

## RAPID RESEARCH IN COVID-19 PROGRAMME

### COVID-19 Blood Pressure Endothelium Interaction Study (OBELIX) [previously Hypertension, inhibitors of the renin angiotensin system and COVID-19]

#### AIMS

- To assess relationships between high blood pressure and COVID-19 in the West of Scotland
- To determine if the use of blood pressure lowering medications are associated with beneficial or adverse outcomes in COVID-19
- To determine if people who have recovered from COVID-19 are at greater risk of developing high blood pressure and/or cardiovascular disease
- To inform treatment strategies in COVID-19 with cardiovascular disease

#### KEY FINDINGS

This study called OBELIX, short for COVID-19 Blood Pressure Endothelium Interaction Study, comprised 3 parts:

##### OBELIX Safe Haven data study

- Those with cancer, kidney and lung disease were at greater risk of COVID-19 requiring hospital admission.
- Those on a combination of blood pressure lowering medication and cholesterol lowering medication had a lower risk of COVID-19 requiring hospital admission
- Those on blood pressure lowering medication alone had a similar risk to those not on blood pressure lowering medication.

##### OBELIX case note review

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- Those on blood pressure lowering medication had no greater risk of critical care admission (high dependency or intensive care) compared to those not on medication
- The use of blood pressure lowering medication was not associated with time to critical care admission or death

### OBELIX clinical study

- At 12-weeks post hospital discharge, those who had recovered from COVID-19, with no prior history of high blood pressure, had 8.6 mmHg higher 24hr average systolic blood pressure than those who did not have infection. The systolic blood pressure is the force at which the heart pumps blood around the body. Higher systolic blood pressure can put extra strain on the heart and blood vessels potentially leading to heart disease and strokes.
- Those who had recovered from COVID-19 had reduced renin and Angiotensin-1-10 levels. Renin is a hormone and angiotensin 1-10 are proteins which are important in the regulation of blood pressure.

## WHAT DID THE STUDY INVOLVE?

The OBELIX study was in three parts:

**Part one** – Anonymous data for all patients admitted to an NHS Greater Glasgow and Clyde (NHSGGC) hospital during April-May 2020 was analysed through the NHSGGC Safe Haven which provides secure access to patient health information for research purposes. Two groups were created: a group who had COVID-19 and a group who did not have COVID-19. These groups were used to make comparisons.

**Part two** – The health record of all NHSGGC patients admitted through the medical department at Queen Elizabeth University Hospital during April-May 2020 were reviewed. Information was collected on basic characteristics (e.g. age, sex, smoking status); hospital observations (e.g. blood pressure, temperature); medications prescribed; imaging tests (e.g. chest x-ray, CT scans); outcome (death and discharges). Groups were created: a group who had COVID-19 and a group who did not have COVID-19. These groups were used to make comparisons. This data was electronically linked to the larger NHSGGC Safe Haven dataset and returned in an anonymised form for analysis.

**Part three** – Patients aged 30-60 with no prior history of high blood pressure, with and without COVID-19, from part two were invited to participate in a hospital research visit. This visit happened at least 12 weeks after hospital discharge. At the visit they had blood tests, urine tests, tests of blood vessel health, blood pressure measurement and were fitted with an automated blood pressure monitor which took readings every 30-60 minutes for 24-hours (ambulatory blood pressure monitor).

## WHAT WERE THE RESULTS AND WHAT DO THEY MEAN?

### Part one

Overall, those in the study were, on average, 62 years old, just over half were female (55%) and 40% lived in the most deprived areas. There were no differences between the those who had COVID-19 and those who did not in terms of age, sex, deprivation, history of diabetes or cardiovascular disease. The number of people taking blood pressure or cholesterol lowering drugs was similar in both groups. There was a greater number of people with a history of cancer, kidney disease and lung disease in the COVID-19 group. When the groups were compared, those with cancer, kidney disease and lung disease were more likely to have COVID-19 requiring admission to hospital. Those taking blood pressure lowering medication or cholesterol lowering medication, alone, had no greater risk of COVID-19 requiring admission to hospital compared to those not on these medications. Those taking a combination of blood pressure and cholesterol lowering medication had a lower risk of COVID-19 requiring admission to hospital compared to those not on these medications.

### Part two

1,044 patients were admitted during April-May 2020. Those with COVID-19 were, on average, older (64 vs 59 years) but there was no difference in sex, smoking status or use of blood pressure lowering medication. Those with COVID-19 had a longer duration of hospital admission (6 vs 3 days) but lower systolic and diastolic blood pressure at the time of discharge. Those on blood pressure lowering medication had no greater risk of critical care admission (high dependency or intensive care) compared to those not on medication. The use of blood pressure lowering medication was not associated with time to critical care admission or death

### Part three

52 participants were recruited for the clinical study. 30 had a history of COVID-19 and 18 had no prior history of COVID-19 and had a negative antibody test (meaning they have had no exposure to the virus). 4 participants were withdrawn from the study as they had no history of having had COVID-19 but had positive antibodies (meaning they have been exposed to the virus but were not unwell; the timing of this exposure could not be determined). The group with COVID-19 were, on average, older (51 vs 45 years) and had a longer duration of hospital admission (2 vs <1 day). Blood pressure at time of discharge from hospital and at the research study visit were compared for each patient and the systolic blood pressure was 17 mmHg higher in those who had COVID-19 compared to those who did not.

Taking into account the body mass index and discharge systolic blood pressure of the participants, those with COVID-19 had an 8.6 mmHg higher average 24-hour systolic blood pressure, 9.4 mmHg higher average daytime systolic blood pressure and 11.5 mmHg higher office systolic blood pressure. The measurements of vascular function (pulse wave velocity, flow mediated dilation) were not different between the groups. Blood measurements of renin and angiotensin 1(1-10), which are involved in the regulation of blood pressure, were lower in the COVID-19 group.

## **WHAT IMPACT COULD THE FINDINGS HAVE?**

This section should cover the implications for

- Patients
  - Reassurance that the use of blood pressure lowering medication does not increase the risk of COVID-19
- Policy
  - The higher blood pressures observed at  $\geq 12$  weeks post hospital discharge may indicate that blood pressure screening would be a valuable to enable treatment, if required, to prevent cardiovascular disease.
- Practice
  - Doctors and other medical professionals can be reassured that blood pressure lowering medication does not increase the risk of COVID-19
  - Doctors and other medical professionals should consider measuring blood pressure in patients in the community post COVID-19

## **HOW WILL THE OUTCOMES BE DISSEMINATED?**

The results of the OBELIX study will be presented at national and international conferences and will be published in high quality peer reviewed medical journals. The study will be presented at the British and Irish Hypertension Society Annual Scientific Meeting in September 2021.

Data from the OBELIX study has been used successfully to gain funding from Heart Research UK for a further study investigating the long-term effects of COVID-19 on high blood pressure and blood vessel health.

## **CONCLUSION**

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In conclusion, blood pressure lowering therapy does not increase the risk of COVID-19 requiring hospital admission but post COVID-19 blood pressure was higher compared to those without COVID-19 and appears to be the low renin form which means that the kidneys may retain a higher level of salt. This may help doctors in choosing the most appropriate blood pressure lowering treatment.

### RESEARCH TEAM & CONTACT

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### ADDITIONAL INFORMATION

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