

### **NOVEL CORONAVIRUS (COVID-19) EPIDEMIC**

Corona means crown in Latin. The now infamous Corona virus got its name from a spiky crown of glycoproteins on its surface. This RNA virus typically infects mammals and birds. It has caused two previous human outbreaks - SARS CoV and MERS CoV. The SARS CoV epidemic, which began in a hotel in Hong Kong in 2002-2003, infected 8098 cases with a mortality of 10%. The 2012 MERS CoV outbreak in the Middle East had infected 855 cases with a mortality of 37%. In the current Coronavirus epidemic in China the first case was reported in Wuhan on 1st December, 2019 and as of 9 February, the total number of cases documented officially had crossed 37,000 and it appears to have a mortality of 2-3%.

The virus seems to have originated in the Huanan seafood market in Wuhan in China and was probably transmitted by pangolins (ant eater) to humans. In the first article published in the Lancet, the clinical symptoms of 41 patients (median age 49 year) infected with the COVID-19 included fever, cough, myalgia, hemoptysis and dyspnea. Investigations revealed lymphopenia, bilateral fluffy shadows or ground glass appearance on the chest X ray and elevated cytokines and troponin I in the critically ill patients. Of the 41 patients, one third were admitted to ICU and 6 died. Diagnosis is being made using RT-PCR and treatment includes supportive care and empirical use of antivirals including oseltamivir, lopinavir and ritonavir.

Incubation period appears to be 2-14 days. Unlike SARS and MERS CoV, which had gastrointestinal symptoms in 20-25%, these are rare in the COVID-19 infection. However, a subsequent study published in JAMA analyzed 138 patients of whom 40 were health care workers. In this series, a patient admitted in a surgical ward with abdominal symptoms went on to infect 10 more healthcare workers. The high mortality appears to be due to a cytokine storm; though, the use of corticosteroids in these patients did not appear to improve outcomes and also delayed viral clearance. Medical personal are advised to use fitted N95 respiratory masks to limit exposure besides routine precautions of hand washing and precautions with aerosol.

*(The Lancet 29 Jan 2020; JAMA 7 Feb 2020)*

### **THE ROBOT RADIOLOGIST**

The use of artificial intelligence (AI) in radiology has recently skyrocketed. A 2018 market survey found that 84% of radiology clinics in the US were either using or planning to use artificial intelligence systems. However, the data and algorithms that these systems use to make a diagnosis are sometimes inexplicable to humans. This is called the black box problem. A case pinpoint would be a study published in 2019 in JAMA Network Open studied 85000 chest X rays in people followed over 12 years. Raw data is fed into the computer and then the computer creates its own algorithms to predict outcomes. This

is called deep learning. Impressed by the accuracy of the programs predictive ability, when researchers analyzed what it was the computer used to predict mortality, many unusual data was noticed. For example, one parameter the computer used was regions below the shoulder which has no known medical significance. Retrospectively it is felt that the parameter represents flexibility and hence may predict mortality. This discordance of human and computer-aided thought process is called the black box problem since it is virtually invisible to human understanding.

What is still unclear is that if medical AI systems make a mistake who will bear the responsibility. One way around the problem is to develop transparent systems which explain the factors taken into building the algorithm at every stage. Another variable in medical AI systems is that they change and improve over time as they get access to more data and their performance is in constant flux. For now the FDA has developed guidelines for algorithms which evolve over time.

It appears that AI may not replace radiologists in the near future, but “*radiologists who use AI will replace radiologists who do not.*”

*(Scientific American 1 February 2020)*

### **DRONE DELIVERY OF BLOOD PRODUCTS**

In the East African nation of Rwanda, medical history is being quietly written. On 21 December, 2016, a 2-year-old girl with severe malaria became the first person to receive a drone delivery of packed RBCs. Since then, more than 4000 units of blood products have been delivered using drones by a US-based startup called Zipline. This technology has reduced the time to deliver blood products in remote areas from nearly 3 or more hours to barely 15 minutes. Till some years ago maternal mortality due to postpartum hemorrhage was a huge problem in Rwanda. The rapid delivery of blood has helped to save precious lives.

It all began when robotics expert Keller Rinaudo and aviation expert Will Hetzler met public health researcher Zachary Mtema in Tanzania. For many of the critical medical problems like availability of blood products, anti-snake venom and anti-rabies immunoglobulins, drone delivery seemed to be an ideal solution. A company was founded and a deal struck with the Rwandan government to build a distribution center near Muhanga. The companies drones, deliver medical supplies within an 80 Km radius of a distribution center. The cost per service is same as the previous motorcycle service but more reliable. In India, Maharashtra has announced that Zipline will provide emergency medicines in the entire state this year. These drones have been listed on Time magazine’s best inventions of 2018.

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