First prospective study of critically ill COVID-19 patients in NYC

20 May 2020

Credit: CC0 Public Domain

The largest prospective study of adult COVID-19 patients in USA to date confirms that critical illness is common among hospitalized patients (22%, 257/1150). Critically ill COVID-19 patients frequently require mechanical ventilation (79%, 203/257) and death rates among such patients are high (39%, 101/257). Risk factors associated with in-hospital death, including older age and chronic heart and lung disease, are consistent with reports from Italy, China and the UK.

A detailed report from 257 COVID-19 patients admitted to two hospitals in New York City, USA from 2 March to 1 April 2020, and followed for at least 28 days, is published today in *The Lancet*, offering a snapshot of how the virus affects adults requiring hospital care.

The study reports a high incidence of critical illness (22%, 257/1150) and a high dependency on mechanical ventilation to support breathing in critically ill patients (79%, 203/257). The researchers say this has important implications for US hospital systems and specifically the need to prepare for large numbers of patients requiring intensive care.

The findings mirror reports from China, Italy and the UK, with older age and pre-existing conditions being the strongest risk factors associated with poor outcomes.

Dr. Natalie Yip, one of the authors of the study, from Columbia University Irving Medical Centre, USA, says: "In the USA, there have been almost 1.5 million confirmed cases of COVID-19 and nearly 90,000 deaths. Although the clinical spectrum of disease has been characterised in reports from China and Italy, until now, detailed understanding of how the virus is affecting critically ill patients in the US has been limited to reports from a small number of cases. Our study aimed to identify risk factors associated with death in critically ill COVID-19 patients in a US hospital setting."

The study focused on two hospitals in New York City, USA, affiliated with Columbia University Irving Medical Center in northern Manhattan. Between 2 March and 1 April 2020, 1,150 adults (aged 18 or over) were admitted to both hospitals with laboratory confirmed COVID-19. Of those admitted to hospital, 257 (22%) were critically ill and required treatment in a high dependency or intensive care unit. The most common symptoms reported were shortness of breath, fever, cough, muscle pain and diarrhoea. As of 28 April 2020, almost 40% of the critically ill patients had died (39%, 101/257) and more than one third remained in hospital (37%, 94/257). Less than one quarter had been discharged alive (23%, 58/257).

More than three quarters of the critically ill patients required mechanical ventilation to help them breathe (79%, 203/257). Patients spent an average of 18 days on a ventilator (range 9-28 days). This rate is higher than reported in smaller studies of cases from Washington state, USA [3, 4], but is in line with a recent report from Italy, the researchers

say. In addition, almost one third of patients developed severe kidney damage and required therapy to support kidney function, such as dialysis (31%, 79/257).

The majority of critically ill patients were men (67%, 171/257). Critical illness was more common in older patients (median age 62 years) but around one in five patients were aged under 50 (22%, 55/257). More than 80% of critically ill patients had at least one chronic illness, the most common of which were high blood pressure (63%, 162/257) and diabetes (36%, 92/257). Nearly half of the patients were obese (46%, 119/257), consistent with trends seen in the UK. Almost two-thirds of critically ill patients were Hispanic or Latino (62%, 159/257) and around one in five were black or African American (19%, 49/257).

People with pre-existing lung or heart conditions had the highest risk of poorer outcomes. High blood pressure was also associated with poorer survival for critically ill patients, consistent with reports from China and Italy.

5% of critically ill patients were employed as healthcare workers (13/257). It is not possible to determine with certainty whether they became infected while working in a clinical setting because the virus was already circulating widely in the community at the time. However, the finding highlights the risks facing frontline healthcare workers and underlines the importance of consistent access to personal protective equipment for hospital staff.

Dr. Max O'Donnell, senior author of the study, from Columbia University Irving Medical Centre, USA, says: "Our study provides in-depth understanding of how COVID-19 may be affecting critically ill patients in US hospitals. Of particular interest is the finding that over three quarters of critically ill patients required a ventilator and almost one third required renal dialysis support. This has important implications for resource allocation in hospitals, where access to equipment and specialised staff needed to deliver this level of care is limited."

The researchers caution that their findings may not be generalizable to other hospital settings as they only looked at patients from two hospitals in New York City. This is particularly important when considering the demographic characteristics of the patient population. Studies involving patient groups that are more racially, ethnically and geographically diverse will be needed in order to confirm these findings.

Writing in a linked Comment article, Dr. Giacomo Grasselli, who was not involved in the study, from the University of Milan, said: "The study by Cummings and colleagues shows that clinicians can produce high-quality research even when facing an overwhelming clinical workload. However, despite providing important insights, this work leaves us with some unanswered questions. While waiting for the availability of a COVID-19 vaccine, further studies are required to improve and personalise patient treatment, with particular attention to the role of initial non-invasive respiratory support strategies, timing of intubation, optimal setting of mechanical ventilation, and efficacy and safety of immunomodulating agents and anticoagulation strategies."

More information: Matthew J Cummings et al, Epidemiology, clinical course, and outcomes of critically ill adults with COVID-19 in New York City: a prospective cohort study, *The Lancet* (2020). DOI: 10.1016/S0140-6736(20)31189-2

Provided by Lancet