physicians in respiratory medicine who had been specifically assigned to treat patients with Covid-19. None of the 23 patients who died were from hospital divisions of infectious diseases or worked in hospitals that specialized in infectious diseases. The infections in these patients may have resulted from inadequate precautions and insufficient protection in the early stages of the epidemic.

As of March 31, none of the 42,600 health care workers who went to Hubei Province to care for patients with Covid-19 were known to have been infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[5] The 42,600 workers included one of us, an intensive care physician from Fujian Province who cared for patients with Covid-19 from January 29 to March 23, first in Wuhan Central Hospital, and then in Wuhan Jinyintan Hospital. These data suggest that sufficient precautions with rigorous enforcement can prevent health care workers from becoming infected with SARS-CoV-2 and the subsequent risk of death. The 23 health care heroes described here were dedicated to saving the lives of others in a catastrophic pandemic that has been plaguing our country and many others around the globe.

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Disclosure forms provided by the authors are available with the full text of this letter at NEJM.org.

This letter was published on April 15, 2020, at NEJM.org.

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DOI: 10.1056/NEJMc2005696

## Neurologic Features in Severe SARS-CoV-2 Infection

**TO THE EDITOR:** We report the neurologic features in an observational series of 58 of 64 consecutive patients admitted to the hospital because of acute respiratory distress syndrome (ARDS) due to Covid-19. The patients received similar evaluations by intensivists in two intensive care units (ICUs) in Strasbourg, France, between March 3 and April 3, 2020.

Six patients were excluded because of paralytic neuromuscular blockade when neurologic data were collected or because they had died without a neurologic examination having been performed. In all 58 patients, reverse-transcriptase–polymerase-chain-reaction (RT-PCR) assays of nasopharyngeal samples were positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The median age of the patients was 63 years, and the median Simplified Acute Physiology Score II at the time of neurologic examination was 52 (interquartile range, 37 to 65, on a scale ranging from 0 to 163, with higher scores indicating greater severity of illness). Seven patients had had previous neurologic disorders, including transient ischemic attack, partial epilepsy, and mild cognitive impairment.

The neurologic findings were recorded in 8 of the 58 patients (14%) on admission to the ICU

(before treatment) and in 39 patients (67%) when sedation and a neuromuscular blocker were withheld. Agitation was present in 40 patients (69%) when neuromuscular blockade was discontinued (Table 1). A total of 26 of 40 patients were noted to have confusion according to the Confusion Assessment Method for the ICU; those patients could be evaluated when they were responsive (i.e., they had a score of −1 to 1 on the Richmond Agitation and Sedation Scale, on a scale of −5 [unresponsive] to +4 [combative]). Diffuse corticospinal tract signs with enhanced tendon reflexes, ankle clonus, and bilateral extensor plantar reflexes were present in 39 patients (67%). Of the patients who had been discharged at the time of this writing, 15 of 45 (33%) had had a dysexecutive syndrome consisting of inattention, disorientation, or poorly organized movements in response to command.

Magnetic resonance imaging (MRI) of the brain was performed in 13 patients (Figs. S1 through S3 in the Supplementary Appendix, available with the full text of this letter at NEJM.org). Although these patients did not have focal signs that suggested stroke, they underwent MRI because of unexplained encephalopathic features. Enhancement in leptomeningeal spaces was noted in 8 patients, and bilateral frontotemporal hypoperfusion was noted in all 11 patients who underwent perfusion imaging. Two asymptomatic patients each had a small acute ischemic stroke with focal hyperintensity on diffusion-weighted imaging and an overlapping decreased apparent diffusion coefficient, and 1 patient had a subacute ischemic stroke with superimposed increased diffusion-weighted imaging and apparent diffusion coefficient signals.

In the 8 patients who underwent electroencephalography, only nonspecific changes were detected; 1 of the 8 patients had diffuse bifrontal slowing consistent with encephalopathy. Examination of cerebrospinal fluid (CSF) samples obtained from 7 patients showed no cells; in 2 patients, oligoclonal bands were present with an identical electrophoretic pattern in serum, and protein and IgG levels were elevated in 1 patient. RT-PCR assays of the CSF samples were negative for SARS-CoV-2 in all 7 patients.

In this consecutive series of patients, ARDS due to SARS-CoV-2 infection was associated with

**Table 1. Characteristics of the Patients with Covid-19 and ARDS.***

| Variable | All Patients (N = 58) |
|---|---|
| **Sedation for ARDS** | |
| Midazolam | |
| No. of patients (%) | 50 (86) |
| Days of treatment | |
| Median | 4 |
| Interquartile range | 4–7 |
| Propofol | |
| No. of patients (%) | 27 (47) |
| Days of treatment | |
| Median | 0† |
| Interquartile range | 1–6 |
| Sufentanil | |
| No. of patients (%) | 58 (100) |
| Days of treatment | |
| Median | 8 |
| Interquartile range | 4–12 |
| **Neurologic signs — no./total no. (%)** | 49/58 (84) |
| Temperature >38.5°C at time of clinical examination | 8/49 (16) |
| Positive findings on CAM-ICU‡ | 26/40 (65) |
| Agitation | 40/58 (69) |
| Corticospinal tract signs | 39/58 (67) |
| Dysexecutive syndrome | 14/39 (36) |
| **Brain MRI — no./total no. (%)** | |
| Leptomeningeal enhancement | 8/13 (62) |
| Perfusion abnormalities | 11/11 (100) |
| Cerebral ischemic stroke | 3/13 (23)§ |
| **CSF analysis — no./total no. (%)¶** | |
| Oligoclonal bands with the same pattern in serum | 2/7 (29)‖ |
| Elevated CSF IgG and CSF protein levels | 1/7 (14)‖ |
| Low albumin level | 4/7 (57) |
| Negative RT-PCR for SARS-CoV-2 in CSF | 7/7 (100) |

* ARDS denotes acute respiratory distress syndrome, CSF cerebrospinal fluid, MRI magnetic resonance imaging, RT-PCR reverse-transcriptase polymerase chain reaction, and SARS-CoV-2 severe acute respiratory syndrome coronavirus 2.

† Some patients received propofol for less than 1 day.

‡ The Confusion Assessment Method for the ICU [intensive care unit] (CAM-ICU) is a diagnostic algorithm for determining the presence or absence of delirium on the basis of four features: acute change or a fluctuation in mental status, inattention, disorganized thinking, and altered level of consciousness.

§ One of the three ischemic strokes had the appearance of subacute infarcts on MRI and probably existed before SARS-CoV-2 infection.

¶ The seven lumbar punctures were performed in seven of the eight patients who underwent brain MRI and electroencephalography (one lumbar puncture was contraindicated because of anticoagulation).

‖ The patient with oligoclonal bands with the same pattern in serum and the patient with elevated CSF IgG and CSF protein levels are different patients.

encephalopathy, prominent agitation and confusion, and corticospinal tract signs. Two of 13 patients who underwent brain MRI had single acute ischemic strokes. Data are lacking to determine which of these features were due to critical illness–related encephalopathy, cytokines, or the effect or withdrawal of medication, and which features were specific to SARS-CoV-2 infection.

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Disclosure forms provided by the authors are available with the full text of this letter at NEJM.org.

This letter was published on April 15, 2020, at NEJM.org.

DOI: 10.1056/NEJMc2008597

# Biopsy for Prostate Cancer Diagnosis

**TO THE EDITOR:** Groundbreaking work at the National Cancer Institute, reported by Ahdoot et al. (March 5 issue),[1] continues to advance the use of magnetic resonance imaging (MRI) of the prostate for the detection of cancer. However, we are concerned that the authors' conclusion that "combined biopsy provides improved diagnostic accuracy over either systematic or MRI-targeted biopsy alone and better predicts the results of final histopathological analysis," while technically correct, will be misconstrued as scientific support for continuing the widespread and time-honored clinical policy of routinely supplementing all targeted biopsy procedures with random 12-core biopsy. Indisputably, histopathological findings are the standard for prostate cancer prognostication. However, the actual risk that a small, high-grade lesion that cannot be detected on MRI will metastasize within 1 year is unknown. We say "1 year" because one potential alternative to the present national policy of performing 1 million random biopsies annually is to rely on targeted biopsy alone initially and to conduct surveillance by repeating the MRI after 1 year to detect small, high-grade lesions that were initially invisible on MRI, since these lesions will presumably grow and become visible on MRI over time. Although the risks of this approach are unknown, the risks of random biopsy — a 2% sepsis rate, reversible impotence, and overdiagnosis and overtreatment — are well documented.

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No potential conflict of interest relevant to this letter was reported.

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DOI: 10.1056/NEJMc2007985

**TO THE EDITOR:** The study by Ahdoot et al. addresses a highly relevant issue in prostate cancer screening and diagnosis: multiparametric MRI (mpMRI) and MRI-targeted biopsies. Indeed, mpMRI has gained increasing importance in the care of patients with prostate cancer, in part owing to the continued refinement of its use. The Prostate Imaging Reporting and Data System (PI-RADS)[1] has attempted to set acquisition and interpretation standards to ensure diagnostic quality. In this light, the mpMRI protocol[2] used by the authors raises some concerns. In particular, the diffusion-weighted imaging (DWI) protocol (five evenly spaced b-values between 0 and 750 seconds per square millimeter) does not meet the requirements of PI-RADS, both in terms