Public Health England

International EPI Cell Daily Evidence Briefing – 25/03/2020

This briefing is produced by the PHE COVID-19 Literature Digest Team. The papers are organised under the following themes:

- Diagnostics and genomics
- Epidemiology and clinical
- Infection control
- Treatment
- Social sciences
- Miscellaneous
- Modelling

Please note that we are including preprints, which are preliminary reports of work that have NOT been peer-reviewed.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

Diagnostics and genomics

Date of publication	Title /URL	Journal / Publication type	Digest
24.03.2020	High-resolution computed tomography manifestations of COVID-19 infections in patients of different ages	European Journal of Radiology / Article in press	• Case data of patients diagnosed with COVID-19 infection in Hangzhou City, Zhejiang Province in China were collected, and chest HRCT signs of infected patients in four age groups (<18 years, 18-44 years, 45-59 years, ≥60 years) were compared. • Chest high-resolution computed tomography (HRCT) manifestations in patients with COVID-19 are related to patient's age, and HRCT signs may be milder in younger patients.
24.03.2020	How to perform lung ultrasound in pregnant women with suspected COVID-19 infection	Ultrasound in Obstetrics and Gynaecology / Article	• The authors propose a practical approach for obstetricians/gynaecologists to perform lung ultrasound, showing potential applications, semiology and practical aspects, which should be of particular importance in emergency situations, such as the current pandemic infection of COVID-19.

29.01.2020	Interpretable detection of novel human viruses from genome sequencing data	bioRxiv (not peer reviewed) / Article	• The authors predict whether a virus can infect humans directly from next-generation sequencing reads. • They propose a new approach for convolutional filter visualization to disentangle the information content of each nucleotide from its contribution to the final classification decision. • Nucleotide-resolution maps of the learned associations between pathogen genomes and the infectious phenotype can be used to detect virulence-related genes in novel agents, as we show here for the SARS-CoV-2 coronavirus
22.03.2020	Characterisation of the transcriptome and proteome of SARS-CoV-2 using direct RNA sequencing and tandem mass spectrometry reveals evidence for a cell passage induced in-frame deletion in the spike glycoprotein that removes the furin-like cleavage site	bioRxiv (not peer reviewed) / Article	• Direct RNA sequencing using an Oxford Nanopore MinION characterised the transcriptome of SARS-CoV-2 grown in Vero E6 cells. • Detection of an apparently viable deletion in the furin cleavage site of the S glycoprotein reinforces the point that this and other regions of SARS-CoV-2 proteins may readily mutate - this is of clear significance given the interest in the S glycoprotein as a potential vaccine target and the observation that the furin cleavage site likely contributes strongly to the pathogenesis and zoonosis of this virus.
22.03.2020	A SARS-CoV-2-Human Protein-Protein Interaction Map Reveals Drug Targets and Potential Drug-Repurposing	bioRxiv (not peer reviewed) / Article	• The authors cloned, tagged and expressed 26 of the 29 viral proteins in human cells and identified the human proteins physically associated with each using affinity-purification mass spectrometry (AP-MS), which identified 332 high confidence SARS-CoV-2-human protein-protein interactions (PPIs). •They identified 67 druggable human proteins or host factors targeted by 69 existing FDA-approved drugs, drugs in clinical trials and/or preclinical compounds, that they are currently evaluating for efficacy in live SARS-CoV-2 infection assay.
20.03.2020	Emergence of SARS-CoV-2 through Recombination and Strong Purifying Selection	bioRxiv (not peer reviewed) / Article	• This paper shows evidence of strong purifying selection around the receptor binding motif (RBM) in the spike gene and in other genes among bat, pangolin and human coronaviruses, indicating similar strong evolutionary constraints in different host species. • It also demonstrate that SARS-CoV-2's entire RBM was introduced through recombination with coronaviruses from pangolins, possibly a critical step in the evolution of SARS-CoV-2's ability to infect humans.
22.03.2020	Protein Structure and Sequence Reanalysis of 2019-nCoV Genome Refutes Snakes as Its Intermediate Host and the Unique Similarity between Its Spike Protein Insertions and HIV-1	Journal of Proteome Research	• The alignments of the spike surface glycoprotein receptor binding domain revealed four times more variations in the bat coronavirus RaTG13 than in the Manis coronavirus compared with 2019-nCoV, suggesting the pangolin as a missing link in the transmission of 2019-nCoV from bats to human.
08.02.2020	The immune vulnerability landscape of the 2019 Novel Coronavirus, SARS-CoV-2	bioRxiv (not peer-reviewed) / Article	• The authors investigated the potential of the SARS-CoV-2 viral proteins to induce class I and II MHC presentation and to form linear antibody epitopes.

			• Using an online database, they showed that genetic variations in SARS-CoV-2, though still few for the moment, already follow the pattern of mutations in related coronaviruses, and could alter the immune vulnerability landscape of this virus. • Importantly, they discovered evidence that SARS-CoV-2, along with related coronaviruses, used mutations to evade attack from the human immune system.

Epidemiology and clinical

Publication Date	Title/URL	Journal/Subject/Type	Digest
22.03.2020	Hypertension and Diabetes Delay the Viral Clearance in COVID-19 Patients	medRxiv (not peer-reviewed) / Article	• To dissect the underlying diseases that could impact on viral clearance, the authors enrolled 106 COVID-19 patients who were hospitalized in the Zhongnan Hospital of Wuhan University, Wuhan, China between Jan 5 and Feb 25, 2020. • They conclude that patients at old age, males, and/or having diseases associated with high expression of ACE2 will have worse prognosis during a COVID-19 infections
24.03.2020	Commentary: COVID-19 in Patients with Diabetes	Metabolism / Article in press	• There is an increased incidence of COVID-19 in patients with diabetes. • Diabetes increases morbidity and mortality in diabetic patients with COVID-19. • Glycaemic control in important in those with coexistence of COVID-19 infection and diabetes.
24.03.2020	Diabetes patients with COVID-19 need better care	Metabolism / Article in press	• In order to investigate current blood glucose (BG) management of the patients with both diabetes and COVID-19, the authors retrospectively analysed 29 inpatients diagnosed with type-2 diabetes and laboratory-confirmed COVID-19 and admitted to a designated isolation medical centre in Wuhan from February 13th to March 1st. • These results suggested a failure of current BG management strategies for patients suffering both diabetes and COVID-19, especially that of postprandial BG. • The authors suggest ways to improve the BG management of these patients.
21.03.2020	Effect of SARS-CoV-2 infection upon male gonadal function: A single center-based study	medRxiv (not peer-reviewed) / Article	• This study provides the first direct evidence about the influence of COVID-19 on male sex hormones, alerting more attention to gonadal function evaluation among patients recovered from SARS-CoV-2 infection.
21.03.2020	Epidemiological parameters of coronavirus disease 2019: a pooled analysis of publicly	medRxiv (not peer-reviewed) / Article	• Between late February and early March of 2020, the individual data of laboratory confirmed cases of COVID-19 were retrieved from 10728 publicly

	reported individual data of 1155 cases from seven countries		available reports released by the health authorities of and outside China and from 1790 publications. • In total, 1155 cases from China, Japan, Singapore, South Korea, Vietnam, Germany and Malaysia were included for the final analysis. • R0 was estimated to be 1.70 and 1.78 based on two different formulas • The findings support current practice of 14-day quarantine of persons with potential exposure, but also suggest that longer monitoring periods might be needed for selected groups
22.03.2020	A comparative multi-centre study on the clinical and imaging features of confirmed and unconfirmed patients with COVID-19	medRxiv (not peer-reviewed) / Article	• Describes clinical and imaging features of confirmed and unconfirmed patients with COVID-19 • Most patients with COVID-19 had a definite epidemiological history of exposure in Wuhan or to infected patients. • The clinical symptoms of COVID-19 were nonspecific, largely fever and dry cough. • The reduced white blood cell count, lymphocytes count and ESR could be used as a reference index for clinical diagnosis of COVID-19, and chest CT could become an effective clinical diagnostic tool for screening patients with suspected COVID-19, but the final diagnosis still needs to be combined with the results of RT-PCR tests.
19.03.2020	A review of the 2019 Novel Coronavirus (COVID-19) based on current evidence	Int J Antimicrob Agents / Review	• Systematically summarizes the epidemiology, clinical characteristics, diagnosis, treatment and prevention of knowledge surrounding COVID-19. • The specific mechanism of the virus remains unknown, and specific drugs for the virus have not been developed.
24.03.2020	Clinical features and obstetric and neonatal outcomes of pregnant patients with COVID-19 in Wuhan, China: a retrospective, single-centre, descriptive study	Lancet Infectious Diseases / Article	• Seven patients, admitted to Tongji Hospital from Jan 1, to Feb 8, 2020, were included in this study. • The mean age of the patients was 32 years (range 29–34 years) and the mean gestational age was 39 weeks plus 1 day (range 37 weeks to 41 weeks plus 2 days). • The maternal, foetal, and neonatal outcomes of patients who were infected in late pregnancy appeared very good, and these outcomes were achieved with intensive, active management that might be the best practice in the absence of more robust data.
24.03.2020	Clinical Characteristics of Children with Coronavirus Disease 2019 in Hubei, China	Current Medical Science / Original paper	• Of 25 hospitalized children with COVID-19, the boy to girl ratio was 1.27:1. The median age was 3 years. • Children were susceptible to COVID-19 like adults, while the clinical presentations and outcomes were more favourable in children. • Children less than 3 years old accounted for majority cases and critical cases

			lied in this age group, which demanded extra attentions during home caring and hospitalization treatment.
24.03.2020	Covid-19 pandemic and the skin - What should dermatologists know?	Clinics in Dermatology / Not peer-reviewed	• Despite the virus not being dermatotropic, several skin conditions have emerged, mainly as a result of prolonged contact to personal protective equipment and excessive personal hygiene. • Pressure injury, contact dermatitis, itch, pressure urticaria, and exacerbation of pre-existing skin diseases, including seborrheic dermatitis and acne, have been described.
24.03.2020	COVID-19 in Europe: the Italian lesson	Lancet / Correspondence	• This piece includes a useful chart showing virus trajectories for different European countries. • The authors urge all countries to acknowledge the Italian lesson and to immediately adopt very restrictive measures to limit viral diffusion, ensure appropriate health-system response, and reduce mortality, which appears to be higher than previously estimated, with a crude case-fatality rate of almost 4%.
21.03.2020	Myocardial injury is associated with in-hospital mortality of confirmed or suspected COVID-19 in Wuhan, China: A single center retrospective cohort study	medRxiv (not peer-reviewed) / Article	• Investigated the association between cardiac injury and in-hospital mortality of patients with confirmed or suspected COVID-19. • Cardiac injury defined by hs-cTnI elevation and elevated d-dimer on admission were risk factors for in-hospital death, while higher SpO2 could be seen as a protective factor, which could help clinicians to identify patients with adverse outcome at the early stage of COVID-19.
24.03.2020	National UK programme of community health workers for COVID-19 response	Lancet / Comment	• The authors propose a large-scale emergency programme to train community health workers (CHWs) to support people in their homes, initially the most vulnerable but with potential to provide a long-term model of care in the UK. • Experience from Brazil, Pakistan, Ethiopia, and other nations shows how a coordinated community workforce can provide effective health and social care support at scale.
24.03.2020	Action at a Distance: Geriatric Research during a Pandemic	Journal of the American Geriatrics Society / Brief report	• Recommendations for clinical researchers working with older adults during the COVID-19 pandemic are discussed.
25.03.2020	[Treatment strategies for colorectal cancer patients in tumor hospitals under the background of corona virus disease 2019]	Chinese Journal of Gastrointestinal Surgery / Chinese article	• By summarizing the research on diagnosis and treatment of people with colorectal cancer, the authors improve treatment strategies in order to provide more choices for patients to obtain the best treatment under the severe epidemic situation of new coronavirus pneumonia.
24.03.2020	Coronavirus Disease (COVID-19): A primer for emergency physicians	American Journal of Emergency Medicine / Article in press	• This narrative review provides clinicians with an updated approach to the evaluation and management of patients presenting to the emergency department with suspected COVID-19.

			• Emergency physicians should focus on identifying patients at risk, isolating suspected patients, and informing hospital infection prevention and public health authorities.

Infection control

Publication Date	Title/URL	Journal/Subject/Type	Digest
24.03.2020	Evidence of initial success for China exiting COVID-19 social distancing policy after achieving containment	Imperial College / Report	• The results of this study suggest that after very intense social distancing which resulted in containment, China has successfully exited their stringent social distancing policy to some degree.
24.03.2020	2019-ncov's epidemic in middle province of northern Italy: impact, logistic & strategy in the first line hospital	Disaster Medicine and Public Health Preparedness / Article	• The first line Hospital had to redesign its logistical and departmental structure to respond to the influx of 2019-ncov positive patients who needed hospitalisation. • Logistical and structural strategies were guided by the crisis unit, managing in 8 days from the beginning of the epidemic to prepare the hospital ready to welcome more than 200 positive COVID19 patients with different ventilatory requirements, keeping clean emergency access lines and restoring surgical interventions and deferred urgent ordinary activity.
23.03.2020	Novel 2019 Coronavirus SARS-CoV-2 (COVID-19): An Updated Overview for Emergency Clinicians	Emergency Medicine Practice / Overview	• In preparation for the arrival of patients suffering from COVID-19, emergency departments (EDs), hospitals, and healthcare systems should make immediate and necessary structural and process changes to prepare for high volumes of patients, primarily in respiratory distress, who will require mechanical support.
23.03.2020	What is the efficacy of standard face masks compared to respirator masks in preventing COVID-type respiratory illnesses in primary care staff?	Oxford COVID-19 Evidence Service / Briefing	• Trials comparing different kinds of mask have been summarised in a recent high quality systematic review and provide cautious support for the use of standard surgical masks in non AGPs, though the empirical studies underpinning this conclusion were not in a COVID-19 population, and only one was in a community setting. • It is clear from the literature that masks are only one component of a complex intervention which must also include eye protection, gowns, behavioural measures to support proper doffing and donning, and general infection control measures - these wider aspects of PPE will be covered in a further rapid review (ongoing)
24.03.2020	The Battle Against Coronavirus Disease 2019 (COVID-19): Emergency Management and Infection Control in a Radiology Department	Journal of the American College of Radiology / Not peer-reviewed	•Describes emergency management and infection control in a radiology department • Emergency management and sensing control teams were set up. The teams formulated various measures, such as reconfiguration of the radiology department, personal protection and staff training, standardized imaging

			examination procedures for fever patients and common patients, etc. • From January 21 to March 9, 3,083 people underwent fever-CT examinations. Including the initial examination and re-examination, the total number of fever CT examination is 3,340. • As a result of our precautions, none of the staff of the radiology department was infected with COVID-19.
24.03.2020	Chronology of COVID-19 cases on the Diamond Princess cruise ship and ethical considerations: a report from Japan	Disaster Medicine and Public Health Preparedness / Article	• Denying a ship's entry based on local politics is incompatible with global justice. • Events such as these require an international response and global regulations that seek to reduce disparities. • The ethical considerations related to cruise ship infection control include the reasonable justification for isolation, the psychological fragility and quality of life of the isolated passengers and crew members, the procedural justice inherent in a forced quarantine, and the optimization of control measures.
24.03.2020	What are good ways to address the shortage of face masks by anesthesiologists?	Stanford Medicine / Briefing	• Frontline health care workers across the United States report shortages of PPE ranging from gloves, protective gowns, eye wear and face masks. • It is unknown how wearing the same mask multiple times effects the fit of N95 masks [NIOSH] • NIOSH states “there is no way of determining the maximum possible number of safe reuses for an N95 respirator as a generic number to be applied in all cases” and advise to “discard N95 respirators following use during aerosol generating procedures.” • Some methods of N95 mask disinfection can maintain filtration efficiency; their effect on mask fit is unknown, and these methods are not approved by NIOSH
24.03.2020	COVID-19: Global Radiation Oncology’s Targeted Response for Pandemic Preparedness	Clinical and Translational Radiation Oncology / Article in press	• Measures are required to reduce infection spread between patients and within the workforce. • The radiation oncology community held an urgent online journal club in March 2020 to discuss these issues and create some consensus on urgent next steps. This document summarises these discussions around themes of infection prevention, rationalisation of workload and working practice in the presence of infection.
15.03.2020	Preparedness, prevention and control of COVID-19 in prisons and other places of detention	World Health Organization / Interim guidance	• Four transmission scenarios that could be experienced by countries at the subnational level have been defined for COVID-19, and countries should therefore adjust and tailor their approach to the local context. • Countries should prepare to respond to different public health scenarios, recognizing that there is no one-size-fits-all approach to managing cases and outbreaks of COVID-19.

21.03.2020	Infection Control of 2019 Novel Corona Virus Disease (COVID-19) in Cancer Patients undergoing Radiotherapy in Wuhan	medRxiv (not peer-reviewed) / Article	• The authors report the infection control measures and early outcomes of patients who received radiotherapy (RT) at a tertiary cancer centre in Wuhan. • They show that in a susceptible population to COVID-19, strict infection control measures can curb human-to-human transmission, and ensure timely delivery of RT to cancer patients.

Treatment

Date of publication	Journal / Publication type	Journal / Publication type	Digest
25.03.2020	Ribavirin, Remdesivir, Sofosbuvir, Galidesivir, and Tenofovir against SARS-CoV-2 RNA dependent RNA polymerase (RdRp): A molecular docking study	Life Sciences / Not peer reviewed	• The availability of FDA-approved anti-RdRp drugs can help treat patients and reduce the danger of the mysterious new viral infection COVID-19. • The drugs mentioned above can tightly bind to the RdRp of the SARS-CoV-2 strain and thus may be used to treat the disease. • No toxicity measurements are required for these drugs since they were previously tested prior to their approval by the FDA.
21.03.2020	Meplazumab treats COVID-19 pneumonia: an open-labelled, concurrent controlled add-on clinical trial	medRxiv (not peer-reviewed) / Article	• The authors aimed to assess the efficacy and safety of meplazumab, a humanized anti-CD147 antibody, as add-on therapy in patients with COVID-19 pneumonia. • Meplazumab efficiently improved the recovery of patients with SARS-CoV-2 pneumonia with a favourable safety profile - our results support to carry out a large-scale investigation of meplazumab as a treatment for COVID-19 pneumonia.
22.03.2020	First Clinical Study Using HCV Protease Inhibitor Danoprevir to Treat Naive and Experienced COVID-19 Patients	medRxiv (not peer-reviewed) / Article	• In the current clinical study conducted at the Nineth Hospital of Nanchang, The authors evaluated therapeutic effects of danoprevir, boosted by ritonavir, on treatment naive and experienced COVID-19 patients. • The data from this small-sample clinical study showed that danoprevir boosted by ritonavir is safe and well tolerated in all patients. • After 4 to 12-day treatment of danoprevir boosted by ritonavir, all eleven patients enrolled, two naive and nine experienced, were discharged from the hospital. • The findings suggest that repurposing danoprevir for COVID-19 is a promising therapeutic option.
25.03.2020	[Several suggestions of operation for colorectal cancer under the outbreak of corona virus disease 2019 in China]	Chinese Journal of Gastrointestinal Surgery / Chinese article	• The authors introduce in detail the operative management and perioperative management of colorectal surgery patients suspected or diagnosed with new coronary pneumonia, including prevention and control measures for medical staff, operating rooms and surgical instruments.

24.03.2020	Immunosuppression for hyperinflammation in COVID-19: a double-edged sword?	Lancet / Correspondence	• The authors hypothesise that approaches such as corticosteroids or Janus kinase (JAK) inhibitors could be considered if hyperinflammation is present. • The decision to pharmacologically immunosuppress a critically unwell patient with COVID-19 remains a difficult one. • Possible beneficial effects of reducing inflammation should be carefully weighed up against the potential for deleterious impairment of anti-microbial immunity.
23.03.2020	COVID-19: Melatonin as a potential adjuvant treatment	Life Sciences / Not peer reviewed	• Melatonin has a high safety profile, and is effective in critical care patients by reducing vessel permeability, anxiety, sedation use, and improving sleeping quality, which might also be beneficial for better clinical outcomes for COVID-19 patients. • There is significant data showing that melatonin limits virus-related diseases and would also likely be beneficial in COVID-19 patients.

Social sciences

Date of publication	Journal / Publication type	Journal / Publication type	Digest
22.03.2020	Analysis of psychological state and clinical psychological intervention model of patients with COVID-19	medRxiv (not peer-reviewed) / Article	• Understanding the psychological state of patients with pneumonia, especially patients with COVID-19, can help clinicians to systematically identify patients vulnerable to psychological pain, and provide targeted psychosocial interventions to improve the mental health of patients.
22.03.2020	High risk of infection caused posttraumatic stress symptoms in individuals with poor sleep quality: A study on influence of coronavirus disease (COVID-19) in China	medRxiv (not peer-reviewed) / Article	• The present study aimed to examine sleep problems and posttraumatic stress symptoms (PTSS) in Chinese immediately after the massive outbreak of COVID-19 - a total of 2027 Chinese participated. • The results indicate that keeping good sleep quality in individuals with high infectious risk is a way to prevent PTSS.

Miscellaneous

Date of publication	Journal / Publication type	Journal / Publication type	Digest
21.03.2020	Characterizing occupations that cannot work from home: a means to identify susceptible worker groups during the COVID-19 pandemic	medRxiv (not peer-reviewed) / Article	• The workers in occupations that have minimal computer use, and high interaction with the public are least likely to be able to work from home during a public health emergency. These workers could also be at an increased risk for job displacement if public-facing establishments close or alter their business model in the face of increased public health restrictions. Occupations where working from home is not possible tend to have lower annual median incomes

			than occupations where working from home is possible, increasing the vulnerability of these workers.
23.03.2020	COVID-19 and Sustainable Healthcare Systems	Evidence Aid / Opinion	• Existing research should be identified that can support the delivery of interventions that maximise the impact of available resources and identify areas where costs can be reduced with the minimum possible impact. • This will include identifying cost-effective interventions, actions and strategies, which offer good value for money, and efficient interventions, actions and strategies, even those which may be comparatively less effective, that open up resources to be used in cost-effective ways elsewhere.

Modelling

Date of publication	Journal / Publication type	Journal / Publication type	Digest
22.03.2020	Estimating excess 1- year mortality from COVID-19 according to underlying conditions and age in England: a rapid analysis using NHS health records in 3.8 million adults	medRxiv (not peer-reviewed) / Article	• They authors provide the public, researchers and policy makers a simple model to estimate the excess mortality over 1 year from COVID-19, based on underlying conditions at different ages. • If the relative mortality impact of COVID-19 were to be about 20% (similar magnitude as the established winter vs summer mortality excess), then the excess deaths would be 0 when 1 in 100 000 (suppression), 13791 when 1 in 10 (mitigation) and 110332 when 8 in 10 are infected (do nothing) scenario.
24.03.2020	Identifying Locations with Possible Undetected Imported Severe Acute Respiratory Syndrome Coronavirus 2 Cases by Using Importation Predictions	Emerging Infectious Diseases / Early release article - not final version	• The authors used air travel volume estimates from Wuhan, China, to international destinations and a generalized linear regression model to identify locations that could have undetected imported cases. • The model can be adjusted to account for exportation of cases from other locations as the virus spreads and more information on importations and transmission becomes available.
22.03.2020	Social distancing strategies for curbing the COVID-19 epidemic	medRxiv (not peer-reviewed) / Article	• The amount of social distancing needed to curb the SARS-CoV-2 epidemic in the context of seasonally varying transmission remains unclear. • Using a mathematical model, the authors assessed that one-time interventions will be insufficient to maintain COVID-19 prevalence within the critical care capacity of the United States. • Seasonal variation in transmission will facilitate epidemic control during the summer months but could lead to an intense resurgence in the autumn - intermittent distancing measures can maintain control of the epidemic, but without other interventions, these measures may be necessary into 2022.

25.03.2020	Fundamental principles of epidemic spread highlight the immediate need for large-scale serological surveys to assess the stage of the SARS-CoV-2 epidemic	University of Oxford / Not peer-reviewed - INCLUDED DUE TO MEDIA INTEREST	• This article was prepared by researchers from the University of Oxford and has been included today because it has been reported in the Financial Times (https://www.ft.com/content/5ff6469a-6dd8-11ea-89df-41bea055720b). • No other link has been found, and therefore it is not clear if it is officially published.
21.03.2020	A New, Simple Projection Model for COVID-19 Pandemic	medRxiv (not peer-reviewed) / Article	• With the worldwide outbreak of COVID-19, an accurate model to predict how the coronavirus pandemic will evolve becomes important and urgent to help policy makers in different countries address the epidemic outbreak and determine policies to control spread more efficiently and effectively. • Unlike the classic public health and virus propagation models, this new projection model takes government intervention and public response into account to make reliable projections of the outbreak 10 days to 2 weeks in advance
21.03.2020	Predicting the number of reported and unreported cases for the COVID-19 epidemic in South Korea, Italy, France and Germany	medRxiv (not peer-reviewed) / Article	• The authors model the COVID-19 coronavirus epidemic in South Korea, Italy, France, and Germany. • They use early reported case data to predict the cumulative number of reported cases to a final size. • The key features of our model are the timing of implementation of major public policies restricting social movement, the identification and isolation of unreported cases, and the impact of asymptomatic infectious case
22.03.2020	Mechanistic-statistical SIR modelling for early estimation of the actual number of cases and mortality rate from COVID-19	medRxiv (not peer-reviewed) / Article	• The authors developed a 'mechanistic-statistical' approach coupling a SIR ODE model describing the unobserved epidemiological dynamics, a probabilistic model describing the data acquisition process and a statistical inference method. • The actual number of infected cases in France is probably much higher than the observations: we find here a factor x15 (95%-CI: 4-33), which leads to a 5.2/1000 mortality rate (95%-CI: 1.5/1000-11.7/1000) at the end of the observation period. • We find a R0 of 4.8, a high value which may be linked to the long viral shedding period of 20 days.
22.03.2020	The impact of temperature and absolute humidity on the coronavirus disease 2019 (COVID-19) outbreak - evidence from China	medRxiv (not peer-reviewed) / Article	• Temperature is an environmental driver of the COVID-19 outbreak in China. • Lower and higher temperatures might be positive to decrease the COVID-19 incidence. • M-SEIR models help to better evaluate environmental and social impacts on COVID-19.

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