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Elective inpatient video-EEG monitoring during the COVID-19 pandemic

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ABSTRACT

Objective. To evaluate the safety and feasibility of admission for elective video-EEG monitoring during the SARS-CoV-2 pandemic.

Methods. We performed a retrospective review of elective inpatient epilepsy monitoring unit admissions at our institution from May 3rd, 2020 to August 12th, 2020. All patients were screened by telephone for symptoms concerning infection or recent diagnosis of SARS-CoV-2 or excess medical risk prior to admission. Patients deemed eligible for admission underwent testing via a nasopharyngeal swab for SARS-CoV-2 within three days of admission, and were directed to self-quarantine between testing and admission.

Results. The community seven-day case rate for SARS-CoV-2 (new cases per 100,000 population) ranged from 2.8 to 28.9 during the study period in our region. A total of 95 patients (63 adults and 32 children) were admitted. One adult patient developed mild SARS-CoV-2 infection and one adult patient tested positive for asymptomatic SARS-CoV-2 infection.

Significance. These findings illustrate that inpatient epilepsy monitoring can be safely performed in carefully selected patients when appropriate processes are in place, even in the setting of the SARS-CoV-2 pandemic. There is a risk of nosocomial spread, and the potential benefits of admission should be balanced against the risks of infection.

Key words: COVID-19, SARS-CoV-2, epilepsy monitoring unit, video-EEG, elective admission

In order to assess the safety and feasibility of admissions for video-EEG monitoring during the COVID-19 pandemic, we performed a retrospective review of elective admissions at our institution. SARS-CoV-2 was reported in Wuhan, China in December 2019 [1]. As the disease spread, nosocomial transmission from infected patients to staff members and admitted patients with unrelated medical conditions occurred [2]. Hospitals reduced elective admissions in order to decrease the risk of transmission and conserve resources including hospital beds and personal protective equipment [3]. Protocols for chronic care such as peritoneal dialysis were modified to provide safety measures to allow for continued provision of essential care with less risk to patients and staff [4]. The utilization of continuous EEG in the critical care setting decreased at most centers in the United States [5]. In Europe, inpatient scalp video-EEG stopped at most adult centers and utilization decreased at most pediatric centers [6, 7].

Epilepsy is a life-threatening disease which can cause mortality due to sudden unexpected death in epilepsy,

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accidents and status epilepticus. Patients with medically intractable epilepsy have been found to have a standardized mortality ratio of up to five [8], and successful surgery has been shown to be associated with elimination of excess mortality [9]. Epilepsy monitoring units are specialized inpatient units that are part of a comprehensive epilepsy center providing multidisciplinary care, including evaluation for surgical treatment in persons with medically intractable epilepsy [10]. At our institution, elective epilepsy admissions were initially stopped to reduce the risk of nosocomial exposure to electively admitted patients, preserve PPE for staff members and to allow hospital beds to be available for patients admitted with SARS-CoV-2. However, once appropriate protocols to ensure patient and staff safety were developed and implemented, and hospital beds were available for admission, elective video-EEG admissions resumed.

Methods

We retrospectively reviewed all elective admissions for video-EEG monitoring at our institution from our resumption of elective admissions on May 3rd, 2020 to August 12th, 2020. Approval from the local institutional review board was obtained for this study. The seven-day case rate for SARS-CoV-2 ranged from 2.8 to 28.9 during the study period in our region [11, 12]. Patients were contacted by telephone and screened for excess medical risk and symptoms concerning infection or recent diagnosis of SARS-CoV-2 by a nurse within five days prior to admission. All patients deemed eligible for admission underwent testing via a nasopharyngeal swab for SARS-CoV-2 within three days of admission, and were directed to self-quarantine between testing and admission. Test type was determined by institutional protocols (see *supplementary material*). Patients requiring surgical procedures had repeat testing within 24 hours prior to surgery.

Patients were housed in a neuroscience unit in which all patients tested negative for SARS-CoV-2 prior to being admitted. Staff members were screened for symptoms and had temperature checks daily prior to beginning each shift, and were required to wear surgical masks at all times. Patients were directed to wear surgical masks when not eating or drinking. Adult patient rooms had two to three patients in each room, and distances of at least six feet were maintained between patients at all times. The pediatric epilepsy unit is an eight-bed room that was reduced to four beds to ensure six feet between patient beds and family members. No visitors were routinely allowed for adult patients. For children, one family member remained at the bedside throughout the hospitalization. The family member was screened for symptoms related to SARS-CoV-2 before entering the hospital, and was required to wear a mask and maintain social distancing. Patients were seen in the clinic or contacted by a member of the study team at least two weeks after admission and asked if they had symptoms or a diagnosis of SARS-CoV-2.

Results

In total, 145 patients were scheduled for admission for video-EEG, and 49 were cancelled either because the treating physician felt that the EEG testing could appropriately be delayed or because the patient elected to postpone the admission. One patient was cancelled due to symptoms concerning illness during telephone screening. The remaining 95 patients admitted all tested negative for SARS-CoV-2 and were electively admitted. The average time between testing and admission was 1.74 days. The average length of stay was 3.5 days (adults: 3.7 days; children: 3.3 days). Forty-two patients were diagnosed with focal epilepsy, 17 with generalized epilepsy, 32 with either normal EEGs or psychogenic non-epileptic spells and three with other diagnoses. Three patients underwent intracranial monitoring via surgically implanted electrodes.

Two adult patients tested positive for SARS-CoV-2-19 while admitted. The first patient was asymptomatic at the time of admission and tested negative for SARS-CoV-2 on the day prior to admission. He underwent stereotactic placement of depth electrodes for epilepsy monitoring on the day of admission. Two days after admission, he had repeat testing using COVID-19 Direct testing in anticipation of surgery for removal of the electrodes and tested positive. Confirmatory testing on the following day was also positive. This patient never developed symptoms consistent with COVID-19.

The second patient was a room-mate of the first patient and was admitted on the same date and tested negative for COVID-19 on the day prior to admission. He was retested due to his room-mate's positive test and again tested positive three days after admission. He was asymptomatic at the time of testing and was only tested due to physical proximity to the first patient. He developed a mild cough consistent with COVID-19 after discharge but never required inpatient care for this diagnosis. The two patients were not known to have come into contact prior to admission. In both cases, the family was informed of the diagnosis of COVID-19 prior to discharge and educated on how to reduce the risk of transmission. No family members of the affected patients were diagnosed with COVID-19. No pediatric patients developed symptoms

consistent with COVID-19 or tested positive during admission.

Discussion

Our experience demonstrates how inpatient epilepsy monitoring can be performed in the setting of the COVID-19 pandemic. Due to the excess mortality associated with medically intractable epilepsy, inpatient video-EEG monitoring, as part of presurgical evaluation, is an important part of the comprehensive management of persons with epilepsy and should be continued when the appropriate resources exist. This requires sufficient available health system resources including hospital beds, PPE for patients and timely testing of patients prior to admission. Careful attention to protocols to minimize the risk of COVID transmission at all steps in the neurodiagnostic evaluation is needed, and several organizations have published guidelines on this topic [13, 14]. In addition, careful screening of potential patients prior to admission to confirm that the patient's individual case would benefit from inpatient monitoring in the setting of a pandemic should be performed, and 34% of patients scheduled for admission at our institution postponed at admission in light of the pandemic. As the proportion of the population who have received vaccination increases, the vaccination status of patients and staff members should also be considered.

We note that two patients, both admitted on the same day, were diagnosed with SARs-CoV-2 infection two and three days after admission, when both were asymptomatic, which was three and four days after each patient initially tested negative. The false negative rate for an infected person with SARs-CoV-2 infection tested with PT-PCR decreases from 100% if they are tested four days prior to symptom onset to 62% on the day of symptom onset and 20% three days after symptom onset [15]. It is estimated that the median incubation period (time from infection to the first symptoms) for COVID-19 is five to six days [16] and that 65% of transmission occurs before a person becomes symptomatic [17]. The serial interval (time between a person starting to show symptoms and the person they infect showing symptoms) for COVID-19 is estimated to be five to six days [18, 19].

Both patients developed positive tests within only two and three days of admission, and were thus independently infected shortly prior to admission or acquired COVID-19 while hospitalized. These two admissions occurred when the community seven-day case rate of confirmed infections from COVID-19 was >20/100,000, the positivity rate for all COVID testing in the community was >10% [12] and the estimated total infections in California at the time were >15 times higher [20]. The patients were not known to have come into contact with each other prior to admission.

It is unlikely that one patient infected the other given the short time between when they first came in contact and the positive tests (while both were asymptomatic), and the short duration between admission and the positive tests would also be unusual for infection related to transmission from an asymptomatic staff member during the admission. Of note, we did not routinely retest asymptomatic patients for COVID-19 after admission, thus it is possible that other asymptomatic patient infections were not identified as other patients were not routinely retested.

Physicians admitting patients for epilepsy monitoring in the setting of a pandemic need to constantly monitor local public health conditions, the resources of their health system and the personal medical condition of individual patients in order to make appropriate decisions about admission. However, given the potential risks of intractable epilepsy including excess mortality, we feel that inpatient epilepsy monitoring can be safely performed in carefully selected cases when appropriate processes are in place. ■

Supplementary material.
Supplementary data accompanying the manuscript are available at www.epilepticdisorders.com.

Disclosures.
None of the authors have any conflicts of interest to disclose.

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