Public Health England

COVID-19 Literature Digest – 14/12/2020

Dear all,

Please find today's report below.

PHE's COVID-19 Literature Digest has been produced since February 2020. A selection of our previous Digests can be found here. This resource aims to highlight a small selection of recent COVID-19 papers that are relevant to UK settings, contain new data, insights or emerging trends. The Digest Team generate a report three times per week (Mon, Wed, Fri). The reports include both preprints, which should be treated with caution as they are NOT peer-reviewed and may be subject to change, and also research that has been subject to peer review and wider scrutiny. The Digest is very rapidly produced and does not claim to be a perfect product; the inclusion or omission of a publication should not be viewed as an endorsement or rejection by PHE. We do not accept responsibility for the availability, reliability or content of the items included in this resource.

To join our email distribution list please send a request to COVID.LitDigest@phe.gov.uk. If you are interested in papers relating to behaviour and social science please contact COVID19.behaviouralscience@phe.gov.uk to sign up to receive the PHE Behavioural Sciences Weekly Report.

Best wishes,

Bláthnaid Mahon, Emma Farrow, James Robinson
On behalf of the PHE COVID-19 Literature Digest Team

Report for 14.12.2020 (please note that papers that have **NOT been peer-reviewed** are highlighted in red).

Sections:

Treatment
Guidance and consensus statements (no digest)
Overviews, comments and editorials (no digest)

Serology and immunology

Publication Date	Title / URL	Journal / Article type	Digest
05.12.2020	Neutralising antibodies drive Spike mediated SARS-CoV-2 evasion	medRxiv (non-peer reviewed) / Article	• Authors report fatal SARS-CoV-2 escape from neutralising antibodies in an immune suppressed individual treated with convalescent plasma, generating whole genome ultradeep sequences over 23 time points spanning 101 days. • Little evolutionary change observed in the viral population during first 65 days despite two courses of remdesivir. • Convalescent plasma brought dynamic virus population shifts, with emergence of a dominant viral strain bearing D796H in S2 and ΔH69/ΔV70 in the S1 NTD of the Spike protein. • Data reveal strong positive selection on SARS-CoV-2 during convalescent plasma therapy and identify the combination of Spike mutations D796H and ΔH69/ΔV70 as a broad antibody resistance mechanism against commonly occurring antibody responses to SARS-CoV-2.
10.12.2020	Diverse Functional Autoantibodies in Patients with COVID-19	medRxiv (non-peer reviewed) / Article	• Authors screened 194 SARS-CoV-2 infected COVID-19 patients and healthcare workers for autoantibodies against 2,770 extracellular and secreted proteins. • COVID-19 patients exhibited dramatic increases in autoantibody reactivities compared to uninfected controls, with high prevalence of autoantibodies against immunomodulatory proteins including cytokines, chemokines, complement components, and cell surface proteins. • Autoantibodies perturb immune function and impair virological control by inhibiting immunoreceptor signalling, and by altering peripheral immune cell composition. • In summary, these findings implicate a pathological role for exoproteome-directed autoantibodies in COVID-19 with diverse impacts on immune functionality and associations with clinical outcomes.

Vaccine development

Publication Date	Title / URL	Journal / Article type	Digest
13.12.2020	The Advisory Committee on Immunization Practices' Interim Recommendation for Use of Pfizer-BioNTech COVID-19 Vaccine — United States, December 2020	MMWR / Report	• On Dec 11, 2020, the Food and Drug Administration issued an Emergency Use Authorization for the Pfizer-BioNTech COVID-19 vaccine. • After an explicit, evidence-based review of all available data, the Advisory Committee on Immunization Practices (ACIP) issued an interim recommendation for use of the Pfizer-BioNTech COVID-19 vaccine in persons aged ≥16 years for the prevention of COVID-19.

Diagnostics and genomics

Publication Date	Title / URL	Journal / Article type	Digest
11.12.2020	Genetic mechanisms of critical illness in Covid-19	Nature / Article	• Authors report results of the GenOMICC (Genetics Of Mortality In Critical Care) genome-wide association study (GWAS) in 2244 critically ill Covid-19 patients from 208 UK ICUs. • Results include evidence in support of a causal link from low expression of IFNAR2, and high expression of TYK2, to life-threatening disease. • Robust genetic signals relating to key host antiviral defence mechanisms / mediators of inflammatory organ damage in Covid-19 identified. • Both mechanisms may be amenable to targeted treatment with existing drugs.
11.12.2020	Innova Lateral Flow SARS-CoV-2 Antigen test accuracy in Liverpool Pilot: preliminary data, 26 November 2020	Gov.uk / Research and analysis	• Compared the classifications made using military supervised self-administered swabs with LFT made on site, vs those obtained by the same asymptomatic person using a second self-administered swab and assayed by a second LFT and reverse transcribed quantitative PCR at a DHSC designated quality assurance (QA) laboratory and then investigate the association between LFT prediction and cycle threshold (Ct) values from a PCR test. • There are paired data for 3199 patients. • Accuracy measures (excluding VOID results), assuming PCR is gold standard: Including 95% confidence intervals: - Sensitivity (true positive rate) 0.488889 (0.337034 to 0.64226), 48.89% (33.7% to 64.23%). - Specificity (true negative rate) 0.999329 (0.997579 to 0.999919), 99.93% (99.76% to 99.99%).
04.12.2020	Amplification-free detection of SARS-CoV-2 with CRISPR-Cas13a and mobile phone microscopy	Cell / Article	• Authors report development of an amplification-free CRISPR-Cas13a assay for direct detection of SARS-CoV-2 from nasal swab RNA that can be read with a

			mobile phone microscope. • The assay achieved ~100 copies/µL sensitivity in under 30 min of measurement time and accurately detected pre-extracted RNA from a set of positive clinical samples in under 5 minutes. • Authors combined crRNAs targeting SARS-CoV-2 RNA to improve sensitivity and specificity and directly quantified viral load using enzyme kinetics. • Integrated with a reader device based on a mobile phone, this assay has the potential to enable rapid, low-cost, point-of-care screening for SARS-CoV-2.
11.12.2020	Can the detection dog alert on COVID-19 positive persons by sniffing axillary sweat samples? A proof-of-concept study	PLoS One / Article	• Proof-of-concept study: six detection dogs and one underarm sweat sample from each of 177 individuals (95 symptomatic COVID-19 positive / 82 asymptomatic COVID-19 negative). • Success rate per dog (i.e., the number of correct indications divided by the number of trials) ranged from 76% to 100%. • Some evidence that detection dogs may be able to discriminate between sweat samples from symptomatic COVID-19 individuals and those from asymptomatic COVID-19 negative individuals. Due to study limitations (including using some COVID-19 samples more than once and potential confounding biases), these results must be confirmed in validation studies.

Epidemiology and clinical – risk factors

Publication Date	Title / URL	Journal / Article type	Digest
11.12.2020	HIV infection and COVID-19 death: a population-based cohort analysis of UK primary care data and linked national death registrations within the OpenSAFELY platform	Lancet HIV / Article	• Whether HIV infection is associated with risk of death due to COVID-19 is unclear. Authors aimed to investigate this association in a large-scale population-based study in England. • 17 282 905 adults were included, of whom 27 480 (0·16%) had HIV recorded. • People with HIV in the UK seem to be at increased risk of COVID-19 mortality. Targeted policies should be considered to address this raised risk as the pandemic response evolves.

Epidemiology and clinical – other

Publication Date	Title / URL	Journal / Article type	Digest
11.12.2020	Rapid triage for COVID-19 using routine clinical data for patients attending hospital: development and	Lancet Digital Health / Article	• Trained linear and non-linear machine learning classifiers to distinguish patients with COVID-19 from pre-pandemic controls, using electronic health record data for patients presenting to the emergency department and admitted

	prospective validation of an artificial intelligence screening test		across a group of four teaching hospitals in Oxfordshire, UK. • The models performed effectively as a screening test for COVID-19, excluding the illness with high-confidence by use of clinical data routinely available within 1 h of presentation to hospital. The approach is rapidly scalable, fitting within the existing laboratory testing infrastructure and standard of care of hospitals in high-income and middle-income countries.
11.12.2020	CO-CIN: Changes in hospital mortality in the first wave of COVID-19 in the UK using the ISARIC WHO Clinical Characterisation Protocol: prospective observational cohort study, 26 November 2020	Gov.uk / Research and analysis	• There is growing evidence of a decline in COVID-19 mortality rates, both in hospital and in the community. The authors investigated this phenomenon using the International Severe Acute Respiratory and emerging Infections Consortium (ISARIC) WHO Clinical Characterisation Protocol UK (CCP-UK). • Concluded that In-hospital mortality rates for patients with COVID-19 fell in the UK over the course of the first wave. • This fall persisted after stratifying for illness severity, changes in patient case-mix and treatment received. Patients were most severely unwell at hospital presentation at the start of the pandemic and presented later in their disease course. At the peak of admissions, NHS trusts were stretched beyond capacity, and the reduction in caseload enabled safer staffing. • Community and hospital practice changed, in particular the use of NIV increased dramatically, and many patients have been included in drug and other treatment trials, which may help to explain the fall in mortality and inform future waves.

Infection control / non-pharmaceutical interventions

Publication Date	Title / URL	Journal / Article type	Digest
08.12.2020	Three-quarters attack rate of SARS-CoV-2 in the Brazilian Amazon during a largely unmitigated epidemic	Science / Report	• SARS-CoV-2 spread rapidly in the Brazilian Amazon, the attack rate there is an estimate of the final size of a largely unmitigated epidemic. • Authors show that by June, one month after the epidemic peak in Manaus, capital of Amazonas state, 44% of the population had detectable IgG antibodies. • Correcting for cases without a detectable antibody response and antibody waning, estimated 66% attack rate in June rising to 76% in October. São Paulo estimated attack rate in October is 29%. • These results confirm that, when poorly controlled, COVID-19 can infect a high fraction of the population causing high mortality.
07.12.2020	Implementation of novel and conventional outbreak control measures in managing a COVID-19 outbreak in a large UK prison	medRxiv (non-peer reviewed) / Article	• On 22nd Mar 2020, following identification of a confirmed COVID-19 case in a prisoner in Prison A (UK), an Outbreak Control Team was convened consisting of prison staff and public health experts from Public Health England and the UK

			National Health Service. • Rapid transmission of SARS-COV-2 was prevented through proactive steps in identifying and isolating infected prisoners (and staff), cohorting new admissions and shielding vulnerable individuals. • These novel and cost-effective approaches can be implemented in a wide range of correctional facilities globally and proved effective even in the absence of mass testing.

Transmission

Publication Date	Title / URL	Journal / Article type	Digest
10.12.2020	Phylogenetic analysis of SARS-CoV-2 in Boston highlights the impact of superspreading events	Science / Article	• Analysis of 772 complete SARS-CoV-2 genomes from early in Boston area epidemic. Numerous introductions of virus, a small number leading to most cases with two superspreading events. • First in a skilled nursing facility led to rapid transmission and significant mortality in this vulnerable population but little broader spread. Other outbreaks in same facility had little effect. • Second at international business conference produced sustained community transmission; resulting in extensive regional, national, and international spread - likely hundreds of thousands of cases. • The two events differed significantly in genetic variation they generated, suggesting varying transmission dynamics in superspreading events. Results show how genomic epidemiology can help understand the link between individual clusters and wider community spread.
11.12.2020	Housing, household transmission and ethnicity, 26 November 2020	Gov.uk / Research and analysis	• Five recent national studies have examined the relationship between Covid-19, ethnicity, and household characteristics. • The studies all find that household composition (i.e. number of people in the household and their ages) are key factors in terms of risk of Covid-19 infection and mortality, even when controlling for deprivation and other factors. • There is increased risk of infection and mortality for those living in larger occupancy households. There is a correlation between large /multigenerational households and increased risk of infection and or mortality across all five studies, even when controlling for deprivation and other factors.

Treatment

Publication Date	Title / URL	Journal / Article type	Digest
11.12.2020	An EUA for Bamlanivimab-A Monoclonal Antibody for COVID-19	Jama / Medical Letter on Drugs and Therapeutics	• The neutralizing IgG1 monoclonal antibody bamlanivimab has been granted an FDA Emergency Use Authorization for treatment of recently diagnosed mild to moderate COVID-19 in patients who are ≥12 years old, weigh at least 40 kg, and are at high risk for progressing to severe disease and/or hospitalisation. • Mechanism, current clinical findings, dosage and adverse effects are described.
11.12.2020	Baricitinib plus Remdesivir for Hospitalized Adults with Covid-19	N Engl J Med / Article	• Double-blind, randomized trial: 1033 patients received remdesivir (≤10 days) and either baricitinib (≤14 days / 515 patients) or placebo (control / 518 patients). • Combination group had 30% higher odds of improvement in clinical status at day 15 (odds ratio, 1.3; 95% CI, 1.0 to 1.6); 28-day mortality was 5.1% versus 7.8% in control group (hazard ratio for death, 0.65; 95% CI, 0.39 to 1.09). • Baricitinib plus remdesivir was superior to remdesivir alone in reducing recovery time and accelerating improvement in clinical status among patients with Covid-19, notably among those receiving high-flow oxygen or non-invasive ventilation. The combination was associated with fewer serious adverse events.
09.12.2020	Early initiation of prophylactic anticoagulation for prevention of COVID-19 mortality: a nationwide cohort study of hospitalized patients in the United States	medRxiv (non-peer reviewed) / Article	• Observational cohort study of 4,297 hospitalised COVID-19 patients evaluated association of prophylactic anticoagulation (PA) within 24 hours of admission (3,627 patients; 84.4%) and COVID-19 mortality. • Concluded that early initiation of prophylactic anticoagulation among patients hospitalized with COVID-19 was associated with a decreased risk of mortality. These findings provide strong real-world evidence to support guidelines recommending the use of prophylactic anticoagulation as initial therapy for COVID-19 patients upon hospital admission.

Guidance and consensus statements

Publication Date	Title / URL	Journal / Article type
11.12.2020	UK Chief Medical Officers' statement on the self-isolation period: 11 December 2020	Gov.uk / Press release

Overviews, comments and editorials

Publication Date	Title / URL	Journal / Article type
08.12.2020	Oxford-AstraZeneca COVID-19 vaccine efficacy	Lancet / Comment
11.12.2020	COVID-19 death in people with HIV: interpret cautiously	Lancet HIV / Comment

Produced by the PHE COVID-19 Literature Digest Team

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