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RCEM COVID-19 CPD Journal club
Weekly top 5 papers
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This week's flash update comes from EIRN @EIRN_Ireland, Emergency Innovation Research Network. We are a collaborative research team working out of Cork University Hospital Emergency Department, Ireland. We promote and develop evidence based practice among the emergency medicine multi disciplinary team with a particular interest in trauma, paediatric emergency medicine & pre-hospital emergency medicine.

We have sorted through over 800 papers and here are the papers that deserve your attention.

As always they have been split into 3 categories that will allow you to focus on the papers that are most vital to your practice.

- Worth a peek: interesting, but not yet ready for prime time
- Head Turner: new concepts
- Game Changer: this paper should change practice

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Assessing a novel, lab-free, point-of-care test for SARS-Cov-2 (CovidNudge): a diagnostic accuracy study by Gibani et al [1]

Topic: Emergency Medicine and COVID-19

Rating: Head Turner

Scout: Joseph Slowey and Conor Deasy

Between April and May 2020, the National Institute of Health Research (NIHR), conducted a diagnostic accuracy study of the CovidNudge, point of care (POC) test for Covid 19, across three clinical sites in the UK: St. Mary's Hospital, Imperial Healthcare NHS Trust, London: and the John Radcliffe Hospital, Oxford University Hospitals NHS foundation Trust, Oxford. The results could be important in safely improving flow in our Emergency Departments (EDs).

The numbers sampled were small (n=386 paired samples) and the confidence intervals around the point estimates of sensitivity and specificity were large for subgroups analyzed, who included health-care workers (n=280), ED patients (n=15), and hospital admissions (n=91). Power calculations were not provided. These confidence intervals would be tightened by increasing the number of paired samples from each subgroup.

Overall, the sensitivity of this point of care test, that is the ability of the test to rule out COVID 19 infection in the presence of a negative test, was 94%. This is of key importance in our ED population as we will make decisions on cohorting admissions or releasing patients into the community based on their clinical appearance and COVID 19 test result and inevitably the test result will carry weight and potentially bias our decision making. The confidence interval was 86-98% when checked against the gold standard lab based PCR test which we know to also provide false negative results, although the baseline gold standard lab based PCR performance was not provided in this paper. So, bottom line is, we'd like to see more reassuring data to prove we can rely on this point of care test to support decision making in our EDs before we flash the cash and spend money implementing this POC test.

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COVID-19 infection in children and adolescents by Naja et al [2]
Topic: Paediatric review
Rating: Worth a peek
Scout: Ronan Callanan and Rory O'Brien

A nice tidy summary on the epidemiology, diagnostics, clinical features and management of under 18s with COVID 19. The prevalence is significantly lower in children than in adults due to possible differences between immature and mature lung tissue, potential cross protection and a greater proportion of asymptomatic carriers among children. Children are vulnerable to the virus via a household cluster however unlikely to actually be the index case. There is limited evidence available on transmission in breast milk or vertical transmission during child birth. Studies have a wide range from 10% - 90% with regard to the amount of children who are asymptomatic, with a retrospective study of 2141 children demonstrated critical illness most prevalent in infants.

Clinical features are similar to adults (sore throat, cough, diarrhoea, vomiting) with adolescents also complaining of dizziness, myalgia and fatigue. 2 studies demonstrated positive rectal swabs with negative nasopharyngeal swabs which raises the possibility of persistent viral shedding in stool. Admission to PICU is rare as is death.

Reverse transcriptase polymerase chain reaction testing remains our "go to" for diagnosis with chest x-ray changes similar to adults: bronchial thickening, ground glass opacities.
A small number of children develop paediatric multisystem inflammatory syndrome which shares features with Kawaski disease, toxic shock syndrome and sepsis. In 2 separate case series the majority of patients had a negative PCR and positive SARS Cov-2 antibodies which describes a rare but severe syndrome as a post infection inflammatory response rather than primary infection. With regard to antiviral and immunomodulating treatment a recommendation has been issued by The Royal College of Paediatrics and Child Health that such interventions should only be considered in a clinical trial setting.

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Diagnostic performance of initial blood urea nitrogen combined with D-dimer levels for predicting in-hospital mortality in COVID-19 patients by Cheng et al [3]

Topic: Prognosis

Rating: Worth a peek

Scout: Stephen Gilmartin and Eoin Fogarty

Early identification of critically ill COVID-19 patients combined with initiation of supportive care, can reduced the incidence of in hospital mortality. This study evaluated the association between BUN and D-Dimer levels on admission to hospital with in hospital mortality in COVID-19 patients. In this retrospective review, the authors looked at 305 COVID-19 patients admitted to Tonji hospital in Wuhan China. 85(27.9%) patients died and 220(72.1%) survived. A univariable regression analysis found increasing age, male sex, hypertension, cardiovascular disease and increasing levels of BUN and D-Dimer were all associated with higher risk of death. Patients were divided into categories dependent on median laboratory values and Kaplan-Meier analysis was performed; BUN (low <4.6mmol/l and high>4.6mmol/l) and D-Dimer (low<0.845ug/l and high>0.845/l). This revealed significant mortality difference between high and low groups for both laboratory tests. Area under the curve(AUC) was calculated for BUN(0.88),D-dimer(0.88) and combined BUN and D-Dimer(0.94). A combination of BUN >5.95 and D-Dimer>2.56 had a sensitivity of 0.85 and specificity of 0.91 for predicting in hospital mortality. This study has some limitations, it was performed retrospectively in a single centre hospital which had been identified as a centre for critically ill COVID-19 patients, this will lead to some selection bias for prognostic research.

Higher initial BUN and D-Dimer levels were associated with in hospital mortality in patients with COVID-19. These values should be used along with patient's age and co-morbidities to aid early identification of patients at risk of death.

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Prone positioning in patients treated with non-invasive ventilation for COVID-19 pneumonia in an Italian emergency department by Bastoni et al [4]

Topic: Therapeutics

Rating: Worth a peek

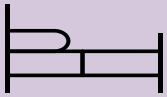
Scout: Michael Dunphy and Darren McLoughlin

The Covid-19 pandemic has the potential to create an overwhelming burden on health care resources. Faced with patients in the Emergency Department in acute respiratory failure waiting on ICU beds and driven by the need to ameliorate the respiratory distress amongst those patients, this small study looked at prone ventilation of patients receiving Non-Invasive Ventilation in the ED. The inclusion criteria were those patients who were not for rapid intubation, were receiving helmet NIV CPAP without improvement in arterial gas measurements, and were awake and collaborative and without any co-morbidity that would prevent therapy escalation under national guidelines.

Ten patients were selected. All patients were receiving NIV CPAP for a median time of 19 hours and all patients had developed severe hypoxaemia (median PaO2/FiO2 ratio 68±5mm Hg). Patients were placed in the prone position and commenced on a morphine infusion of 20–30mg/day to improve patient compliance. 6 patients completed the cycle of prone ventilation. Lack of compliance, pain control, and refusal were the reasons for non-completion.

The effects of pronation were assessed in two ways: improvement in PaO2/FiO2 ratio and changes in point of care ultrasound. After 1hour of proning, ABG measurements showed an improvement in PaO2/FiO2 ratio for all the patients(median 97±8mm Hg).

Lung US after 1hour of prone position showed no differences in findings.
All six patients were admitted to ICU.



Although proning in the ED did not prevent ICU admission, prone NIV CPAP is feasible and easily performed. It results in improved oxygenation and could be considered for patients non-responsive to traditional NIV CPAP as a bridge prior to more invasive management in critical care.

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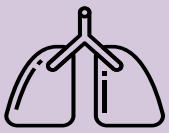
Chest X-ray features of SARS-CoV-2 in the emergency department: a multi-center experience from northern Italian hospitals by Ippolito et al [5]
Topic: Radiology, retrospective review
Rating: Game Changer
Scout: Andrew Patton and Adrian Murphy

This paper describes the chest x-ray (CXR) findings of patients confirmed with SARS-CoV-2 treated at two northern Italian emergency departments (EDs) during March 2020. This is highly relevant to Emergency Medicine as CXRs are a routine and easily accessible investigation in the ED. The findings of this paper suggest a tendency to the development of interstitial and/or alveolar infiltrates in patients with SAR-CoV-2, which may heighten clinical suspicion for the presence of this disease.

This is a retrospective review of CXRs performed on 468 consecutive SARS-CoV-2 positive patients presenting to two EDs in northern Italy. The images were reviewed blindly and independently by two radiologists, looking for a pre-determined list of parenchymal abnormalities and their location.

The most common CXR findings were interstitial opacities (71.1%) and alveolar (60.5%) opacities. Frequently these were bilateral (64.5%) in nature and had a peripheral pattern (62.5%), with distribution slightly predominant in the lower lung. These pulmonary changes were more likely seen on CXRs of patients who presented to the ED after five days from onset of symptoms. These findings were more commonly observed in older patients in contrast to the younger population.



Patients with SARS-Cov-2 infection appear to have identifiable pathological changes on CXR, which is important for the Emergency Clinician to be aware, as it could greatly contribute to their diagnostic work-up.

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Game changer summary

Ippolito et al gives us definitive data on pathological features of COVID-19 CXR in the ED [5]

In summary

Gibani et al are looking for more reassuring data with regard to a POC test for COVID-19 [1]

Naja et al reviewed the epidemiology, clinical characteristics, diagnostic pathway and treatments for paediatric patients with COVID 19. The authors advocate for paediatric immunomodulating and antiviral treatment to be used solely in a clinical trial setting [2]

Cheng et al describe that higher initial BUN and D-Dimer levels on initial attendance are associated with higher risk of in hospital mortality, may help us zero in on those high risk patients [3]

Bastoni et al demonstrated proning in the ED did not prevent ICU admission but offered improved oxygenation while circling the intubation drain [4]

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