 hospitalisation or COVID-19-related death after vaccination stratified by the number of doses received and explore potential risk factors. This will be measured through estimated relative risks and corresponding 95% confidence intervals.
2. Prediction model, using a clustering algorithm, to identify risk profiles associated with a composite outcome of COVID-19 hospitalisation or COVID-19-related death after the deployment of the vaccination campaign in England and the prevalence of subgroups consistent with each identified risk profile.

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Previous secondary outcome measures as of 11/07/2022 to 16/12/2022:
Exploratory Outcome Measures
1. Patients who developed a composite outcome of COVID-19 hospitalisation or COVID-19-related death after vaccination stratified by the number of doses received and explore potential risk factors. This will be measured through estimated relative risks and corresponding 95% confidence intervals.
2. Prediction model, using cox proportional hazards regression, to identify risk profiles associated with a composite outcome of COVID-19 hospitalisation or COVID-19-related death after the deployment of the vaccination campaign in England and the prevalence of subgroups consistent with each identified risk profile.

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Previous secondary outcome measures:
Exploratory Outcome Measures
1. Patients who developed COVID-19 infection after vaccination are stratified by the number of doses received and explore potential risk factors. This will be measured through estimated relative risks and corresponding 95% confidence intervals.
2. Prediction model, using cox proportional hazards regression, to identify risk profiles associated with COVID-19 infection after the deployment of the vaccination campaign in England and the prevalence of subgroups consistent with each identified risk profile.

### Completion date
23/11/2025

# Eligibility

### Key inclusion criteria
This study will include all subjects in England who were active in all datasets described above for at least 1 day during the COVID-19 infection identification period

### Participant type(s)
All

### Healthy volunteers allowed
No

### Age group
All

### Sex
All

### Total final enrolment
11990730

### Key exclusion criteria
Current participant exclusion criteria as of 16/12/2022:
No general exclusion criteria will be applied for defining the overall study population.

Previous participant exclusion criteria:
Subjects will be excluded from this study if they have less than 12 months of baseline data prior to 1 September 2020

### Date of first enrolment
01/09/2020

### Date of final enrolment
01/09/2020

## Locations

### Countries of recruitment
United Kingdom

England

### Study participating centre
**Not applicable**
-
-
United Kingdom
-

## Sponsor information

### Organisation
AstraZeneca (United Kingdom)

### ROR
https://ror.org/04r9x1a08

## Funder(s)

### Funder type
Industry

### Funder Name
AstraZeneca

### Alternative Name(s)

AstraZeneca PLC, Pearl Therapeutics, AZ

### Funding Body Type
Government organisation

### Funding Body Subtype
For-profit companies (industry)

### Location
United Kingdom

## Results and Publications

### Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study are not expected to be made available due to the data sharing agreement with NHS digital. Researchers can apply to data set access through NHS digital directly.

### IPD sharing plan summary
Not expected to be made available

### Study outputs

| Output type | Details | Date created | Date added | Peer reviewed? | Patient-facing? |
|---|---|---|---|---|---|
| Results article | 2023 results | 13/10/2023 | 08/01/2024 | Yes | No |
| Results article | | 29/01/2025 | 03/02/2025 | Yes | No |
| Protocol file | | 19/10/2021 | 21/10/2021 | No | No |