Public Health England

International EPI Cell Evidence Digest – 10/07/2020

Please find today's report below.

This Evidence Digest is produced by the PHE COVID-19 Literature Digest Team as a resource for professionals working in public health. We do not accept responsibility for the availability, reliability or content of the items included in this resource and do not necessarily endorse the views expressed within them. The papers are organised under the following themes:

- Serology and immunology
- Diagnostics
- Genomics
- Epidemiology and clinical - children and pregnancy
- Epidemiology and clinical - risk factors
- Epidemiology and clinical - other
- Infection control
- Modelling
- Overviews, comments and editorials (no digest)

Please note that we are including preprints (highlighted in red), which are preliminary reports of work that have <u>NOT</u> been peer-reviewed. They should not be relied on to guide clinical practice or health-related behaviour and should <u>NOT</u> be reported in news media as established information.

Serology and immunology

Publication Date	Title/URL	Journal/ Article type	Digest
08.07.2020	Immunological and inflammatory profiles in mild and severe cases of COVID-19	Nat Commun / Article	• Performed a cross-sectional observational study of immunological and inflammatory markers and cells in 41 COVID-19 patients (29 with mild disease and 12 with severe disease including 2 fatal cases). • Lymphopenia, selective loss of CD4+ T cells, CD8+ T cells and NK cells, excessive T-cell activation and high expression of T-cell inhibitory molecules are more prominent in severe cases than in those with mild disease.

Publication Date	Title/URL	Journal/ Article type	Digest
08.07.2020	High levels of SARS-CoV-2 specific T-cells with restricted functionality in patients with severe course of COVID-19	medRxiv (non-peer reviewed) / Article	• Study to characterise SARS-CoV-2 specific T-cells and antibodies in patients (n=50) with different COVID-19 related disease severity, finding that patients with severe disease mounted significantly higher levels of SARS-CoV-2 specific T-cells as compared to convalescent individuals. • SARS-CoV-2 specific CD4 T-cells dominated over CD8 T-cells and closely correlated with the number of plasmablasts and SARS-CoV-2 specific IgA- and IgG-levels. Unlike in convalescents, SARS-CoV-2 specific T-cells in patients with severe disease showed marked alterations in phenotypical and functional properties, which also extended to CD4 and CD8 T-cells in general.
07.07.2020	SARS-CoV-2 Seroprevalence Rates of Children in Louisiana During the State Stay at Home Order	medRxiv (non-peer reviewed) / Article	• In a study of 1690 blood samples from 812 individuals from a Louisiana Children's Hospital, 62 subjects (7.6%) were found to be seropositive. The median age was 11 years with 50.4% female. • The presenting complaint of seropositive patients was chronic illness (43.5%). Only 18.2% had a previous positive COVID-19 PCR or antibody test. • Seropositivity was significantly associated with parish (counties), race, and residence in a low-income area. Importantly, seropositivity was linearly correlated with cumulative COVID-19 case number for all ages by parish.

Diagnostics

Publication Date	Title/URL	Journal/ Article type	Digest
09.07.2020	International external quality assessment for SARS-CoV-2 molecular detection and survey on clinical laboratory preparedness during the COVID-19 pandemic, April/May 2020	Eurosurveillance / Rapid communication	• Present the results of a first external quality assessment (EQA) on molecular detection of SARS-CoV-2 introduced by Quality Control for Molecular Diagnostics (QCMD, Glasgow, Scotland), an independent International EQA organisation. • Also present data from a survey by the EU project RECOVER, a COVID-19-related project originating from the EU-initiative Platform for European Preparedness Against (Re-)emerging Epidemics (PREPARE), assessing the molecular testing capacity and throughput of clinical laboratories in 36 countries.
07.07.2020	Artificial intelligence driven assessment of routinely collected healthcare data is an effective screening test for COVID-19 in patients presenting to hospital	medRxiv (non-peer reviewed) / Article	• As an alternative to RT-PCR testing, the authors describe the development of two early-detection models to identify COVID-19 using routinely collected data typically available within one hour. • On 115,394 emergency presentations and 72,310 admissions to a large UK teaching hospital, their emergency department (ED) model achieved 77.4%

			sensitivity and 95.7% specificity (AUROC 0.939) for COVID- 19 amongst all patients attending hospital, and admissions model achieved 77.4% sensitivity and 94.8% specificity (AUROC 0.940) for the subset admitted to hospital. • Both models achieve high negative predictive values (>99%) across a range of prevalences (<5%), facilitating rapid exclusion during triage to guide infection control.

Genomics

Publication Date	Title/URL	Journal/ Article type	Digest
07.07.2020	No evidence of viral polymorphisms associated with Paediatric Inflammatory Multisystem Syndrome Temporally Associated With SARS-CoV-2 (PIMS-TS)	medRxiv (non-peer reviewed) / Article	• Analysis of viral sequences from 13 paediatric COVID-19 patients hospitalised in London between late-Mar and mid-May 2020, of whom five were diagnosed with paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS). • In contrast to what has been hypothesised, there was no evidence of unique sequences associated with the viruses from PIMS-TS patients.
28.06.2020	The Global Phosphorylation Landscape of SARS-CoV-2 Infection	Cell / Article	• Phosphoproteomics analysis of SARSCoV-2-infected Vero E6 cells reveals host cellular pathways hijacked by viral infection, leading to the identification of small molecules that target dysregulated pathways and elicit potent antiviral efficacy.
28.06.2020	A Universal Design of Betacoronavirus Vaccines against COVID-19, MERS, and SARS	Cell / Article	• Present the structure-guided design of a coronavirus immunogen comprised of two protein subunits each containing the virus spike receptor binding domain fused together via a disulfide link or tandem repeat. • The immunogen elicits strong immunogenicity in mice and protects them against viral challenge. • The vaccine design strategy can be universally applied to SARS, MERS, COVID-19, and other CoV vaccines to counter emerging threats.

Epidemiology and clinical - children and pregnancy

Publication Date	Title/URL	Journal/ Article type	Digest
09.07.2020	Intensive care admissions of children with paediatric inflammatory	The Lancet Child & Adolescent Health / Article	• Multicentre observational study of children between 1 Apr and 10 May. 78 cases of paediatric inflammatory multisystem syndrome temporally

			associated with SARS-CoV-2 (PIMS-TS) were reported by 21 of 23 PICUs in the UK. • During the study period, the rate of PICU admissions for PIMS-TS was at least 11-fold higher than historical trends for similar inflammatory conditions. Clinical presentations and treatments varied. Coronary artery aneurysms appear to be an important complication. Although immediate survival is high, the long-term outcomes of children with PIMS-TS are unknown.
multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS) in the UK: a multicentre observational study			
09.07.2020	SARS-CoV-2 Infection in Febrile Neonates	J Pediatric Infect Dis Soc / Article	• Case series of four full term neonates hospitalized with fever and found to have SARS-CoV-2 infection with a spectrum of illness severities. • Two neonates required admission to the intensive care unit for respiratory insufficiency and end organ involvement. Half of the patients were found to have a co-infection. One neonate received antiviral therapy with remdesivir and is, to the authors knowledge, the youngest patient to receive this drug for COVID-19. • All neonates had favourable outcomes.

Epidemiology and clinical - risk factors

Publication Date	Title/URL	Journal/ Article type	Digest
09.07.2020	Pandemic peak SARS-CoV-2 infection and seroconversion rates in London frontline health-care workers	The Lancet / Correspondence	• 200 patient-facing healthcare workers were enrolled in SARS-CoV-2 Acquisition in Frontline Healthcare Workers—Evaluation to inform Response (SAFER), a prospective cohort study in high-risk frontline HCWs in an acute NHS hospital trust in London. • 87 (44%) of 200 HCWs had evidence of SARS-CoV-2 infection at any timepoint, detected either by serology or RT-PCR. Of the 42 HCWs that ever tested positive for SARS-CoV-2 by RT-PCR, 20 (48%) reported symptoms within 7 days of the positive test that were consistent with PHE's COVID-19 case definition, and 16 (38%) did not report any symptoms in the same time frame. • Evidence of infection in central London healthcare workers was more than double that of the London population during this time period.
08.07.2020	OpenSAFELY: factors associated with COVID-19 death in 17 million patients	Nature / Article	• Previously included as a preprint, this study on behalf of NHS England describes the creation of OpenSAFELY: a secure health analytics platform covering 40% of all patients in England, holding patient data within the existing data centre of a major primary care electronic health records

			vendor. Primary care records of 17,278,392 adults were pseudonymously linked to 10,926 COVID-19-related deaths. • COVID-19-related death was associated with: being male; older age and deprivation (both with a strong gradient); diabetes; severe asthma; and various other medical conditions. • Compared with people with white ethnicity, Black and South Asian people were at higher risk even after adjustment for other factors.
10.07.2020	[Race/Ethnicity, Underlying Medical Conditions, Homelessness, and Hospitalization Status of Adult Patients with COVID-19 at an Urban Safety-Net Medical Center - Boston, Massachusetts, 2020](#)	MMWR Morb Mortal Wkly Rep / Article	• This report describes the characteristics and clinical outcomes of 2,729 adult patients with laboratory-confirmed COVID-19 treated at Boston Medical Centre during Mar 1-May 18, 2020. • The cohort comprised 44.6% non-Hispanic black (black) patients and 30.1% Hispanic or Latino (Hispanic) patients. Persons experiencing homelessness accounted for 16.4% of patients. Most patients who died were aged ≥60 years (81.6%). • Clinical severity differed by age, race/ethnicity, underlying medical conditions, and homelessness. A higher proportion of Hispanic patients were hospitalized (46.5%) than were black (39.5%) or non-Hispanic white (white) (34.4%) patients, a finding most pronounced among those aged <60 years. • A higher proportion of non-ICU inpatients were experiencing homelessness (24.3%), compared with homeless patients who were admitted to the ICU without mechanical ventilation (15.9%), with mechanical ventilation (15.1%), or who died (15.3%).
08.07.2020	[Rapid Emergence of SARS-CoV-2 in the Greater New York Metropolitan Area: Geolocation, Demographics, Positivity Rates, and Hospitalization for 46,793 Persons Tested by Northwell Health](#)	Clin Infect Dis / Article	• From Mar 8 through Apr 10, a total of 26,735 of 46,793 persons (57.1%) tested positive for SARS-CoV-2 at Northwell Health Laboratories. • Males of each race were disproportionally more affected than females above age 25, with a progressive male predominance as age increased. • Total hospitalization rate was 8,174 persons (30.6% of positive persons). • There was a broad range (greater than 10-fold) in the cumulative number of positive cases across individual zip codes following documented first case incidents. Test positivity was greater for persons living in zip codes with lower annual household income.
07.07.2020	[High excess mortality during the COVID-19 outbreak in Stockholm Region areas with young and socially vulnerable populations](#)	medRxiv (non-peer reviewed) / Article	• Study set in Stockholm to explore excess mortality (EM) variation by socioeconomic status (tertiles of income, education, Swedish-born, gainful employment) and age distribution (share of 70+ year-old persons). • An EM was first detected during the week of Mar 23-29 2020. During the peaking week of the epidemic (6-12 April 2020), an EM of 160% was observed: 211% in 80+ year-old women; 179% in 80+ year-old men. During

			the same week, the highest EM was observed for Demographic Statistics Area with lowest income (171%), lowest education (162%), lowest share of Swedish-born (178%), and lowest share of gainfully employed (174%). There was a 1.2 to 1.7-fold increase in EM between those areas with a higher vs. lower proportion of young people. • Living in areas with lower socioeconomic status and younger populations is linked to COVID-19 EM. These conditions might have facilitated the viral spread.
08.07.2020	COVID-19 Cases and Deaths in Federal and State Prisons	JAMA / Research letter	• Research letter showing that the COVID-19 case rate for prisoners was 5.5 times higher than the US population case rate of 587 per 100 000. • A standardized calculation shows that the adjusted death rate in the prison population was 3.0 times higher than would be expected if the age and sex distributions of the US and prison populations were equal.
10.07.2020	Update: COVID-19 Among Workers in Meat and Poultry Processing Facilities - United States, April-May 2020	MMWR Morb Mortal Wkly Rep / Article	• Report providing updated aggregate data from US states regarding the number of meat and poultry processing facilities affected by COVID-19, the number and demographic characteristics of affected workers, and the number of COVID-19-associated deaths among workers, as well as descriptions of interventions and prevention efforts at these facilities. • COVID-19 was confirmed in 16,233 workers from 239 affected facilities, including 86 COVID-19-related deaths. Among 14 states reporting the total number of workers in affected meat and poultry processing facilities (112,616), COVID-19 was diagnosed in 9.1% of workers. Among 9,919 (61%) cases in 21 states with reported race/ethnicity, 87% occurred among racial and ethnic minority workers.
08.07.2020	Coronavirus Disease among Persons with Sickle Cell Disease, United States, March 20-May 21, 2020	Emerg Infect Dis / Article	• Among 178 persons with sickle cell disease in the US who were reported to an SCD-coronavirus disease case registry, 122 (69%) were hospitalized and 13 (7%) died. • Comparison to a previous report of COVID-19 in the general US population indicates that hospitalization, ICU admission, and case-fatality rates for persons with SCD could be much higher than persons of similar ages in the US population-at-large.

Epidemiology and clinical – other

Publication Date	Title/URL	Journal/ Article type	Digest
07.07.2020	Digestive Manifestations in Patients Hospitalized with COVID-19	medRxiv (non-peer reviewed) / Article	• Consecutive patients hospitalized with COVID-19 were identified across a geographically diverse alliance of medical centres in North America. • Of 1992 patients analysed, 53% of patients experienced at least one gastrointestinal symptom at any time during their illness, most commonly diarrhoea (34%), nausea (27%), vomiting (16%), and abdominal pain (11%). In 74% of cases, gastrointestinal symptoms were judged to be mild. • In total, 35% of patients developed an abnormal alanine aminotransferase or total bilirubin level; these were elevated to less than 5 times the upper limit of normal in 77% of cases. • After adjusting for potential confounders, the presence of gastrointestinal symptoms at any time or liver test abnormalities on admission were not independently associated with mechanical ventilation or death.

Infection control

Publication Date	Title/URL	Journal/ Article type	Digest
08.07.2020	SARS-CoV-2 is transmitted via contact and via the air between ferrets	Nat Commun / Article	• Study showing that SARS-CoV-2 is transmitted efficiently via direct contact and via the air (via respiratory droplets and/or aerosols) between ferrets, 1 to 3 days and 3 to 7 days after exposure respectively. • The pattern of virus shedding in the direct contact and indirect recipient ferrets is similar to that of the inoculated ferrets and infectious virus is isolated from all positive animals, showing that ferrets are productively infected via either route. This study provides experimental evidence of robust transmission of SARS-CoV-2 via the air.
06.07.2020	Environmental Detection of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) from Medical Equipment in Long-Term Care Facilities undergoing COVID-19 Outbreaks	Am J Infect Control / Article	• Environmental sampling at long-term care facilities was carried out to determine the extent of surface contamination with SARS-CoV-2 virus. • Medical equipment used throughout the facility was determined to be contaminated.

Publication Date	Title/URL	Journal/ Article type	Digest
30.06.2020	Environmental contamination by SARS-CoV-2 of an imported case during incubation period	Sci Total Environ / Article	• To evaluate the stability of SARS-CoV-2 during the incubation period of an imported case traveling to Qingdao, China, environmental surface samples were collected prior to and after disinfection of a quarantine room. • SARS-CoV-2 was widely distributed on object surfaces in a quarantine room of a later diagnosed COVID-19 case during the incubation period, with 47.8% of the first batch of environmental surface samples (within 4 h after case confirmation) testing positive, in contrast to 8.7% of the second batch of environmental samples (after first disinfection). • The inner walls of toilet bowl and sewer inlet were the most contaminated sites with the highest viral loads.
08.07.2020	Association of a Public Health Campaign About Coronavirus Disease 2019 Promoted by News Media and a Social Influencer With Self-reported Personal Hygiene and Physical Distancing in the Netherlands	JAMA Netw Open / Original investigation	• Survey study of 17 189 participants to uncover self-reported gaps in behaviour regarding personal hygiene and physical distancing in the Netherlands, and to determine whether a social media campaign may be an effective method to improve behaviour. • Exposure to a targeted campaign video and news article was associated with an approximately 2-fold increase in the odds of washing of all required hand areas and longer duration of handwashing. • These findings suggest that evidence-based campaigns using existing digital news and social media platforms may be an effective means to help combat critical health issues, such as the COVID 2019 pandemic.
10.07.2020	Initial and Repeated Point Prevalence Surveys to Inform SARS-CoV-2 Infection Prevention in 26 Skilled Nursing Facilities - Detroit, Michigan, March-May 2020	MMWR Morb Mortal Wkly Rep / Article	• Report from the Detroit Health Department showing how repeated point prevalence surveys in skilled nursing facilities (SNFs) identified asymptomatic COVID-19 cases, informed cohorting and IPC practices aimed at reducing transmission, and guided prioritization of health department resources for facilities experiencing high levels of SARS-CoV-2 transmission.

Modelling

Publication Date	Title/URL	Journal/ Article type	Digest
07.07.2020	Reconstructing the global dynamics of under-ascertained COVID-19 cases and infections	medRxiv (non-peer reviewed) / Article	• To understand the level of ascertainment (the ratio of confirmed symptomatic cases to the true number of symptomatic individuals) and undetected epidemic progression in COVID-19, this study estimated the proportion of symptomatic cases reported in 210 countries and territories. • They estimate that, during Mar 2020, the median percentage of symptomatic cases detected across the 84 countries which experienced more than ten deaths ranged from 2.38% (Bangladesh) to 99.6% (Chile).

		• Across the ten countries with the highest number of total confirmed cases as of 6th July 2020, they estimated that the peak number of symptomatic cases ranged from 1.4 times (Chile) to 17.8 times (France) larger than reported. • Finally, they estimated seroprevalence for each country, with results suggesting that all countries have had only a small fraction of their populations infected as of July 2020.

Overviews, comments and editorials

Publication Date	Title/URL	Journal/ Article type
09.07.2020	Retraction and republication: cardiac toxicity of hydroxychloroquine in COVID-19	The Lancet / Comment
08.07.2020	Effectiveness of Cloth Masks for Protection Against Severe Acute Respiratory Syndrome Coronavirus 2	Emerg Infect Dis / Report
07.07.2020	Pre-existing immunity to SARS-CoV-2: the knowns and unknowns	Nat Rev Immunol / Comment
08.07.2020	Covid-19: The inside story of the RECOVERY trial	Bmj / Feature
09.07.2020	The Lancet COVID-19 Commission	The Lancet / Comment
11.07.2020	COVID-19: the worst may be yet to come	The Lancet / Editorial

Produced by the PHE COVID-19 Literature Digest Team