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# COVID-19 in care homes (VIVALDI)

**Submission date**
04/06/2020

**Recruitment status**
No longer recruiting

**Registration date**
05/06/2020

**Overall study status**
Completed

**Last Edited**
04/10/2024

**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
COVID-19 is a condition caused by the coronavirus (called SARS-CoV-2) that was first identified in late 2019. This virus can infect the respiratory (breathing) system. Some people do not have symptoms but can carry the virus and pass it on to others. People who have developed the condition may develop a fever and/or a continuous cough among other symptoms. This can develop into pneumonia. Pneumonia is a chest infection where the small air pockets of the lungs, called alveoli, fill with liquid and make it more difficult to breathe.
In 2020, the virus has spread to many countries around the world and the effectiveness of newly developed vaccines and specific treatments is unknown. As of March 2020, it is advised that people minimize travel and social contact, and regularly wash their hands to reduce the spread of the virus.
COVID-19 has caused many deaths worldwide, as a result of which 'lockdown' measures have been brought in to prevent infection. The virus spreads by breathing in virus in droplets from coughing, sneezing or from infected surfaces. There are also a significant number of people who do not show any symptoms but may spread the infection. Elderly people, and those in care homes in particular are at significant risk of catching COVID-19, and being admitted to hospital or dying from infection. This is likely to be driven by frequent close contact between residents and staff, and other factors related to the care home setting that are not well understood. In England, we do not know how many care staff and residents are infected with COVID-19 now, or have been infected in the past. Are people who have been infected once protected from future infections? We also do not know the most effective way to prevent infection from spreading in care homes and how effective the different vaccines against COVID-19 are. This study will address these questions in all staff and residents of approximately 350 care homes in England.

Who can participate?
All staff and residents of participating care homes in England

What does the study involve?
The researchers will collect nose/throat swabs to test who is infected right now, and blood samples to find out who has been infected in the past. They will also collect saliva samples from some participants to test whether saliva testing is as good as throat swab testing for detecting infection. These tests will be repeated in some participants over the next 6-12 months to understand how these results change over time. The researchers will also find out what measures care homes are taking to prevent infection spreading, and what works. Using national

databases on hospital admissions, vaccinations and deaths, they will find out what happens to study participants over the subsequent 2 years after the study has ended.

What are the possible benefits and risks of participating?
The benefits of study participation are that participants are regularly tested for coronavirus infection and will receive results of their antibody testing, which will tell them if they have previously had the infection although this cannot inform them on whether they are immune to it. In addition, each additional care home will receive feedback on their own infection rates and effectiveness of control measures enabling them to optimise them and improve quality of care and safety for residents and staff.
The risks relate to blood samples and throat swabs. Taking blood samples can cause discomfort and distress, however this will be managed by skilled healthcare professionals with experience in taking blood. Throat swabs can cause discomfort and sometimes make the person gag, but the healthcare professionals performing these tests will be trained in managing these events.

Where is the study run from?
University College London (UK)

When is the study starting and how long is it expected to run for?
May 2020 to March 2023

Who is funding the study?
The Department of Health and Social Care (UK)

Who is the main contact?
1. Dr Laura Shallcross (scientific contact)
2. Dr Maria Krutikov (public contact)
Unfortunately, this study is not recruiting public volunteers at this time. This is because the research isn't ready for volunteers yet or the researchers are directly identifying volunteers in certain areas or sites. Please do not contact the research team as they will not be able to respond. For more information about COVID-19 research, visit the Be Part of Research homepage.

### Study website
https://www.ucl.ac.uk/health-informatics/research/vivaldi-study

# Contact information

### Type(s)
Scientific

### Contact name
Dr Laura Shallcross

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### Type(s)
Public

### Contact name
Dr Maria Krutikov

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## Additional identifiers

### EudraCT/CTIS number
Nil known

### IRAS number
284545

### ClinicalTrials.gov number
Nil known

### Secondary identifying numbers
CPMS 45953, IRAS 284545

## Study information

### Scientific Title
Understanding SARS-CoV-2 infection, immunity and its duration in care home staff and residents in the UK (VIVALDI)

### Acronym
VIVALDI

### Study objectives

In England an estimated 45,000 care home residents live in approximately 9,000 care homes. Mortality data from ONS suggests that >45,000 care home residents have died from COVID-19 during the pandemic, although only 12,500 of these deaths were explicitly linked to COVID-19. Accurate estimates of the burden of SARS-CoV infection in care home residents and staff and the proportion of cases without symptoms are lacking because there has to date been limited testing for infection (antibody and antigen tests), and there is no comprehensive surveillance system for infection in care homes. We also have little insight into how infection transmits in the care home, both between staff and residents, and between care homes and other settings (community, hospitals). The prevalence and duration of immunity to SARS-CoV-2 among staff and residents is also unknown.

The Department of Health & Social Care is currently rolling out infection (PCR) testing to all care home staff and residents. This will provide accurate data on the prevalence of infection across all care homes and insights into the types of care homes that are most likely to develop outbreaks. But this large-scale approach is not well-suited to assessing how outbreaks progress over time, or duration of immunity – information that is essential to inform the approach to testing in care homes for current and future pandemic waves.

The prevalence and incidence of COVID-19 in care home staff and residents is substantially higher than the general population, driven by close contact in a semi-closed environment, and characteristics of the setting and residents that are not well understood.

These questions can be answered most efficiently through a large prospective cohort study of care home staff and residents with repeat testing for infection (antigen and antibody) and detailed follow-up. This study is one of the largest undertaken in care homes, and will inform planning and the national public health response to COVID-19.

## Ethics approval required
Old ethics approval format

## Ethics approval(s)
Approved 29/05/2020, South Central - Hampshire B Research Ethics Committee (Level 3 Block B, Whitefriars, Lewins Mead,
Bristol BS1 2NT; +44 (0)20 7104 8057; hampshireb.rec@hra.nhs.uk), ref: 20/SC/0238

## Study design
Non-randomized observational cohort study

## Primary study design
Observational

## Secondary study design
Cohort study

## Study setting(s)
Other

## Study type(s)
Screening

## Participant information sheet

Not available in web format, please use the contact details below to request a patient information sheet

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

## Interventions
Current interventions as of 10/02/2021:
This study will enrol >5000 care home residents and >6500 care home staff from approximately 350 care homes in England between June 2020 and April 2022. Eligible care homes will be identified using registers held by care home providers and through the clinical research network (CRN) and their ENRICH network and will be contacted by study investigators to confirm willingness to participate. Information sheets and consent forms will be distributed by care home managers amongst all staff and residents and will be sent to all documented next of kin of residents. Senior care home members or CRN nurses will be responsible for obtaining informed consent using capacity assessment procedures already in place in the care homes. In cases where participants are unable to provide informed consent, the next of kin will be asked to be a personal consultee and provide written consent on their behalf. If a personal consultee is not available then a member of care home staff will be able to act as a nominated consultee and provide written consent on behalf of the resident as outlined in the consent section of this document.

1. Baseline assessment and antibody testing
Baseline nasal/throat swabs (Swab 1) will be taken for PCR testing to test for current infection as part of the national roll-out of testing. This will be accompanied by a symptom questionnaire for those sampled. A baseline blood sample (Blood 1) will be taken from all study participants that will be sent for serology testing to look for evidence of past infection. Data will be extracted from the care home electronic systems to capture demographic data on staff and residents including date of entry and exit to the care home, information on infection incidents and characteristics of the care home (care home size, residential/nursing care, geographical location).

2. Intensive testing for infection (PCR and antibody)
Swab test results will be integrated with the care home's existing system to monitor the number of confirmed and suspected cases across all care homes. This information will be used to identify care homes with active outbreaks (two or more suspected or confirmed cases) and homes with no reported cases of infection. Depending on testing capacity and the number of care homes with outbreaks, selected care homes from each of these groups will be identified for intensive testing (as outlined below). This is to inform our understanding of a) the proportion of residents and staff who become infected during a known care home outbreak, and b) how many cases of infection are undetected in care homes that are not reporting cases.

A brief symptom questionnaire will be completed by the care home manager for each participant at each round of swab testing.

Care homes with suspected outbreaks based on national testing:
Study participants will have a repeat nose/throat swab (Swab 2) taken 7-14 days after Swab 1 to estimate of the proportion of residents and staff who have become infected over this period. In a subset of 4-8 care homes, staff and residents who have capacity will be asked to provide a

saliva sample at the time of nasopharyngeal swabbing. This will be used to investigate whether salivary testing (which is more acceptable to the patient) is a reliable alternative to nasopharyngeal swabbing for detecting SARS-CoV-2.

Care homes that have not reported any confirmed or suspected COVID-19 cases in the preceding 28 days:
All study participants will have a swab (Swab 2) taken from their nose/throat to identify those with asymptomatic infections. In homes where at least one case of infection is identified, a third swab (Swab 3) will be repeated after 7-14 days to estimate the proportion of participants who become infected subsequently.

All swab tests will be followed up by repeat blood (antibody) tests 4-6 weeks and 3 months after the latest swab test (Swab 2 in outbreak homes; Swab 3 in non-outbreak homes). This will assess the proportion of staff and residents who have evidence of prior infection, and may be immune. In a sample of residents with evidence of immunity at 3 months, blood tests will be repeated at 6 and 12 months follow-up to assess the duration of the immune response.

In order to evaluate vaccine efficacy, participants recruited to the study after January 2021 will undergo up to 5 rounds of blood testing.

3. Data linkage:
Care home residents will be asked to consent to data linkage following study completion, with NHS held databases on hospital admissions, staff test results, vaccination and mortality. This will allow us to estimate the rate of hospital admissions and deaths in care home residents in relation to COVID-19, and to explore the frequency with which COVID-19 is imported into the care home setting when residents are discharged back to the care home from hospital. It will also allow us to evaluate vaccine effectiveness within care homes.

At the end of the study, care home staff will be invited to participate in an established community survey called 'VirusWatch' that includes prospective follow-up with testing for infection (sponsor reference number 132665, IRAS number 281933). Participation is entirely voluntary.

End of study:
Participant follow-up will end in April 2022 and the study end will be November 2022. Follow-up through data linkage will continue for 2 years. As part of the national pandemic response, viral samples will be sent from the national testing (Lighthouse Laboratory) to the Sanger Institute for whole genome sequencing.

Previous interventions:
This study will enrol >5000 care home residents and >6500 care home staff from all FSHC care homes in England between May 2020 and April 2021. Eligible care homes will be identified using registers held by FSHC and will be contacted by study investigators to confirm willingness to participate. Information sheets and consent forms will be distributed by care home managers amongst all staff and residents and will be sent to all documented next of kin of residents. Senior care home members will be responsible for obtaining informed consent using capacity assessment procedures already in place at FSHC. In cases where participants are unable to provide informed consent, the next of kin will be asked to be a personal consultee and provide written consent on their behalf. If a personal consultee is not available then a member of care home staff will be able to act as a nominated consultee and provide written consenton behalf of the resident as outlined in the consent section of this document.

1. Baseline assessment and antibody testing
Baseline nasal/throat swabs (Swab 1) will be taken for PCR testing to test for current infection as part of the national roll-out of testing. This will be accompanied by a symptom questionnaire for those sampled. A baseline blood sample (Blood 1) will be taken from all study participants that will be sent for serology testing to look for evidence of past infection. Data will be extracted from FSHC's electronic systems to capture demographic data on staff and residents including date of entry and exit to the care home, information on infection incidents and characteristics of the care home (care home size, residential/nursing care, geographical location).

2. Intensive testing for infection (PCR and antibody)
Swab test results will be integrated with FSHC's existing system to monitor the number of confirmed and suspected cases across all care homes. This information will be used to identify care homes with active outbreaks (two or more suspected or confirmed cases) and homes with no reported cases of infection. Depending on testing capacity and the number of care homes with outbreaks, selected care homes from each of these groups will be identified for intensive testing (as outlined below). This is to inform our understanding of a) the proportion of residents and staff who become infected during a known care home outbreak, and b) how many cases of infection are undetected in care homes that are not reporting cases.

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Study participants will have a repeat nose/throat swab (Swab 2) taken 7-14 days after Swab 1 to estimate of the proportion of residents and staff who have become infected over this period. In a subset of 4-8 care homes, staff and residents who have capacity will be asked to provide a saliva sample at the time of nasopharyngeal swabbing. This will be used to investigate whether salivary testing (which is more acceptable to the patient) is a reliable alternative to nasopharyngeal swabbing for detecting SARS-CoV-2.

Care homes that have not reported any confirmed or suspected COVID-19 cases in the preceding 28 days:
All study participants will have a swab (Swab 2) taken from their nose/throat to identify those with asymptomatic infections. In homes where at least one case of infection is identified, a third swab (Swab 3) will be repeated after 7-14 days to estimate the proportion of participants who become infected subsequently.

All swab tests will be followed up by repeat blood (antibody) tests 4-6 weeks and 3 months after the latest swab test (Swab 2 in outbreak homes; Swab 3 in non-outbreak homes). This will assess the proportion of staff and residents who have evidence of prior infection, and may be immune.

In a sample of residents with evidence of immunity at 3 months, blood tests will be repeated at 6 and 12 months follow-up to assess duration of the immune response.

3. Data linkage:
Care home residents will be asked to consent to data linkage following study completion, with NHS held databases on hospital admissions, staff test results and mortality. This will allow us to estimate the rate of hospital admissions and deaths in care home residents in relation to COVID-19, and to explore the frequency with which COVID-19 is imported into the care home setting when residents are discharged back to the care home from hospital.

At the end of the study, care home staff will be invited to participate in an established community survey called 'VirusWatch' that includes prospective follow-up with testing for infection (sponsor reference number 132665, IRAS number 281933). Participation is entirely voluntary.

End of study:
Participant follow-up will end in April 2021 and the study end will be November 2021. Follow-up through data linkage will continue for 2 years. As part of the national pandemic response, viral samples will be sent from the national testing (Lighthouse Laboratory) to the Sanger Institute for whole genome sequencing.

## Intervention Type
Other

## Primary outcome measure
1. Proportion of care home staff and residents who have been infected with SARS-CoV-2 measured using antibody testing at baseline

## Secondary outcome measures
1. Proportion of staff and residents who become infected during an outbreak measured using PCR and antibody testing of samples taken at baseline and 7-14 days after baseline
2. Proportion of staff and residents in a care home with asymptomatic infection measured using PCR testing of swab samples taken at baseline, 7-14 days after baseline and 7-14 days after the second swab
3. Duration of antibody response in residents measured using antibody testing 4-6 weeks and 3 months after the last swab test in those who tested positive for virus infection and at 6 and 12 months follow-up in those who tested positive for antibodies at 3 months
4. Proportion of care home staff and residents who have been infected with SARS-CoV-2 measured using PCR of swab tests taken at baseline and 7-14 days later in all participants, and 7-14 days after the second swab in homes where there has been infection
5. Number of residents discharged from hospital to the home assessed using linkage to hospital episode statistics at regular intervals throughout the study
6. Sensitivity and specificity of the Roche/Abbott antibody testing platform assessed using serum samples from all study participants at baseline, 4-6 weeks and 3 months
7. Sensitivity and specificity of the novel ELISA test for immunoglobulins IgG and IgM that has been developed by the University of Oxford assessed using a subset of 20% of all serum samples taken over the study period that will be tested retrospectively after they have had standard testing on the Abbott/Roche platforms
8. Sensitivity and specificity of RT-PCR based detection of SARS-CoV-2 using saliva samples versus nasopharyngeal swabs assessed using a subset of samples from 4-8 care homes from consenting participants at the second or third round of swabbing

Added 10/02/2021:
9. Incidence of infection in vaccinated and unvaccinated participants (based on serology and PCR testing) in the 12 months following vaccination

## Overall study start date
28/05/2020

## Completion date
31/03/2023

# Eligibility

### Key inclusion criteria
Current participant inclusion criteria as of 01/04/2022:
Staff and residents aged >65 years from participating care homes in England

Previous participant inclusion criteria:
1. Staff and residents aged >65 years from participating Four Seasons Health Care (FSHC) Homes in England
2. Can speak and understand English

### Participant type(s)
Mixed

### Age group
Adult

### Sex
Both

### Target number of participants
Planned Sample Size: 11,000; UK Sample Size: 11,000

### Total final enrolment
10412

### Key exclusion criteria
None

### Date of first enrolment
03/06/2020

### Date of final enrolment
31/03/2023

# Locations

### Countries of recruitment
England

United Kingdom

### Study participating centre
**University College London**
Institute for Health Informatics
London
United Kingdom
NW1 2DA

**Study participating centre**
**Four Seasons Health Care**
Head Office
Norcliffe House
Station Road
Wilmslow
United Kingdom
SK9 1BU

# Sponsor information

**Organisation**
University College London

**Sponsor details**
Joint Research Office
1st Floor Maple House (Suite B)
149 Tottenham Court Rd
London
England
United Kingdom
W1T 7DN
+44 (0)203 447 5696
pushpen.joshi1@nhs.net

**Sponsor type**
University/education

**Website**
http://www.ucl.ac.uk/

**ROR**
https://ror.org/02jx3x895

# Funder(s)

**Funder type**
Government

**Funder Name**
Department of Health and Social Care

### Funder Name
National Institute for Health Research (NIHR) (UK)

### Alternative Name(s)
National Institute for Health Research, NIHR Research, NIHRresearch, NIHR - National Institute for Health Research, NIHR (The National Institute for Health and Care Research), NIHR

### Funding Body Type
Government organisation

### Funding Body Subtype
National government

### Location
United Kingdom

## Results and Publications

### Publication and dissemination plan
Rapid results from this study will be shared with national advisory committees and organisations who are leading the pandemic response. Results will also be shared with Four Seasons Health Care and participants. Publication in a high impact peer-reviewed journal is planned within 1 year of study completion.

### Intention to publish date
30/11/2022

### Individual participant data (IPD) sharing plan
A subset of anonymised data generated through the study will be available on request from Dr Laura Shallcross for use in future research. In sharing the data we will work within the principles set out in the UKRI Guidance on best practice in the management of research data https://www.ukri.org/files/legacy/documents/rcukcommonprinciplesondatapolicy-pdf/. Consent has been obtained from participants for use of their data in future research studies, and for data to be shared anonymously with other researchers.

### IPD sharing plan summary
Available on request

### Study outputs

| Output type | Details | Date created | Date added | Peer reviewed? | Patient-facing? |
|---|---|---|---|---|---|
| Protocol (preprint) | | 07/10/2020 | 05/02/2021 | No | No |
| Protocol article | protocol | 29/01/2021 | 05/02/2021 | Yes | No |
| Results article | first dose results | 23/06/2021 | 28/06/2021 | Yes | No |

| | | | | | |
|---|---|---|---|---|---|
| Results article | observational cohort sub-study | 19/08/2021 | 26/08/2021 | Yes | No |
| Results article | duration of vaccine effectiveness results | 04/07/2022 | 13/07/2022 | Yes | No |
| Results article | effectiveness of booster vaccine against omicron infection | 29/12/2022 | 31/01/2023 | Yes | No |
| HRA research summary | | | 26/07/2023 | No | No |
| Results article | Association between built environment and SARS-CoV-2 transmission in care homes | 05/12/2023 | 11/12/2023 | Yes | No |
| Plain English results | | 12/07/2021 | 08/03/2024 | No | Yes |
| Plain English results | | 19/02/2024 | 08/03/2024 | No | Yes |
| Plain English results | | 19/02/2024 | 08/03/2024 | No | Yes |
| Plain English results | | 12/07/2021 | 08/03/2024 | No | Yes |
| Plain English results | | 19/02/2024 | 08/03/2024 | No | Yes |
| Preprint results | description of samples in the study biobank available to researchers | 04/12/2023 | 08/03/2024 | No | No |
| Preprint results | humoral response to anti-nucleocapsid antibody associated with natural infection | 19/02/2024 | 08/03/2024 | No | No |
| Results article | Changes in COVID-19 outbreak severity and duration | 18/11/2021 | 08/03/2024 | Yes | No |
| Results article | anti-spike antibody levels following second dose of ChAdOx1 nCov-19 or BNT162b2 vaccine | 28/11/2022 | 08/03/2024 | Yes | No |
| Results article | association between the SARS-CoV-2 antibody status at baseline and subsequent infection | 03/06/2022 | 08/03/2024 | Yes | No |
| Results article | effectiveness of third, fourth and fifth dose booster vaccination | 01/08/2023 | 08/03/2024 | Yes | No |
| Results article | infection-naive residents | 04/07/2022 | 08/03/2024 | Yes | No |
| Results article | mortality and hospital admissions | 08/11/2023 | 08/03/2024 | Yes | No |
| Results article | prevalence and duration of antibodies from the first year of the pandemic | 16/12/2021 | 08/03/2024 | Yes | No |
| Results article | risk of severe outcomes following infection | 04/05/2022 | 08/03/2024 | Yes | No |
| Results article | spike-specific immune responses in staff and residents in LTCF receiving an mRNA vaccine following dual primary series vaccination with BNT162b2 or ChAdOx1 | 20/01/2023 | 08/03/2024 | Yes | No |
| Results article | vaccine-naïve residents | 30/05/2024 | 08/03/2024 | Yes | No |

| | | | | | |
|---|---|---|---|---|---|
| Results article | VIVALDI Cohort Profile: Using linked, routinely collected data and longitudinal blood sampling to characterise COVID-19 infections, vaccinations, and related outcomes in care home staff and residents in England | 19/08/2024 | 04/10/2024 | Yes | No |