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Title: Crisis Standard of Care: Management of Infantile Spasms during COVID-19

Running head: Management of Infantile Spasms during COVID-19

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Abstract

The Child Neurology Society collaborated with the Pediatric Epilepsy Research Consortium to issue an online statement April 6, 2020 of immediate recommendations to streamline diagnosis, treatment, and follow up of infantile spasms. The recommendations encourage use

of telemedicine, outpatient over inpatient studies, and oral therapies as initial treatment. Each recommendation is earmarked as enduring if intended to outlast the pandemic, and limited if intended only during the duration of the pandemic.

"Crisis standards of care" are guidelines to help healthcare providers deliver the best possible medical care when resources are acutely limited, such as by war, natural disaster, or public health catastrophe. Public health officials and emergency preparedness experts have devoted significant professional effort to conceptualize and draft such guidelines,[1] but there has been little attention to such planning in child neurology. As the current COVID-19 pandemic profoundly changed health care delivery, we felt growing uncertainty on how to approach one of the most important clinical scenarios in our practice: new onset infantile spasms.

Infantile spasms occur typically in the first year of life once per 2400–5500 live births. This is roughly as often as other well-known pediatric disorders like cystic fibrosis, Tetralogy of Fallot, and type 1 diabetes. Infantile spasms cause a developmental epileptic encephalopathy – i.e., the abnormal cerebral electrical activity impairs cognition *and* derails ongoing developmental processes. Timely effective treatment improves the chance of resolution of epileptic spasms and improves outcomes. Thus rapid diagnosis is critical. Outcomes vary from normal to substantial neurodevelopmental disability, and depend both on treatment response, as well as the infant's neurologic status prior to diagnosis (i.e., pre-existing risk of developmental impairment, pre-existing epilepsy at diagnosis, and etiology).[2]

The COVID-19 pandemic has strained healthcare delivery, and mandated a change to standard management of infantile spasms. Traditionally, care involves an urgent inpatient evaluation to coordinate video-EEG monitoring, imaging, laboratory studies, and initiation of treatment. However, at present, every in-person healthcare visit puts children, their caregivers, and their clinicians at risk for infection, particularly given days-long pre-symptomatic COVID-19 carriage[3] and airborne transmission.[4]

As we write, COVID-19 infections are common among patients admitted to hospitals, and many pediatric wards are occupied by sick adults. Governments worldwide have closed businesses and public spaces and issued stay-at-home orders to reduce community transmission. Although COVID-19 infections are milder in children, infants and immunocompromised individuals have the most severe disease among pediatric populations.[5]

To balance clinical and public health imperatives, and to respond to urgent questions regarding patient management, the Child Neurology Society collaborated with the Pediatric Epilepsy Research Consortium to issue an online statement April 6, 2020 of immediate recommendations to streamline diagnosis, treatment, and follow up of infantile spasms.[6] The recommendations encourage use of telemedicine, outpatient over inpatient studies, and oral therapies as initial treatment. Each recommendation is

earmarked as *enduring* if intended to outlast the pandemic, and *limited* if intended only during the duration of the pandemic.

The statement included these *enduring* recommendations:

The initial clinical visit for suspected infantile spasms *may be performed by telemedicine or video conference.*

Parents should be instructed to obtain and share *video of several consecutive typical events,* to be reviewed prior to or during the initial clinical encounter.

The evaluation should include inquiry and observation for *light spots on the skin,* given the common association of infantile spasms with tuberous sclerosis complex (TSC).

EEG confirmation is strongly encouraged and should include at least one sleep-wake cycle, recognizing that epileptiform abnormalities are potentiated by sleep.

Hypsarrhythmia may be absent and is not required for the diagnosis.[7]

Following diagnosis, if the etiology is uncertain, an MRI is recommended urgently, for example to diagnose TSC or a structural brain lesion.[8] A genetic evaluation can be high yield, and should also be prioritized.

For initial treatment, unless there are contraindications, *select from among three choices: ACTH, high dose prednisolone (4-8 mg/kg/day), and vigabatrin*.[9]

For TSC, vigabatrin is preferred if immediately available. Otherwise oral prednisolone should be initiated and an echocardiogram obtained. (Hormonal treatments can increase the size of cardiac rhabdomyomas.)

Non-standard therapies should be avoided as the first treatment choice for infantile spasms (e.g., topiramate, ketogenic diet, benzodiazepines).

For hormonal treatments, *GI prophylaxis* with a proton pump inhibitor or H2 blocker is recommended with steroid treatment, and *a single prescription* should include both two weeks at a high dose and a two-week taper.

The statement included these *limited* recommendations:

Outpatient EEG is preferred over inpatient admission. The need for inpatient care is driven by the need for rapid and coordinated care, rather than by risk of cardiorespiratory instability or acute neurological decompensation.

Initiate treatment with high dose oral prednisolone in the outpatient setting, other than for TSC. Prednisolone is inexpensive, readily available in commercial pharmacies, and orally administered, in contrast with ACTH and vigabatrin, which require use of subspecialty pharmacies, pre-approval by insurance, and special training of caregivers (ACTH, injections; vigabatrin, mixing of sachets). High-dose prednisolone regimens (4-8mg/kg/day) have better response rates than low dose prednisolone,[10] though the optimal regimen is not established.

Follow up via *telehealth at least weekly*.

If using hormonal therapy, arrange to *measure blood pressure at least weekly.*

Limit laboratory testing to specific indications or clinical concerns.

If clinical spasms continue after 7-10 days, add or modify treatment *without* confirmatory EEG.

If clinical spasms resolve, or if the caregiver is uncertain, *repeat an EEG,* including at least one sleep-wake cycle, with preference for outpatient EEG.

These recommendations are our crisis standard of care for new onset infantile spasms. The exigency of the current public health crisis demands a fast, effective pivot in how we manage our most vulnerable patients, including a shift to an outpatient based protocol for both diagnosis and treatment. Heightened concern relates to the utilization of high dose steroid therapy placing the patients at risk for an iatrogenic immunocompromised state. Our recommendations have appeared to receive widespread acceptance among the child neurology community, functioning within the confines of a new reality, if temporary, of a drastic reduction in availability of hospital-based services. Further study will be needed to assess the impact of these sudden changes. While *enduring* recommendations are applicable throughout the pandemic and beyond, *limited* recommendations are intended for implementation during the time of the pandemic but may be needed for future crises of contagion.

Potential Conflicts of Interest

The authors report no potential conflicts of interest.

Author Contributions

All authors contributed to conception and design and to drafting the manuscript

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