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Special Issue Article

Electroconvulsive Therapy Practice Changes in Older Individuals Due to COVID-19: Expert Consensus Statement

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ABSTRACT

The ubiquitous coronavirus 2019 (COVID-19) pandemic has required health-care providers across all disciplines to rapidly adapt to public health guidelines to reduce risk while maintaining quality of care. Electroconvulsive therapy (ECT), which involves an aerosol-generating procedure from manual ventilation with a bag mask valve while under anesthesia, has undergone drastic practice changes in order to minimize disruption of treatment in the midst of COVID-19. In this paper, we provide a consensus statement on the clinical practice changes in ECT specific to older adults based on expert group discussions of ECT practitioners across the country and a systematic review of the literature. There is a universal consensus that ECT is an essential treatment of severe mental illness. In addition, there is a clear consensus on what modifications are imperative to ensure continued delivery of ECT in a manner that is safe for patients and staff, while maintaining the viability of ECT services. Approaches to modifications in ECT to address infection control, altered ECT procedures, and adjusting ECT operations are almost uniform across the globe. With modified ECT procedures, it is possible to continue to meet the needs of older patients while mitigating risk of transmission to this vulnerable population. (Am J Geriatr Psychiatry 2020; 28:1133–1145)

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INTRODUCTION

With over 3.8 million cases in the United States alone,¹ the coronavirus 2019 disease (COVID-19) caused by the novel coronavirus (SARS-CoV-2) has had a profound impact on health care systems. Because COVID-19 primarily presents as a respiratory illness and is transmitted through respiratory droplets, great care must be taken to reduce the risk of transmission during as electroconvulsive therapy (ECT), which involves an aerosol-generating procedure from manual ventilation with a bag mask valve while under anesthesia. The danger of ECT practice during COVID-19 is compounded as patients who undergo ECT are often older, frail, and at higher risk than the general population. ECT is deemed an essential procedure by the American Psychiatric Association² and drastic changes to ECT practices have been necessary to mitigate risk for both patients and staff while continuing to provide essential care.

For the geriatric population with severe depression or psychosis who are highly burdened by psychiatric symptomatology, ECT is an important and necessary treatment. Data have shown that ECT is safe in older adults despite medical comorbidities and is highly effective in treating severe psychiatric illnesses such as major depressive disorder, psychosis, mania, and behavioral symptoms of dementia.^{3,4} Disruption in the acute course of ECT in the absence of adverse events would be harmful for older patients, potentially precipitating clinical decline.

Continuing safe administration of ECT to those who need it while at the same time maintaining safety for patients and staff presents an extraordinary challenge in clinical practice. In this paper we describe modifications in ECT practices due to the COVID-19 pandemic based on expert consensus. The aim is to help guide ECT clinicians in continuing to provide ECT in a manner that is safe for patients and staff while still preserving public health efforts to mitigate and avoid infection spread.

METHODS

The development of this expert consensus statement involved the following steps: 1) topic selection;

2) expert group discussion; and 3) systematic review of literature.

Topic Selection

The focus of this paper is on the impact of COVID-19 on ECT practices. Questions have arisen regarding what modifications are needed to administer ECT in a manner that is safe for both patients and staff, within the available resources, and consistent with good clinical practice. With such rapidly evolving information, a consensus statement will consolidate and disseminate current knowledge and provide guidance to ECT practitioners and stakeholders.

Expert Group Discussion

The expert group is comprised of ECT experts involved in the conduct of ECT-AD (A Randomized Controlled Trial of Electroconvulsive Therapy plus Usual Care versus Simulated-ECT plus Usual Care for the Acute Management of Severe Agitation in Alzheimer's Dementia), an NIH-funded multisite clinical trial of ECT for the treatment of severe agitation and aggression in dementia. The authors serve as site PIs (ML, AH, LN, MM, GP, BF), site co-investigators (SS, SS), and project manager (HH), and have expertise in psychiatry, geriatric psychiatry, and ECT clinical administration and research. The conception, design, and content of the manuscript were discussed during weekly ECT-AD meetings from March thru May 2020. In-depth discussions were held regarding modifications that were being implemented at each of the sites. In addition, an email question "Are there any changes to your ECT practice specific to geriatric patients?" was sent out to the International Society for ECT and Neurostimulation listserv and responses were compiled.

Systematic Review of Literature

The literature was searched by a medical librarian for ECT or neurostimulation combined with COVID-19. The search strategies were created using a combination of keywords and standardized index terms. Searches were run in May 2020 in Google Scholar, Ovid EBM Reviews, Ovid Embase (1974+), Ovid Medline (1946+ including epub ahead of print, in-process & other non-indexed citations), Ovid PsycINFO

(1806+), Scopus (1970+), and Web of Science (1975+). Results were limited to English citations from 2019+. All results were exported to Endnote where obvious duplicates were removed leaving 37 citations. Search strategies are provided in the appendix. Two authors (ML, SS) independently reviewed titles and abstracts to select relevant studies, and disagreements were resolved by consensus.

RESULTS

Results from ECT-AD discussions, insights from International Society for ECT and Neurostimulation members, and information from the systematic review are collated and described below.

Systematic Review

Of 37 articles identified from the search, 11 met inclusion criteria and were included in the review, reported in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram. (Fig. 1) The articles summarized in Table 1 include four from the United States and Canada, four from outside the United States, and three statements and guidelines from professional associations.

DISCUSSION

Based on the expert group discussions and systematic review of the literature, there is a clear universal agreement that ECT is an essential treatment that should continue to be provided even during this pandemic. There is a clear consensus regarding the modifications that are essential to ensure that providing ECT care is safe for patients and staff. There are also changes to care processes and workflow that are common to all ECT practices. (Fig. 2) Despite the clear consensus on current standards in ECT practice, there is a lack of literature specific to older adults. The following recommendations represent a consolidation of the expert group discussions, results of the systematic review, and incorporation of considerations specific to treating older adults with ECT in the current pandemic environment.

INFECTION PREVENTION AND CONTROL MEASURES

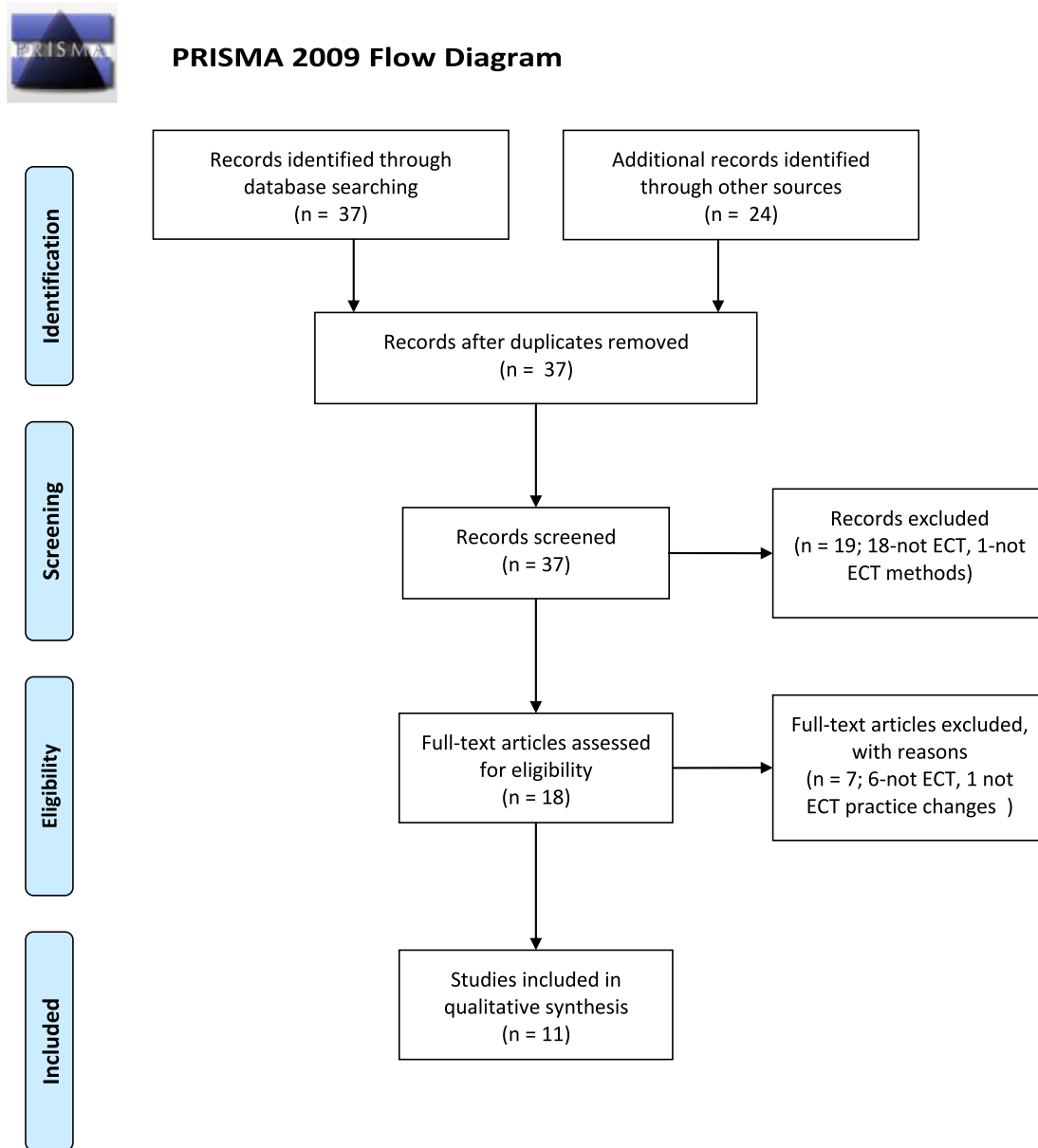
Based on the assumption that any patient is potentially infected or a carrier of COVID-19, ECT practices must follow standard, contact, and airborne precautions, as well as eye protection measures. Personal protective equipment protects health care workers, sanitation and disinfection practices reduce the risk of viral transmission, and clustering of ECT patients can help prevent cross contamination.

PPE

The use of PPE is imperative for staff protection, in order to reduce the spread of COVID-19 through patient contact. All health care personnel involved in the administration of ECT are required to wear N95 respirators, which require prior fit testing and education for N95 respirator use. A procedure mask can be worn over the N95 respirator as an additional precaution if prolonged or repeated use is anticipated. In addition to N95 respirators and procedure masks, goggles, eye shields, or face shields have been added to standard PPE to further prevent contact with potentially infected droplets. Gloves are required, and some use double gloves and replace the outer gloves after each patient in order to prevent cross contamination between patients. Gowns are standard and changed at varying times, although not required in some institutions.

While protecting health care personnel during ECT is paramount, the widespread shortage of proper PPE has presented extensive obstacles to this goal. Policies and guidelines on PPE are institution-specific and evolving based on PPE availability. In ECT facilities with adequate PPE resources, staff in the screening area, waiting room, preparation or IV room, and recovery room are also fitted with N95 respirators. A lack of surplus in most locations requires staff to be assigned one set of PPE, and to reuse as appropriate. Maintenance of N95 respirators is the responsibility of individual staff, and the N95 respirators can be kept in the ECT facility for reuse in individual, labelled bags. Like the N95 respirators, other protective equipment such as procedure masks, goggles, eye shields, or face shields also often need to be reused due to supply shortages. Gowns and head

FIGURE 1. PRISMA 2009 flow diagram. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.



coverings however should be disposed of at the end of each day. Gloves are not reused. Every personnel must be trained in proper donning (putting on) and doffing (taking off), as well as PPE disposal. In general ECT clinics are restricting or completely banning the presence of non-essential personnel in the treatment area to maximize the preservation of PPE for essential staff.

Sanitation and Disinfection

The SARS-CoV-2 virus has been shown to survive in aerosols and on surfaces for many days.⁵ The need for environmental cleaning and decontamination lowers the risk of viral transmission. Treatment rooms are cleaned thoroughly after each treatment day, by housekeeping or facility staff. However, to protect

TABLE 1. Summary of Relevant United States and International Literature on ECT Practice Changes Due to COVID-19.

United States/Canada				
Author, Year	Type of Article	Group/Specialty	Aim/Purpose	ECT Practice Modifications
Bryson and Aloysi, 2020 ¹¹ US	Commentary	Icahn School of Medicine at Mount Sinai Anesthesiology, Psychiatry	To describe ECT strategies during the first 4 weeks of the SARS-CoV-2 outbreak in New York City.	<ul style="list-style-type: none"> • Consider every patient as exposed and potentially contagious. • Twice daily temperature and assessment of respiratory symptoms. • If febrile or with symptoms, defer ECT until second nasal swab negative. • Only treat the most critically ill. • Move ECT from post-anesthesia care unit (PACU) to negative pressure operating room (OR). • No intubation or use of laryngeal mask airway (LMA), use standard bag-valve-mask (BMV). • Use breathing circuit filter (BCF) with filter retention efficiency for airborne particles. • Mask kept on patient's face during passive exhalation and surgical mask over the nose and mouth all other times. • Only essential members in treatment room. • N95 mask, face shield and non-porous gown and double gloves. • Same N95 respirator and gowns per day, but gloves changed between patients. • Anesthesiologist changes gowns for each patient. • Proper donning and doffing of personal protective equipment (PPE). • Patients brought to OR wearing surgical mask, removed only during positive pressure ventilation. • Patients recover in OR. • Allow time for full circulation of room atmosphere prior to next patient. • All equipment cleaned with hydrogen peroxide disinfectant wipes between each case.
Burhan et al, 2020 ¹² Canada	Reflection	Parkwood Institute-Mental Health Care Building, an academic site of Western University in London Ontario Canada.	To describe approach of a rigorous patient prioritization process for selection of ECT patients.	<ul style="list-style-type: none"> • Rigorous colored prioritization process modeled after ISEN recommendations. • Red (emergent), orange (highly urgent), yellow (urgent, can wait for up to 4 weeks), green (clinically monitored, provide quick access if the acuity changes), and gray (stable long term, can be re-referred for new episode of illness). • Informed consent process revised to add risk of infection. • ECT room modified to provide negative pressure and allow optimum air circulation between patients. • Full PPE for staff, changed between patients. • COVID-19 screen prior to ECT, if positive, test with PCR4. • COVID-19 positive requires infectious disease and pandemic management team consultation. • ECT started or re-started for red and orange zone within 1 week of initiating the process.
Espinoza et al, 2020 ¹³ United States	Editorial	UCLA, Medical University of South Carolina, Medical College of Georgia, Augusta University Psychiatry	To emphasize ECT as an essential treatment.	<ul style="list-style-type: none"> • Education is the first step in understanding ECT as an essential treatment. • Modifications to keep ECT service viable will vary at the local level. • Logistical changes and the process by which these changes are undertaken are important. • Identifying key stakeholders will support access to continued ECT services. • Limiting new ECT and less frequent maintenance ECT may conserve resources. • ECT is lifesaving and should not be stopped completely in a discriminatory fashion.

(continued on next page)

TABLE 1. (continued)

United States/Canada				
Author, Year	Type of Article	Group/Specialty	Aim/Purpose	ECT Practice Modifications
Flexman et al, 2020 ¹⁴	Consensus statement	Society for Neuroscience in Anesthesiology and Critical Care (SNACC)	To provide advice for neuro-anesthesia clinical practice, including ECT.	<ul style="list-style-type: none"> • Test each patient before procedure. • ECT only for asymptomatic. • No ECT if COVID-19 positive. • If asymptomatic and tests positive but remains asymptomatic, proceed only if testing 14 days later is negative, and if ECT is life-saving. • ECT in a negative pressure single airborne suite, utilize full PPE, restrict personnel, careful disinfection, 30 minutes between patients. • Glycopyrrolate to minimize hypersalivation. • Remifentanyl to reduce coughing on emergence, and lidocaine after seizure. • Avoid BMV if possible. • Induction agents for best seizure quality include ketamine, etomidate, and methohexital. • Careful preoxygenation before induction of anesthesia when BMV is minimized, consider apneic oxygenation. • Consider LMA when hyperventilation is required. • Patients should be masked in recovery.
International				
Author, Year	Type of Article	Group/Specialty	Aim/Purpose	ECT Practice Modifications
Braithwaite, 2020 ¹⁰ United Kingdom	Case report	Psychiatry	To describe successful ECT in a 67-year old male with life threatening severe major depression with catatonia, who was positive for SARS-CoV-2 with active symptoms and radiological evidence of pneumonitis.	<ul style="list-style-type: none"> • 6 bitemporal ECT twice weekly. • Positive-pressure emergency OR. • Four professionals - anesthesiologist, anesthesiology assistant, psychiatrist and psychiatric nurse. • N99 respirator, cap, visor, gown, apron, shoe covers, three pairs of gloves. • Thorough disinfection of theatre and all equipment before next case. • Anesthesia induction with propofol, muscle relaxation with suxamethonium, inhibition of secretions with glycopyrrolate. • 4 of 6 ECT – avoided BMV by using O2 via mask alone • ECT Three and five - videolaryngoscopic intubation, followed by 20 minutes of inhaled sevoflurane and mechanical ventilation, after which suxamethonium was given and ECT was delivered. • Psychiatrist was only present to deliver ECT, but was outside the treatment room for intubation and extubation. • Successful outcome, catatonia and depression resolved after 6 ECT.
Colbert, 2020 ¹⁵ Ireland	Images in Clinical ECT	Psychiatry	To illustrate visually the PPE ensemble worn by members of the ECT team, including gowns, headgear, masks, goggles and gloves.	<ul style="list-style-type: none"> • ECT practitioners need to liaise with anesthesia colleagues for a safe ECT environment. • PPE is demonstrated in a picture. • Protocols should follow best practices. • PPE conservation should be considered in clinical decision-making processes.
Sienaert, 2020 ⁹ Belgium	Perspective	KU Leuven, Academic Center for ECT and	To provide a perspective on the essential nature of ECT and describe measures to	<ul style="list-style-type: none"> • Psychiatrists review ECT needs with patients and families. • Close follow-up if maintenance ECT (M-ECT) is withheld or delayed.

(continued on next page)

TABLE 1. (continued)

International				
Author, Year	Type of Article	Group/Specialty	Aim/Purpose	ECT Practice Modifications
		Neuromodulation (AcCENT), Center of anatomical sciences and education UHasselt, Department of infection control, Department of Anesthesiology	guide practitioners in safe administration of ECT.	<ul style="list-style-type: none"> • Rescue ECT protocol for signs of relapse based on monitoring and rating scales via televisits. • Temporary closure of day hospitals for persons 65 years and older prevented nursing home residents to get M-ECT. Weekly ECT team meetings reviewed these cases and rescue ECT was applied as needed. • Nasopharyngeal swab for PCR testing obtained a day before ECT. • For inpatients, daily monitoring for fever, coughing and dyspnea, and PCR-testing weekly. • For outpatients, PCR testing obtained a day before ECT. • If positive PCR-test, ECT still given but patients were treated last. • Rigorous cleaning, adequate ventilation with air flow of 5 air changes per hour, disinfection of devices and surfaces with chlorine solution. • Minimum personnel in treatment room, including nurse, psychiatrist, anesthesiologist and assistant-anesthesiologist. • PPE included two-respirator and gown (worn for whole day), eye protection, gloves (changed according to WHO indication). • Glycopyrrolate used routinely. • BMV avoided, and pre-oxygenation at 5LPM via mask is used instead. • Re-allocation of resources required redeployment of staff to other tasks. • Weekly reassessment of readmission and rescue ECT processes. • Concludes with recommendations for ECT clinics to cooperate locally or regionally to ensure availability of essential ECT to older adults and other vulnerable populations.
Tor, 2020 ¹⁶ Singapore	Commentary	Department of Mood and Anxiety, West Zone, Institute of Mental Health	To describe ECT challenges in Singapore and describe ECT modifications to adapt to COVID-19 environment.	<ul style="list-style-type: none"> • ECT identified as essential service. • Full PPE (N95 masks, eye wear, gown, gloves) for all ECT staff (includes recovery room). • 3-ply facemask and gloves for nonclinical ECT staff interacting with patients. • Decontamination of ECT room between batches of patients, and cleaning work area with 70% ethanol. • Single use Mapleson C circuits for anaesthesia, disposable bite blocks, oral airways and HEPA (high efficiency particulate air) filters. • Restrict numbers of ECT staff, others were redeployed. • Screening and temperature before patient entry. • Limit to one visitor with a face mask to accompany patient. • Batch patients (inpatient and/or outpatient), with decontamination and PPE change between batches, with new operations board set up for scheduling. • Increased from 7 to 8 ECT half-day sessions to maintain capacity. • PPE training sessions for ECT team, with audits. • Reduce ECT frequency when feasible. • ECT continued despite a case of COVID-19 in the inpatient unit, with infection control procedures. • Continuously looking at sustainability of ECT operations with the realization that the COVID-19 will not resolve quickly.






Non-indexed


Author, Year	Type of Article	Group/Specialty	Aim/Purpose	ECT Practice Modifications
National Network of Depression Centers (NNDC), 2020 ¹⁷ United States	Announcement	NNDC is a network of depression centers that collaborate to advance state-of-the-science in the field of mood disorders.	NNDC Urges Medical Officials to Consider ECT an Essential Medical Service.	<ul style="list-style-type: none"> The Center for Medicare Services (CMS) recommendation to postpone non-essential surgeries and other procedures has constrained the use of ECT. ECT is a vital, life-saving treatment that is nonelective and should be maintained as essential, consistent with the CMS tiered approach of providing treatment without delay when acuity is high.
International Society for ECT and Neurostimulation (ISEN), 2020 ¹⁸ United States	Letter	ISEN is an international organization dedicated to promoting safe, ethical and effective use of ECT and other brain stimulation therapies for the treatment of neuropsychiatric illness through education and research.	To address concerns of ISEN members and ECT professionals on how best to provide ECT services during the crisis, and provides suggestions about practice adaptations.	<ul style="list-style-type: none"> ECT is a vital, and for some critical, treatment. Caseload reduction to preserve manpower and resources requires triaging and classifying each patient as elective, urgent/essential, or emergency. COVID-19 screening process for patients and family members before and on arrival for ECT. Avoid ECT if COVID-19 positive or patient under investigation (PUI), unless risk is imminent. ECT for COVID-19 positive or PUI needs discussion regarding intubation versus BMV, negative pressure room. PPE includes gown, N95 mask, eye shield, head covering, gloves. N95 not always required. Essential staff only in treatment room. Batching cases, e.g., outpatients before inpatients. Staffing plan for ECT team members, scheduling, back-up and contingencies to allow continued ECT service. ECT is an aerosol generating medical procedure (AGMP). Cautious selection of patients, reserve for those at high risk of psychiatric deterioration without ECT. M-ECT: previous treatment trials, lowest frequency, concurrent pharmacologic treatments to increase intervals. Acute ECT: alternative treatments. No ECT if COVID-19 positive, under investigation, or under self-isolation or monitoring. Reduce volumes given increased time and PPE to deliver ECT. Outpatient ECT only for exceptional Circumstances and require prior approval. Minimum number in treatment room. PPE for all staff in treatment room includes gloves, level II gowns, eye protection, N95 mask. Ambu bag and/or anesthesia circuit with attached HEPA filter. Minimum 3 minutes pre-oxygenation and BMV. Treatment room door remains closed until 99% filtration has occurred, additional HEPA filters can augment air changes per hour. Patients transported to recovery after the required time has elapsed. Shared Health Manitoba Algorithm for low risk operative procedures is used to make decisions to treat ECT patient as COVID-19 suspects.
Tenenbein et al, 2020 ¹⁹ Canada	Guidelines	University of Manitoba, Department of Anesthesiology, Perioperative & Pain Medicine, WRHA Anesthesia Program Anesthesia – Shared Health	To provide guidelines for providing ECT safely while mitigating risks of COVID-19 transmission.	

FIGURE 2. Electroconvulsive therapy during COVID-19 pandemic Perioperative considerations.

ELECTROCONVULSIVE THERAPY DURING COVID-19 PANDEMIC

Perioperative Considerations

PATIENT SELECTION	AIRWAY MANAGEMENT	RECOVERY
<p>Each patient should be tested for SARS-COV-2</p>  <p>If SARS-COV-2 positive, WAIT 14 days after a subsequent negative test</p>  <p>SYMPTOMATIC, SARS-COV-2 POSITIVE patients should NOT undergo ECT</p>	<p>POSITIVE PRESSURE mask ventilation is often a common practice during ECT procedures</p> <ul style="list-style-type: none"> This practice may risk viral aerosol generation and possible spread to healthcare workers. Practices to minimize positive pressure mask ventilation should be considered <p>MINIMIZING MASKING STRATEGIES</p> <ul style="list-style-type: none"> AVOID hyperventilation Consider glycopyrrolate dose to minimize hypersalivation and prevent cough Consider anti-tussive strategies on emergence, i.e. IV remifentanyl or lidocaine <p>Use CAREFUL PREOXYGENATION and APNEIC OXYGENATION</p>  <p>Utilize a NEGATIVE PRESSURE ROOM if possible.</p>	 <p>Recover patients in designated areas with SURGICAL MASK</p>  <p>Allow 30 MINUTES between patients and treatments</p>

 **SNACC**
SOCIETY FOR NEUROSCIENCE ANESTHESIOLOGY AND CRITICAL CARE

Source: Flexman AM, Abcejo AS, Avitsian R, et al. Neuroanesthesia Practice During the COVID-19 Pandemic: Recommendations From Society for Neuroscience in Anesthesiology and Critical Care (SNACC). *J Neurosurg Anesthesiol.* 2020;32(3):202-209. doi:10.1097/ANA.0000000000000691

janitorial staff or housekeeping, gloves and procedure masks are recommended, as well as limiting exposure to the treatment rooms to before or after the treatments are completed. This means that the treatment team personnel are responsible for sanitizing with hospital-grade wipes between patients, including the ECT machine, computer keyboards and/or mouse, anesthesia machine, and any countertop. ECT personnel replace outer gloves, or change gloves and wash hands, between each patient. Bite blocks, if used, should be disposable. To protect the anesthesia machine from being contaminated, a viral filter should be used for each patient. At the time of supply constraints, viral filters are placed in a paper bag, labeled and stored for future use on the same patient.

Clustering Strategy: Outpatient and Inpatient ECT

ECT treatment facilities that serve both inpatients and outpatients minimize patient-to-patient exposure by allocating the different populations to different treatment “clusters” or to different days, a practice which greatly decreases the chance of cross-

contamination between groups during transport and recovery. Inpatients can be further clustered by unit. Some departments have also designated treatment “teams” who alternate working certain shifts to further reduce risk of exposure.

ECT patient census is also impacted greatly by the effects of COVID-19. As local incidence increases, having a patient test positive on a psychiatric inpatient unit becomes more likely. A moratorium on admissions for an inpatient unit thus leads to a lower inpatient ECT census, which can further affect the ability to schedule ECT for inpatients and outpatients on separate days and may require services to operate fewer days per week. Hospital administrations have also pressured many sites to reduce operational days.

Although never ideal, sites have had to reduce their current patient censuses - some by as much as half – in order to accommodate reduced operations. Reducing or altogether interrupting treatment can be somewhat standardized with the use of a flow chart or algorithm, but ultimately this must be carefully considered on a case-by-case basis. Important factors to consider are the age of the patient, their location (i.

e., are they currently in a nursing home or living independently), and the potential outcome of relapse. When deciding whether or not to treat a patient during this time, a fundamental consideration is to weigh the risk of exposure to a hospital setting and potentially infected asymptomatic staff and/or other patients with the benefit of avoiding a severe relapse and admission to the emergency room.

CHANGES TO ECT PROCEDURES

Pre ECT

COVID screening is performed prior to each visit. Screening questions include 1) Does the patient have close contact with a person with a laboratory confirmed case of COVID-19? 2) In the last 14 days, has the patient experienced fever or new symptoms of cough or shortness of breath, sore throat, diarrhea, respiratory distress, chills, myalgias, loss of smell, or change or loss of taste sensation.

If a patient is symptomatic, COVID-19 testing is indicated. Whether to test asymptomatic patients coming from a higher risk environment such as a nursing home is dependent on several factors. If there have been known cases or contacts, then testing is recommended. However, some facilities have been on lockdown and have eliminated any contact between clients, and others may refuse to test asymptomatic individuals. Furthermore, state and federal guidelines regarding testing continue to evolve based on availability and other factors, making these decisions more complicated. Therefore, the decision to test an asymptomatic individual coming from a high-risk environment is case dependent but should be strongly considered.

During Treatment

Ventilation

Masked ventilation causing aerosolization may be the biggest risk to patients and staff in terms of potential exposure. The use of High Efficiency Particulate Air (HEPA) filters for masked ventilation and anesthesia prevent the anesthesia machine itself from becoming contaminated and exposing subsequent patients. Although not an ideal practice, rationing of

these supplies is often necessary due to shortages; many sites are saving HEPA filters in biohazard bags to be used again for the same patient.

Some sites have used pre-oxygenation to avoid bagged mask ventilation (BMV) use during the procedure for appropriate patients.⁶ Pre-oxygenation is done with a regular or non-rebreather mask (slight difference between sites) for several minutes pre-treatment, and then having the patients self-hyper-ventilate as they go off to sleep to try to minimize BMV. While some patients still require BMV, it is avoided as much as possible, which has the advantage of cutting down the risk of aerosolization, and helps preserve HEPA filters.

Air recirculation

Given that BMV during ECT is an aerosol-generating procedure, facilities have revised the time interval between ECT treatments based on factors such as the size of ECT treatment rooms, capacity of the ventilation systems, air changes per hour in the building, and location of exhaust vents. Determining the air changes per hour or air circulation rate in the building will help roughly calculate time to clear up most of the room air and thereby the aerosols. The air circulation times can vary and are only estimates. Center for Disease Control has guidelines that help calculate the time required for air-borne contaminant removal by efficiency. Close attention should be paid to the assumptions in the tables provided in the appendices of the guideline.⁷ A collaboration between engineering infection control departments can be helpful in trying to determine a reasonable amount of time to wait before bringing another patient into the room. Some institutions have used two or more treatment rooms and alternate between rooms to allow more air recirculation between patients in each room. Obviously, this option is not available at many ECT sites.

Anesthesia

Anesthetic dosing generally has remained unchanged in response to the virus. However, some sites have tried to keep succinylcholine doses at the lower end of the safe range in order to allow for a quicker return of spontaneous breathing after the seizure. This minimizes BMV overall, and in sites using the preoxygenation and/or self-hyperventilation

technique described above, may allow for the elimination of BMV altogether in some cases.

ECT titration

For newly-initiated acute courses of ECT, some ECT psychiatrists continue the usual method of determining the seizure threshold, while others have stopped the titration method to determine seizure threshold. One method being used is starting at 100% energy at the first ECT, in order to minimize the time a patient is not breathing since they are not being ventilated. Other methods include use of a prior stimulus dose (if applicable) or an age-based approach. When titration method is used to determine seizure threshold, other ECT providers use 6–12 times the seizure threshold for subsequent ECT when using right unilateral placement.

Post ECT

Recovery room practice has not been dramatically altered by the risk of COVID. However, recovery nurses should wear eye protection and surgical masks. Some sites felt that nurses working with patients in immediate recovery should have N95 masks given the risk of exposure due to close contact while patients may be coughing and emitting secretions. Patients who are coughing and not fully awake should be allowed to recover in the treatment room and be brought out only when they are not coughing. As early as possible, before bringing the patient out of the treatment room, a procedure mask should be correctly placed on the patient's face. Patients should be separated by at least 6 feet and/or physical barriers such as partitions or curtains, if possible. Some sites have shortened their stay requirement in the recovery room or recovery lounge (if a 2-stage recovery) in order to avoid crowding in these areas and maximize social distancing.

ECT OPERATIONS

Starting ECT

Nursing homes and other long-term care (LTC) facilities for older adults are known to have high transmission rates for infectious diseases, and thus

have unfortunately become “hot spots” for the spread of COVID-19.⁸ For this reason, ECT services have had to be especially stringent when considering treating older patients referred from LTC facilities – not only due to the risk that an incoming patient may infect ECT staff and other patients, but also the risk of rapid spread to other vulnerable older adults if a patient carries COVID-19 back to their LTC facility. It is paramount to involve the medical staff at the LTC facility when weighing the pros and cons of treating these patients. In places where pre-op testing is not readily available, some ECT services have chosen to stop accepting any geriatric patients or those coming from LTC facilities.

Stopping ECT

Due to the COVID-19 crisis, many centers felt significant pressure to quickly and dramatically reduce the size of their ECT census. Given this, and the increased mortality and morbidity risk of COVID-19 to geriatric patients, the decision regarding continuing ECT treatment, especially in the continuation or maintenance phase requires a risk and/or benefit analysis. Treatment discontinuation, in some cases, can result in dangerous relapse of symptoms that are not well controlled by other means which could send patients to the emergency room – an especially hazardous setting for a geriatric patient during this time. Additionally, a full relapse can result in an inpatient admission and the need for another acute course of ECT, which both introduces additional risks to the patient and utilizes more valuable resources. To avoid this, clinicians are tapering down the frequency of ECT treatments slowly while patients are closely monitored by the primary psychiatric providers. Close communication between the ECT service and the outpatient treating psychiatrist is essential to establish a safe treatment plan.

To Treat or Not to Treat

In the US, it is clear across ECT practices that any known COVID-19 positive patient, whether symptomatic or not, does not get treated with ECT unless it is determined as life-saving for a life-threatening condition. In such rare cases, ECT should be administered in an operating room set-up with negative pressure. However, in Belgium patients with COVID-

19 continue to receive ECT with a special treatment schedule,⁹ and a single case report in the UK described successful ECT treatment of a patient with severe catatonia who was ill with COVID-19.¹⁰

In patients who previously tested positive but are now asymptomatic, the criteria for treating with ECT are either 1) 2 weeks from being diagnosed and 3 days of being asymptomatic, or 2) 2 weeks of being asymptomatic. The same criteria can be used for people who had symptoms suggestive of COVID-19 but were never tested as the symptoms did not meet testing threshold. With all patients, 2 consecutive negative tests and no new exposure indicate it is safe to proceed with ECT. For patients who test positive during a course of ECT, the decision to extend testing to other patients is based on clinical indications and clinical judgment. These criteria vary by ECT practice.

Consent Issues

An important issue that is missing in the literature is that of informed consent and disclosure of risks related to COVID-19 transmission, which is particularly important in older adults who have increased risk of more severe illness and morbidity from COVID-19. Based on expert group discussions, there is a consensus that the potential risk of COVID-19 transmission should be discussed with the patients and the legal authorized representatives or substitute decision-makers. Across all the ECT practice sites, written consent forms for ECT have not been altered to include specific COVID-19 wording, consistent with all other practices that involve aerosol-generating procedures.

CONCLUSIONS

There is a clear and universal consensus that ECT is a critical and essential treatment. In older adults, ECT may be life saving for treatment resistant depression, depression with psychotic features, catatonia,

and severe agitation and aggression in individuals with dementia. Reduction in the delivery of both acute and maintenance ECT treatment for older adults as a result of COVID-19 restrictions have resulted in less effective treatment and greater relapse of severe mood disorders and agitation in older adults. Further, the clinical practice of ECT has rapidly changed as a consequence of the pandemic, and approaches to mitigate infection transmission in the setting of the COVID-19 are almost uniform across the globe. Current testing for COVID-19 is limited by testing equipment availability and treatment trials and vaccine development are in very early stages of development. Therefore, modifications to the practice of ECT are likely to last for a substantial period of time and may evolve further as the understanding and treatment of COVID-19 and availability of PPE improve. The community of clinicians involved in neurotherapeutics must continue to collaborate, share lessons learned and collect systematic outcome data to ensure safe access to ECT administered with the highest standards of infection mitigation.

AUTHORS' CONTRIBUTION

MIL wrote this manuscript using content gathered by, and with revision from, SS, APH, BPF, SNS, GP, LN, and MM. HLH contributed to the organization, composition, and revision of the manuscript.

DISCLOSURE

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