4.3 The weight of evidence is stronger in some areas than others, however. Evidence of staff to staff transmission has emerged in the genomic analysis (high confidence). Weak evidence on hospital discharge and modelling the impact of visitors (see also para 6 below) does not suggest a dominant causal link to outbreaks from these sources.

4.4 Public Health measures that reduce community incidence could be effective in reducing ingress into care homes. In the first wave, care homes appeared to show less impact from lockdown measures, with numbers continuing to rise more than cases in the community. It is thought that greater internal infection control measures now in place will make it easier to understand where infection is coming from.

4.5 Asymptomatic or atypically symptomatic presentation in residents[1] and staff mean that ingress may be hidden for a number of generations of disease.

4.6 Sequencing community tests to understand the comparator population is critical for the future.

5 Recommendations and barriers to improve virological analysis

5.1 Future research considerations identified

- Further work on the longevity and quality of antibodies. What proportion of care homes that experienced outbreaks in the first wave have evidence of sufficient resident and staff exposure to likely reduce the risk of further outbreaks or limit their size? Does the proportion of residents and staff with antibodies reduce over time due to waning of immunity or resident and staff turnover bringing in susceptible individuals? Cohort studies following particular homes in detail will be important, such as the Easter 6 study.

- How does the physical layout of a home influence transmission? Have homes that have cohorted residents onto different floors, been able to arrest the spread of the virus? How elements of ventilation & heating impact on transmission potential.

- Surveys on behavioural aspects of controlling the virus are important, for example a qualitative study interviewing staff to get further insight into how ways of working have changed.

- Exploration of severity of outcomes and what impacts this, looking at how severity varies with different co-morbidities etc.

5.2 Barriers and opportunities identified:

a. The structural set up of testing arrangements can have a major impact on the ability to analyse sequencing. The location for sample processing appears fixed without opportunity for dynamic decision making and sample redirection. **It is recommended that SAGE endorse processes to**

[1] Wide ranging symptomatology may be present in this population (See SAGE paper *Community case definitions for Covid-19*) and coupled with inability to express symptoms because of cognitive impairment or communication problesm.

ensure COG UK and other groups can benefit from flexible rerouting of samples to specific laboratories.

b. The ability to connect data across organisations and studies due to information governance issues.
c. **SCWG is seeking SAGE to strongly encourage organisations, researchers and the SCWG to work collaboratively to devise the optimum approach that would balance protection of data with the facilitation of research.**
d. It is critical moving forwards that studies build collaboratively within microbiology but also within other expertise domains to leverage knowledge and skill. Greater transparency and connectivity is needed with funders of projects to enable collaboration and linkage.
The SCWG will gather more information about ongoing and proposed research projects areas and [2] seek to join up studies and disciplines in future work.
e. It may be useful to set up a mechanism to produce analysis on a regular basis to give an up to date view of how the virus and different strains are spreading at a local / regional level.

6 Additional risk factors and modelling

6.1 Visiting

Recommendations to allow visitors to care homes within risk assessed parameters and based on local clinical judgement was made in June although many homes have continued to maintain closed doors. Isolation can however be harmful to residents, particularly where poor recognition or sensory deficit is present. Urgent work has commenced to try to develop a cost consequence model of the impact of disease ingress due to visitors (supplementary to other ingress), and the impact of stopping visitors for an extended period of isolation, using EQ-5D and ICECAP-O measures of quality of life.

Modelling studies have shown that allowing visiting has only a marginal impact on case load in a home (a median increase of 1 additional case in an outbreak of about 30 cases in a medium sized care home but this is not a significant increase given other stochastic effects). Greater confidence would be found with genomic or epidemiological confirmation of this finding but a key gap is the lack of a robust process to better characterise the impact of isolation on individuals.

6.2 Dynamic risk assessment

The tool presented in the SAGE paper of18/06/2020 has been extended to incorporate further routes of ingress of disease and prototyped with data from Scotland suggesting an effective tool can be developed in combination with other sources of intelligence. The tool suggests testing frequency could be reduced in areas of low prevalence or smaller care homes but requires further consideration.

6.3 Excess deaths