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**The Resident and Fellow’s Survival Guide to the Mt Sinai EEG/Epilepsy Rotation**

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Prepared by Ji Yeoun (Jenna) Yoo, MD

July 2024 – 6th Edition

**Educational Goals and Objectives:**

1. **Patient Care and Procedural Skills**

Fellows are expected to demonstrate competence in:

(a) the diagnostic evaluation, medical management, and surgical evaluation of patients with epilepsy and seizures

(b) interviewing and examining patients with epilepsy and seizures

(c) determining the differential diagnosis of the various clinical presentations of epilepsy and seizures

(d) determining the appropriate medical and surgical investigations for the diagnosis of epilepsy and seizures, including laboratory, pathologic, radiologic, and neurophysiologic testing

(e) inpatient and outpatient management of patients with epilepsy and seizures (both medically and surgically)

(f) working in multidisciplinary teams and coordinating patient care

1. **Medical Knowledge**

Fellows are expected to demonstrate competence in their knowledge of:

(a) the basic science of epilepsy and seizures

(b) the genetics of epilepsy and seizures

(c) the epidemiology of epilepsy and seizures

(d) neuroimaging and other diagnostic modalities in epilepsy

(e) neuropsychology

(f) pharmacologic treatment of epilepsy

(g) non-pharmacologic treatments of epilepsy

(h) co-morbidity in epilepsy and seizures

(i) ictal and interictal EEG patterns across the lifespan; and,

(j) prognosis in epilepsy and seizures.

1. **Practice-based Learning and Improvement**

Fellows are expected to develop skills and habits to be able to meet the following goals:

(1) systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement; and,

(2) locate, appraise, and assimilate evidence from scientific studies related to their patients’ health problems.

1. **Interpersonal and Communication Skills**

Fellows are expected to demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals.

1. **Professionalism**

Fellows are expected to demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles.

1. **Systems-based Practice**

Fellows are expected to demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.

**Overall Site-Specific Goals and Objectives**

Mount Sinai Hospital (MSH)

This site includes the Kravis Children's Hospital, the Pediatric Department's facility within the Mount Sinai Medical Center. At this site trainees learn to monitor, interpret and report long term EEGs for patients admitted to the Epilepsy Monitoring Unit and Intensive Care Unit, learning overall epilepsy patient care, pediatric epilepsy and pediatric epilepsy surgery.

Mount Sinai West (MSW)

This site provides exposure to adult epilepsy surgery, outpatient routine and ambulatory EEGs, and epilepsy care.

At this site, the epilepsy fellow receives training on reading and reporting of outpatient routine and ambulatory overnight EEGs, inpatient routine and continuous video-EEG monitoring, intracranial EEGs for adult epilepsy surgery patients, cortical mapping of implanted patients, as well as outpatient epilepsy patient care.

**Circumstances in which trainees MUST communicate with supervising faculty members:**

A trainee must communicate with the admitting attending or fellow under the following circumstances:

  Their patient is admitted to the epilepsy monitoring unit

  Their patient is admitted to the Neuroscience Intensive Care Unit

  Their patient is undergoing epilepsy surgery

  Significant change/worsening of clinical status

**Epilepsy Team Members**

|  |  |  |
| --- | --- | --- |
| **Name** | **Phone number** | **Email** |
| ***EMU attendings (listed alphabetically)*** |  |  |
| Anuradha Singh, MD | 917-545-3407 | Anuradha.singh@mssm.edu |
| James “Jake” Young, MD | 917-544-1828 | James.young@mssm.edu |
| Jiyeoun “Jenna” Yoo, MD | 510-529-1957 | Jiyeoun.yoo@mssm.edu |
| Kyusang Lee, MD | 917-757-7565 | Kyusang.lee@mountisinai.org |
| Lara Marcuse, MD | 917-459-3595 | Lara.marcuse@mssm.edu |
| Leah Blank, MD | 857-998-0661 | Leah.blank@mssm.edu |
| Madeline Fields, MD | 917-945-9569 | Madeline.fields@mssm.edu |
| Maite La Vega-Talbott, MD | 917-697-5531 | Maite.LaVega-Talbott@mountisinai.org |
| Natasha Acosta-Diaz, MD | 917-282-8191 | Natasha.acosta-diaz@mssm.edu |
| Sonam Verma, MD | 732-788-4778 | [Sonam.verma@mssm.edu](mailto:Sonam.verma@mssm.edu) |
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| ***Nurse Practitioners*** |  |  |
| Dina Bolden (MSW inpatient) | 917-531-2685 | Dina.bolden@mountsinai.org |
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| Timothy Bell (Kravis inpatient) |  | Timothy.bell@mountsinai.org |
|  |  |  |
| **EMU coordinator** |  |  |
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| Toni Kavanaugh, RN (peds) | 914-588-4228 | Toni.kavanagh@mountsinai.org |
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| ***Neurosurgeons*** |  |  |
| Saadi Ghatan, MD | 917-379-3013 | Saadi.ghatan@mountsinai.org |
| Ted Panov, MD | 570-578-6634 | Fedor.panov@mountisinai.org |
| Peter Morgenstern, MD |  | Peter.Morgenstern@mountsinai.org |
|  |  |  |
| ***EEG Tech managers*** |  |  |
| Pepi Dakov (MSH) | 718-614-4138 | Pepi.dakov@mssm.edu |
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| ***Neuropsychologists*** |  |  |
| Adam Saad |  | [Adam.saad@mountsinai.org](mailto:Adam.saad@mountsinai.org) |
| Sloane Sheldon |  | Sloane.sheldon@mountsinai.org |
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| Brad Delman |  | Bradley.delman@mssm.edu |
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| ***Psychiatrists*** |  |  |
| Pojen Deng |  | Pojen.deng@mountsinai.org |
| Tianxu Xia |  | Tianxu.xia@mssm.edu |
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| ***Administrative Assistants*** |  |  |
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| Melissa Sebastian | 917-704-3881 | Melissa.sebastian@mssm.edu |
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| ***Social worker*** |  |  |
| Ilona Silva Alvarez | 929-656-3174 | Ilona.silvaalvarez@mssm.edu |
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| ***Neurology IT*** |  |  |
| Devell Perdue | (212) 241-5858 X45858, c (347) 213-9157 | Devell.perdue@mountsinai.org |
| ***MSH clinic*** |  |  |
| Yocasta Santana | (212) 241-3571 X43571 | X43571 |
| **MSH inpatient units** |  |  |
| MSH 8W front desk | (212) 241-5558 | X45558 |
| MSH EMU monitor watcher | (212) 241-5039 | X45039 |
| MSH NSICU | (212) 241-2100 | X42100 |
| NEMAT | (212) 241-6467 | X46467 |
| MSH Neuroradiology | (212) 241-4261 | X44261 |
| MSH Lab | x4labs |  |
| MSH IT | 4help |  |
| MS School IT | 47091 |  |
| MSH Admitting Office | 41900 |  |
| MSH Transfer Office | 65902 |  |

**Checklist prior to start of fellowship:**

Program Coordinator: Jennifer.munoz@mssm.edu

1. VPN access
2. Obtain hospital DEA number and link to VPN
3. Cognisent app (NotifyMD) – program coordinator to email [Yvette.lopez@mssm.edu](mailto:Yvette.lopez@mssm.edu) to set up.
4. Natus and Citrix access – program coordinator to email [pepi.dakov@mssm.edu](mailto:pepi.dakov@mssm.edu)
5. EPIC access to clinics (including Friday seizure clinic – fellows to call helpdesk (212-241-4357), provide life number and ask to be added to EPIC ID 8530012 [HOSP NEURO SEIZURE]
6. TEAMs app for MSSN chats

**Program Director to include in Orientation:**

1. EPIC chat groups – add new fellows and remove old fellows
2. Final block and call schedules

**General:**

1. How to find out who is on call: [www.amion.com](http://www.amion.com/) (pwd: msneuro)
2. How to page: 41300 (212-241-1300) then follow the direction. You can also page directly from Amion.
3. EEG access from Citrix: msvpn.mountsinai.org
4. Resident/fellow resources: <https://icahn.mssm.edu/education/residencies-fellowships/life>

**EEG LABORATORIES**

Location:

MSH - Annenberg 2nd floor – Neurology Practices Area

MSW – 4th floor

Time: Mon-Fri 8am – 4pm.

Fellows are **encouraged to watch the EEG technologists perform at least 2-3 hookups and then do their own measurements/electrode placements on 1-2 patients early in their training (July or August)**.

Residents rotating through the epilepsy service are encouraged to spend one PM session in the EEG laboratory to observe EEG placements.

**FELLOWS: INPATIENT ROTATION**

MSH: 4 adult EMU beds (Guggenheim 8th floor, 8West)

MSW: 4 adult EMU beds (8th floor, 8B)

**EEG reporting**

MSH rotation: inpatient long term and rEEG at MSH and MSQ

MSW rotation: inpatient long term and rEEG at MSW, MSM and MSSN

**Daily Routines in the epilepsy rotation:**

Fellows are expected to remain on site until at least 5 PM every weekday.

AM:

* Start reading long term EEGs between 7-8 am (Fellows are expected to prepare preliminary reports on all long term EEGs before rounding starts with the attending ~9-10AM)
  + Start with ICU studies
  + NSICU fellow will provide names of the patients who need priority reading between 7-8AM via EPIC chat msg
* Rounding with the attending starts between 9-10 am (discuss rounding time with the attending on service).
* After the EEG reports are finalized with the epilepsy attending, communicate with the primary team (use EPIC chat or call to discuss) and decide whether to continue or discontinue the recording.
* Round on EMU and epilepsy consult patients.

PM:

* Read inpatient routine & baseline inpatient long-term EEGs done up to 5 pm and leave preliminary report in EPIC as an incomplete procedure note. Co-signer should be the epilepsy attending on service.
* Follow up on all long-term EEGs (including EMU patients) up to 5 PM
* All long-term EEGs (except EMU patients) should be read up to 5 PM and interim daily EEG progress report (1-2 lines – if any changes from the AM report, any seizures, etc) should be put in EPIC as a progress note at the end of the work day.
  + Example:

\*\* Epilepsy Fellow long term EEG Progress Note:

“EEG read up to 5 pm. No changes in EEG seen since 8AM. Full report to follow tomorrow. Please call if any urgent matters”

“EEG read up to 5 pm. One electroclinical seizure captured at 11AM, with left centroparietal onset, clinically manifested by right facial twitching, lasting about 2 minutes. Discussed with primary team and lorazepam 1mg given, and levetiracetam increased from 750 mg bid to 1000 mg bid. Full report will follow tomorrow. Please call if any urgent matters”

* Follow up on prior day or the day’s discontinued EEGs (on Monday, follow up weekend’s) EEGs, read until the end of the recording, finalize the report and leave it as an incomplete procedure note, and have them signed off by the attending during morning rounds.
* Any patients that need a follow up at night should be signed out to the fellow/attending on call.

**EMU Elective admissions and stay**

* Fellows are responsible for writing the H&P, placing admissions orders and signing out to on-call residents for elective admissions.
  + If there is a dedicated resident assigned to the EMU, the fellow will help the resident write the H&P and give feedback on their admission exam.
  + Fellow is responsible for checking the elective admission’s calendar and communicate with Vincent Palmieri to confirm patient’s arrival.
  + If admission occurs after 5PM, a preliminary H&P note and detailed sign out should be pended for the covering resident on call and communicated clearly.
  + For blocks with rotating resident, EMU patients are to be followed, written progress notes, and signed out to on call team by rotating PGY2/4. For blocks with no rotating resident, EMU patient are taken care by general neurology floor team. Fellows are to clearly communicate round time and recommendations to general neurology floor team on EMU patients.

**Epilepsy Consults**

* NSICU and General Neurology Consult Team can request consults from epilepsy team (see criteria below). Fellows are to see, write consult notes, and staff with attending during day shift. For blocks with a rotating resident, consults should be divided between resident and fellow at the discretion of the fellow’s schedule (eg. clinics).
  + Consults assigned to the resident should be discussed with the fellow prior to staffing with the attending.

**Outpatient clinics**

During your MSH rotation

* Friday PM: Fellows’ continuity clinic (17E 102nd street, with Dr. Maria Muxfeldt)

During your MSW rotation

* 1st week of the block: Thursday PM: Dr. Fields (MSW 10th floor)
* 2nd week of the block: Friday PM: Dr. Marcuse (MSW 10th floor)
* After clinics, EEGs need to be followed up and sign out should be emailed to the on call attending and fellow on call
  + During the week, only people who need close monitoring at night need to be signed out. For the weekend, all EMU and ICU EEGs need to be signed out.

**Protocol for generating an EEG report:**

**Step 1:** In the Natus Database, right click and go into “Study reports” and then “Create report”

You will get the following options:

텍스트, 스크린샷, 폰트, 번호이(가) 표시된 사진

자동 생성된 설명

**Step 2:** Pick the appropriate template. This will populate some demographic information as well as the start time into the report.

**Step 3:** Open the patient in the correct context in EPIC.

For inpatients, go to “Notes” section and then “New note”. Type is “procedure”. Please cut and paste the template there

**Step 4:** Write the report (you got this ☺!). When you are done, please Pend reports.

Every day the attending will review your report, makes edits and sign it.

**Multi-day reports (all VEEG**): you will copy forward the attending report in EPIC from the prior day. You will (1) add the next day under Study Date and Time; update the medications: add the next day of reporting, and update the summary and clinical correlation as appropriate.

**Finalize the report:** When a patient is disconnected, read the remainder of the file, copy forward the report again, add FINAL REPORT to the top, update the time, and pend this for your attendings review.

**Report template type**

**2023 VEEG:** For any ongoing VEEG in patients that have had a routine EEG within the last 6 months.

**2023 VEEG** neonatal: For any VEEG in a neonate

**2023 EMU Monitoring:** This has more information on the person’s epilepsy and should be used for every patient admitted to the EMU in Kravis, MSH, or MSW.

**2024 BASELINE AND CONTINUOUS VEEG:** For patients connected to VEEG without a prior routine EEG. The techs will stop and restart the study after 20-60 minutes- this is the baseline. Use this template, write the report, enter it in EPIC, pend it in EPIC, ***and make sure to let your attending know***. All baselines done before 5 pm must be read and entered into EPIC the day they are performed. The next morning, this same report is copy forwarded to describe the next day of EEG.

**2023 VEEG SAH HEMORRHAGE:** For any patient with an aneurysmal hemorrhage we are tracking ADR and alpha variability, use this report.

**2023 Intracranial report:** This is like an EMU report tailored for intracranial studies. While constructing this report, you will need to know where all of the leads are, including the internal and external contacts as we document their location in the table. Very helpful to look at the post-op CT or fused MRI images.

**2021 Brain Mapping:** This is the report for brain mapping. Can and should be tailored to the patient (ie, if more detailed language mapping is done, please add to the columns)

**Amb ABN/Amb nl:** Used for the prolonged outpatient studies

**Observation unit:** This is a VEEG done as an outpatient at MSH, please use VEEG template.

**2023 Routine ABN/NL/Neonatal:** Used for outpatient and inpatient routine EEG without a same day longer study

**Epilepsy Consult Guidelines**

The fellows are responsible for epilepsy consults requested by the NSICU and general neurology teams. General neurology consult team can triage consult and refer to epilepsy if appropriate. Fellow should split consult requests but should supervise (i.e., review with resident) all consults seen by the resident. Overnight epilepsy consult cases staffed with fellows should be rounded by fellow/rotating residents in AM and staffed with attending the following day if non-urgent. Fellows/residents are to follow epilepsy consult patients, write progress notes as needed and communicate recommendations to the primary team until signing off. If there are no rotating residents, all consult patients are to be followed by fellows. Clear documentation should be implemented when the epilepsy consult signs off the patient. The fellows are responsible for following established epilepsy patients (patients of Mt Sinai epileptologists) when admitted outside of the EMU, as requested by the primary team. Fellows are responsible for signing out consult patients between blocks to incoming fellow and any rotating residents.

Appropriate epilepsy consults

1. Patients with known epilepsy presenting with **unprovoked** breakthrough seizures or new events requiring medication titration
2. Patients with possible psychogenic events who need to be on EEG monitoring who has already been evaluated by the Neurology consult team
3. Patients with suspected nonconvulsive seizures/SE, connected to EEG and found to be seizing who has already been evaluated by the Neurology consult team
4. Patients with refractory or super refractory status epilepticus on continuous EEG monitoring

Appropriate epilepsy e-consults

Direct communication with the consulting neurologists / NSICU providers should always occur before placing e-consults. The e-consult order will be placed by the primary / neurology consult team and the note should be linked to the order.

1. Patients in super-refractory status epilepticus (patients having seizures on EEG despite being on anesthesia medications), whose ASM management depends on the EEG reads. Inpatient consults are preferred whenever possible, but in remote settings, e-consults can be utilized.
2. Simple management such as converting po to iv ASM medications, or titration/ taper schedule that was unable to be addressed by the general neurology consult team.

**Daily Must-Do’s other than above**

1. For all long term EEGs:

* Need to include a brief clinical history at the top of the report
* Daily CNS-acting medication need to be listed in the report for each day of recording – also specify dose.

1. For each day

* Put at least three annotations on the files - Awake, Asleep, Interictal findings
* If you see anything interesting put an “interictal” mark so that it will be saved and to discuss these findings with the attending.
* Both *Event* and *Seizure* will save the file with video.
* When closing the file in patient information, click the patient info and click the “custom” field and mark the appropriate findings.

**Call Schedule**

Weekdays (5 PM to 8 AM): Epilepsy for all Mount Sinai Health System hospitals

Weekends (Friday 5 pm to Monday 8 am): Epilepsy for MSH and MSW inpatients

On call attending and fellow are physically present at MSW for weekend rounding. After hour calls are home-calls. One of the attendings will always be on call with you to discuss EEG findings or any management decisions. At night, fellows will answer phone calls from the answering service (patients of epilepsy attendings, ED physicians, etc.) and residents. During the weekends, on call fellows are responsible for reading all inpatient MSH & MSW EEGs, communicating with the on call residents, and answering phone calls. Sign out should be emailed on Sunday for the incoming team on Monday. Brief history and plan for the EMU patients and epilepsy consult patients should be included.

**FELLOWS: OUTPATIENT ROTATION**

**EEG Reporting:**

Ambulatory block:

AM: Attend faculty clinics: see below schedule

PM: Read outpatient routine and ambulatory EEGs at MSH, MSW, MSM and MSQ. Rounding with Ambulatory block attending (discuss the time of rounding with the attending on ambulatory block, typically in the afternoon)

Elective block:

Two AM faculty clinic per week: Tue AM: Dr. Blank, Fri AM: Dr. Yoo

**AEEG Block Schedule**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Monday | Tuesday | Wednesday | Thursday | Friday |
| AM | Fields (MSW) | Blank  (MSH) |  | Marcuse  (MSW) | Yoo  (MSH) |
| PM | Outpatient REEG and AEEG reading and rounding | Outpatient REEG and AEEG reading and rounding | Outpatient REEG and AEEG reading and rounding | Outpatient REEG and AEEG reading and rounding | Outpatient REEG and AEEG reading and rounding |

**FELLOWS: PEDIATRIC EPILEPSY ROTATION**

During pediatric rotations, focus on learning neonatal EEGs and early childhood EEGs, pediatric epilepsy syndromes, genetics related to epilepsy, metabolic disorders related to epilepsy, ketogenic diet, and pediatric epilepsy pre-surgical evaluation.

Please discuss the rotation schedule with the pediatric attending on service.

AM: Monday to Friday 8:00 am to 11:00 am

Pediatric EMU at Kravis 5th floor

* Read inpatient EEGs at Kravis and Neonatal ICU at MSW, elective EMUs at Kravis, and intracranial EEGs at Kravis
* Tuesdays and Thursdays: Pediatric Neurology team has clinic at 9 AM Reading/rounding for non-EMU patients should be finished before 9AM. Afterwards, read/round for EMU and intracranial EEGs. Please discuss rounding schedule with the pediatric epilepsy attending.

PM: 1-5 pm

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mon | Tue | Wed | Thu | Fri |
| Peds Amb EEG reading | Dr. La Vega  (MSBI) |  | Peds Amb EEG reading | Dr. La Vega  (5E 98th street) |

Mount Sinai Beth Israel clinic: 10 Union Square East, 5th floor, suite 5-G

Mount Sinai East: 5E 98th street 1st floor in the movement disorder

Fellows should follow up on long term EEGs (focusing on ICU studies). Brief progress notes in EPIC should be done for ICU EEGs (same as above).

**FELLOWS: OTHER RESPONSIBILITIES**

**MDC Preparation**

Fellows are responsible for preparing and presenting epilepsy surgery cases (~1 NEW case per fellow, 1 FOLLOW UP per fellow), which are held every Wed 4-5:30 PM. Epilepsy attendings are expected to give the names of the patients by the previous Friday. Generally, the fellow who read the video EEG or intracranial EEG will be the presenting fellow for the case. Use “.fpmdc” smartphrase in EPIC to create the MDC note. After you prepare your MDC presentation, please go over it with the patient’s epileptologist prior to the presentation. During the case conference, fellows should update discussion and plan, and finalize the note.

**EEG conferences**

1st week – joint NSICU conference, 3rd week – interesting EEG cases (Wed 1-2 pm)

This conference is to share interesting or challenging cases together and to learn from each other. When you encounter these EEGs, please make a note to present them during these conferences. Each fellow is expected to present 2-3 cases per conference. One third of the time should be devoted to pediatric cases.

**RESIDENTS / INPATIENT ROTATION**

**MSH and MSW EMU Rotation:**

AM workflow (~7am-12pm):

7-8AM: Arrive and preround on patients (EMU and epilepsy consults)

8-9AM: Attend morning report

9-10AM: Read at least one LTM EEG (first week: EMU study, second week: one EMU and one ICU study) and draft EEG reports. The residents on the epilepsy rotation should be assigned to read at least 1 long term EEG in the morning and continue writing EEG reports on these patients until the end of monitoring. When EEG monitoring is finished for the patient, pick up another patient.

Between 10 AM till 12 PM: Round with epilepsy fellow/attending

PM workflow (12-5PM):

12-1 PM : Attend neurology noon conference 12-1 PM (MSH)

1-5 PM: Elective admission H&Ps, epilepsy consults, follow-up on LTM EEG that you read, read new inpatient routine EEGs (at least 1-2) and a new LTM EEGs (if the EEG you were following was discontinued)

Neurology residents’ ACGME milestone

Graphical user interface, table

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**RESIDENTS / OUTPATIENT ROTATION**

**MSH Amb EEG/Outpatient Rotation (MSH PGY-2)**

8-9AM: Attend morning report

**AM**: Epilepsy Clinic or EEG reading- if no clinic, self-study and outpatient EEG reading

**PM**: Residents’ continuity clinic or faculty clinic, Ambulatory EEG readings with the ambulatory block attending (Discuss time of rounding with ambulatory block attending)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Monday | Tuesday | Wednesday | Thursday | Friday |
| AM (9-1) | Self-directed EEG Learning | Blank  (MSH) | Outpatient EEG reading | Outpatient EEG reading | Yoo  (MSH) |
| PM (1-5) | Resident clinic | Outpatinet EEG reading  & round with AEEG block attending | 1-2 PM: fellow conference  2-4 PM: Outpatient EEG rounding  4-5:30 PM:  MDC conference | Outpatient EEG reading  & round with AEEG block attending | Resident clinic |

\*\* Note: Faculty clinic schedule will vary depending on their inpatient rotation schedule. If the clinic attending does not have AM clinic, self-read routine EEGs and go over them with the ambulatory EEG attending in the afternoon.

**MSW Outpatient rotating Residents**: (MSW PGY-2s)

**AM**: Epilepsy Clinic (if no clinic, self EEG reading)

**PM**: Ambulatory EEG readings with the ambulatory block attending

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Monday | Tuesday | Wednesday | Thursday | Friday |
| AM | Fields  (MSW) | Blank  (MSH) | Singh  (MSH) | Marcuse (MSW) | Yoo  (MSH) |
| PM | EEG reading | EEG reading | EEG reading | EEG reading | Didactics |

\*\* One afternoon will be spent in their continuity clinic (Tue/Wed/Thu)

\*\*First &Third Thu AM – continuity clinic

\*\* Post-calls (q6-7) for PGY-2s

\*\* Drs. Fields and Marcuse’ clinics are at MSH on the 4th week.

\*\* Note: Faculty clinic schedule varies depending on their inpatient rotation schedule. If the clinic attending does not have AM clinic, self-read routine EEGs and go over them with the ambulatory EEG attending the day or the next day.

**TEACHING ROUNDS**

(All epilepsy conferences are held via zoom currently)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name of Seminar** | **Day of Week** | **Time** | **Location** | **Description** | **Participants** |
| Epilepsy surgery conference  (mandatory) | Wed | 4-5:30 pm | Levy Library (MSH) / Zoom | Epilepsy Surgery Cases | Comprehensive Epilepsy Team |
| Teaching Rounds /  Interesting EEG cases  (mandatory) | Wed | 1-2 pm | Zoom | **1st :** ICU EEGs (fellows present – joint conf with NSICU)  **2nd and 4th:** Faculty lecture series  (see below schedule)  **3rd week:**  Interesting EEGs (fellows and attendings present)  **5th week:**  Other | Epilepsy attendings on service, fellows, residents, students, EEG technicians |
| Grand Rounds | Fri | 8-9am | Hess Center  (remote access available) | Neurology Grand Rounds | Neurology faculty, fellows, residents, students |
| EEG conference with residents | Fri  (Biweekly- 2nd Fri of the block) | 12-1 pm | Anbg 14th floor conf room | Attending/Fellow on service go over interesting EEG cases for the block | Residents, fellows,  Students,  attending on service |

**Curriculum:**

Lectures (Jul-Sep: summer bootcamp with weekly lectures)

|  |  |
| --- | --- |
| Jul | 1st week: EEG techniques (A. Singh)  2nd week: Normal EEG and benign variants (L. Blank)  3rd week: Abnormal EEGs and ACNS nomenclature (J. Yoo)  4th week: Status Epilepticus (L. Marcuse) |
| Aug | 1st week: Intro to epilepsy / seizure semiology (A. Singh)  2nd week: Neonatal and Infancy epilepsy – part 1 (M. La Vega)  3rd week: Childhood and Adolescents epilepsy – part 2 (S. Verma)  4th week: Intracranial EEGs (J. Yoo) |
| Sep | 1st week: ASMs – part 1 (M. Fields)  2nd week: ASMs – part 2 (M. Fields)  3rd week: EEG techniques and hands on experience (P. Dakov)  4th week: No conference (Neurology Boards) |
| Oct | 2nd week: Epilepsy surgery and Neuromodulation (F. Panov)  4th week: Quantitative EEG (H. Baang) |
| Nov | 2nd week: Women’s Issues in Epilepsy (L. Marcuse)  4th week: Genetics and Epilepsy (M. La Vega) |
| Dec | 2nd week: Biology of Epilepsy (J. Young)  4th week: No conference (holiday) |
| Jan | 2nd week: Neuroradiology (B.Delman)  4th week: RNS programming (L. Marcuse) |
| Feb | 2nd week: Psychiatry (P.Deng)  4th week: EEGs in cardiac arrest (A. Reynolds) |
| Mar | 2nd week: Neuropsychology (S. Sheldon)  4th week: Rare pediatric epilepsy syndrome (N. Acosta-Diaz) |
| Apr | 2nd week: Sleep and movement disorder (E. During)  4th week: Diversity and Inclusion |
| May | 2: week: Fellows’ lecture  4th week: Fellows’ lecture |
| Jun | 2nd week: Fellows’ graduation party! |

**EMU admission, transfers and consults**

All transfers from outside hospitals or from ED to EMU admissions must be discussed with the epilepsy attending on service. The epilepsy attending must communicate with the resident and/or nurse practitioner to develop a plan of care.

Elective admission:

1. Characterization of events. This can be for patients with new onset seizures (wo provoking factors) or patients with known epilepsy with a new event type.
2. Pre-surgical work up. For patients with drug-resistant epilepsy, considering advanced therapeutics and epilepsy surgery.
3. Medication adjustment in a safe environment.

Transfer to the EMU from an outside hospital

1. Epilepsy attending on service must accept patient
2. Transfer coordinator to arrange for case presentation, whenever possible, from the neurologist at the OSH
3. If unit triage (NSICU vs. EMU) is not clear, initial call should be between on call NEMAT provider and on call epilepsy provider.

Transfer to EMU from OSH or another service

1. Only medically stable patients should be transferred to the EMU
2. Patients with known epilepsy who continue to have breakthrough seizures or seizure-like episodes despite treatment, who are medically stable on the floor
3. Patients with epilepsy with medication toxicity or who need urgent medication adjustment with ongoing EEG in a safe and monitored setting
4. Patients whose seizure like events, including PNES, need to be characterized and who are medically stable on the floor
5. New onset seizures that are not easily controlled, in a patient who is medically stable on the floor

Patients who may be appropriate for transfer but not to EMU

1. Exclude patients with acute neurologic or systemic problems (i.e., new onset stroke or sepsis)
2. Exclude patients with serious psychiatric problems, such as active suicidal ideation or homicidal ideation
3. Exclude patients who are in the ICU or intubated
4. Exclude medically ill patients with altered mental status for ruling out subclinical seizures
5. Intubated patients with recent seizures or status epilepticus

Transfers from the NSICU to the EMU

1. NSICU patients should come to EMU service only if they continue to require vEEG monitoring
2. Epilepsy patients who come to NSICU with status may be appropriate transfers
3. New onset SE patients who are medically stable but are requiring intensive medication adjustments
4. Patients who are intubated and trached and need time before transfer out of Mt Sinai should not be in the EMU

Admissions to EMU from the ED

1. Known epilepsy patients who comes to ED with difficult to control seizures who is medically stable
2. New onset seizures who would benefit from VEEG
3. Known epilepsy patient who presents with a new event type
4. Person with suspected psychogenic non-epileptic events, especially if this event has not yet been captured on VEEG.

Appropriate epilepsy consults

1. Patients with known epilepsy presenting with **unprovoked** breakthrough seizures or new events requiring medication titration
2. Patients with possible psychogenic events who need to be on EEG monitoring who has already been evaluated by the Neurology consult team
3. Patients with suspected nonconvulsive seizures/SE, connected to EEG and found to be seizing who has already been evaluated by the Neurology consult team
4. Patients with refractory or super refractory status epilepticus on continuous EEG monitoring

NSICU / EEG workflow

1. The neurocritical care fellows are encouraged to give the names of the patients who need priority readings during their pre-rounding time via EPIC chat (7:30-8:30 AM). The preliminary EEG findings for these patients will be verbally communicated between the epilepsy fellow and the critical care fellow prior to rounding.
2. After the rounding, critical care fellows and epilepsy fellows should communicate to discuss findings/management plans/whether to continue or discontinue EEGs (12-1 PM).
3. Clarifying the reason for the EEG for each patient in the NSICU progress note is helpful (e.g; rule out seizures, alpha/delta ratio for SAH patients)
4. The epilepsy fellows should leave 1-2 lines for NSICU follow-up EEG readings around 5-6 PM. After this time, no routine EEG reading is expected, unless there are specific reasons (e.g; new seizure-like events in existing patients, new patients hook up concerning for ongoing status epilepticus). This request should be made only by calling the epilepsy fellow/attending on call (not by EPIC chats). If anesthesia medications are being tapered, please keep this schedule in mind for follow-up EEG readings.

AM / PM consults: Some seizure consults that come in overnight and staffed with epilepsy fellow/attending on call will be staffed by epilepsy attending on service during the day.

Seizure consults that come in during the day – brief check-in with fellows/attendings before sign-out, but no formal in-person afternoon rounds

**When to call the epilepsy fellow/attending on service (8-5 pm) / on call (after 5pm)**

* Patient who needs admission from ED to EMU
* Patient who can be discharged from ED and need epilepsy follow up
* Patient who is on EEG and suspected to be having frequent seizures or in status epilepticus on residents’ review
* Patient who is electively admitted to EMU had a bilateral tonic clonic seizure

**Special Circumstances**

* Patients who are having clinical seizure(s) - first, follow the protocol to treat the seizure/status epilepticus, call NEMAT if needed, formulate the overall assessment and plan then call epilepsy if needed as above (Do not call, “what do I do, this patient is seizing!”)
* If patient is already connected to EEG, look at the EEG and try to read from the review station (in 8W back nursing station: ID and PWD: nurse) before calling the fellow. If general slowing only, no need to call the fellow/attending on call.

**READING RESOURCES**

From the American Clinical Neurophysiology Society, Canadian Society of Clinical Neurophysiology, and Faculty recommendations

**EEG Primer**

* Marcuse L, Fields, M, Yoo, J. Rowan’s Primer of EEG, 2nd Edition, Elsevier, 2015
* Blum, A. S., & Rutkove, S. B. (2010). The clinical neurophysiology primer: Humana.

**Reference Textbooks**

* Brenner, R. P., & Scheuer, M. L. (2013). Adult EEG: an interactive reading session (2nd ed.): Demos Medical.
* Comair, Y. G., & Lüders, H. O. (2001). Epilepsy surgery. Philadelphia, Pa: Lippincott Williams & Wilkins.
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* Engel, J., & Pedley, T. A. (2008). Epilepsy: a comprehensive textbook. Philadelphia: Lippincott Williams & Wilkins.
* Fisch and Spehlmann's EEG Primer: Basic Principles of Digital and Analog EEG. Bruce Fisch. Elsevier. 2009.
* LaRoche, S. M., & Haider, H. A. (2018). Handbook of ICU EEG monitoring (2nd ed.): Demos Medical.
* Leppik, I. E. (2006). Contemporary diagnosis and management of the patient with epilepsy. Newtown, Pa.: Handbooks in Health Care Co.
* Schomer, D. L., & Lopes da Silva, F. H. (2018). Niedermeyer's electroencephalography: basic principles, clinical applications, and related fields (7th ed.): Oxford University Press.
* Shorvon, S. D., Guerrini, R., Trinka, E., & Schachter, S. C. (2019). The causes of epilepsy: common and uncommon causes in adults and children (2nd ed.): Cambridge University Press.
* Wyllie, E. (2020). Wyllie's Treatment of Epilepsy: Principles and Practice (7th ed.): Lippincott Williams and Wilkins.
* Yamada T, Meng E. Practical Guide for Clinical Neurophysiologic Testing: EEG. Second edition. Wolters Kluwer. 2017.

**EEG Atlases**

* Atlas of Adult Electroencephalography, 2nd Edition Blume WT, Kaibara M, Young GB 2001. Lippincott Williams & Wilkins.
* Atlas of Pediatric EEG, Laoprasert P, 2011. McGraw-Hill Medical.
* Atlas of Pediatric Electroencephalography, 2nd Edition Blume WT, Kaibara M. Lippincott, Williams and Wilkins.
* Stern JM, Engel J Jr. Atlas of EEG Patterns. Lippincott Williams and Wilkins. 2005
* Abon-Khalil B, Misulis KE. Atlas of EEG and Seizure Semiology. Butterworth Heinemann. 2006
* Kellaway P, Mizrahi E, Hrachovy R. Atlas of Neonatal Electroencephalography. 3rd Edition. Lippincott, Williams, and Wilkins. 2003
* Krauss, G. L., Fisher, R. S., & Kaplan, P. W. (2011). The Johns Hopkins atlas of digital EEG: an interactive training guide. Baltimore: Johns Hopkins University Press.
* Mizrahi, E. M., & Hrachovy, R. A. (2016). Atlas of neonatal electroencephalography. New York: Demos Medical Publishing, LLC.
* Hirsch L, Brenner R. Atlas of EEG in critical care. Wiley-Blackwell. 1st Edition. 2010.

**Useful websites**

* American Clinical Neurophysiology Society Guidelines : [www.acns.org](http://www.acns.org/)
* ILAE website : [www.ilae.org](http://www.ilae.org/)
* Neurocritical Care Society [www.neurocriticalcare.org](http://www.neurocriticalcare.org/)
* Epilepsy foundation : [www.epilepsy.com](http://www.epilepsy.com/)
* Youtube channels for EEGs

**Important Papers by Subject Area**

**Epilepsy Classifications and Definitions**

**Critical Care EEG**

* **Hirsch LJ, Fong MWK, Leitinger M, et al. American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology: 2021 Version. J Clin Neurophysiol. 2021 Jan 1; 38(1):1-29.**
* Herman ST et al. Critical Care Continuous EEG Task Force of the American Clinical Neurophysiology Society. Consensus statement on continuous EEG in critically ill adults and children, part I: indications. J Clin Neurophysiol. 2015 Apr; 32(2):87-95.
* Herman ST et al. Critical Care Continuous EEG Task Force of the American Clinical Neurophysiology Society. Consensus statement on continuous EEG in critically ill adults and children, part II: personnel, technical specifications, and clinical practice. J Clin Neurophysiol. 2015 Apr; 32(2):96-108.
* Vincent Alvarez and Andrea O. Rossetti. Clinical use of EEG in the ICU: technical settings. J Clin Neurophysiol 32: 481–485, 2015
* Raoul Sutter and Peter W. Kaplan. Clinical and electroencephalographic correlates of acute encephalopathy. J. Clin Neurophysiol 30: 443-453, 2013
* Udaya Seneviratne. Rational manipulation of digital EEG: pearls and pitfalls. J Clin Neurophysiol 2014;31: 507–516, 2014
* Gerhard Bauer, Eugen Trinka and PW Kaplan. EEG patterns in hypoxic encephalopathies (post–cardiac arrest syndrome): fluctuations, transitions, and reactions. J Clin Neurophysiol 30: 477-489, 2013
* Yoo JY, Rampal N, Petroff OA, Hirsch LJ, Gaspard N. Brief potentially ictal rhythmic discharges in critically ill adults. *JAMA Neurol.* (2014) 71:454–62. 10.1001/jamaneurol.2013.6238
* Sutter R and Kaplan PW. EEG criteria for nonconvulsive status epilepticus: synopsis and comprehensive survey. J Clin Neurophysiol 53 (suppl. 3): 1-51, 2012
* Young, GB. The EEG in Coma. J Clin Neurophysiol. 2000; 17(5):473-485.
* Brenner, Richard P. EEG in Convulsive and Nonconvulsive Status Epilepticus. J Clin Neurophysiol 2004; 21 (5): 319-331.
* Kaplan PW. The EEG in metabolic encephalopathy and coma. J Clin Neurophysiol 2004; 21(5):307-318.
* Kaplan, Peter W. The EEG of Status Epilepticus. J Clin Neurophysiol 2004; 21 (5): 307- 318.

**Surgical Evaluation**

* Kwan P, Brodie MJ. Early identification of refractory epilepsy. N Engl J Med. 2000 Feb 3;342(5):314-9. doi: 10.1056/NEJM200002033420503. PMID: 10660394.

**Pediatric Epilepsy and EEG**

* Shellhaas RA, Chang T, Tsuchida T, Scher MS, Riviello JJ, Abend NS, Nguyen S, Wusthoff CJ, Clancy RR. The American Clinical Neurophysiology Society's Guideline on Continuous Electroencephalography Monitoring in Neonates. J Clin Neurophysiol. 2011 Dec; 28(6):611-7
* Hrachovy RA, Frost, James D. Jr Infantile epileptic encephalopathy with hypsarrhythmia (infantile spasms/West syndrome). J Clin Neurophysiol 2003; 20(6):408-42
* Yamatogi Y, Ohtahara S. Severe epilepsy with multiple independent spike foci. J Clin Neurophysiol 2003; 20 (6):442-448.
* Guerrini R; Aicardi J. Encephalopathies with myoclonic seizures in infants and children (severe myoclonic epilepsy and myoclonic-astatic epilepsy). J Clin Neurophysiol 2003; 20{6): 462-472.
* Smith, MC, Hoeppner, T J. Epileptic encephalopathy of late childhood: Landau- Kleffner Syndrome and the syndrome of continuous spikes and waves during slow- wave sleep. J Clin Neurophysiol 2003; 20(6): 462-472.
* McCoy B, Hahn CD. Continuous EEG Monitoring in the Neonatal Intensive Care Unit. J Clin Neurophysiol 2013; 30: 106-114.
* Ohtahara S, Yamatogi Y. Encephalopathies in early infancy with suppression• burst. J Clin Neurophysiol. 2003; 20(6):398-407.
* Markand ON. Lennox-Gastaut syndrome (childhood epileptic encephalopathy). Journal of Clinical Neurophysiology 2003; 20(6):426-441.
* Bourel-Ponchel E, Gueden S, Hasaerts D, et al. Normal EEG during the neonatal period: maturational aspects from premature to full-term newborns. Neurophysiol Clin. 2021 Jan;51(1):61-88.

**EEG Technique and Neurophysiology**

* Dash D. et al. Update on Minimal Standards for Electroencephalography in Canada: A Review by the Canadian Society of Clinical Neurophysiologists Volume 44, Issue 6. November 2017, pp. 631-642
* Lagerlund TD. Electrical safety in the laboratory and hospital. Chapter 2. pp 21-30. In: Clinical Neurophysiology. (ed. Jasper Daube and Devon Rubin). Contemporary Neurology Series. Volume 46. Oxford University Press 2009
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* Daube JR and Stead SM. Basics of neurophysiology. Chapter 5. pp 69-93. In: Clinical Neurophysiology. (ed. Jasper Daube and Devon Rubin). Contemporary Neurology Series. Volume 46. Oxford University Press 2009
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**Other Interesting Manuscripts**

* Blume WT. The necessity for sphenoidal electrodes in the presurgical evaluation of temporal lobe epilepsy: Con Position. J Clin Neurophysiol 2003; 20(5):305-310.
* Badawy RA, Harvey AS, Macdonell RA. Cortical hyperexcitability and epileptogenesis: Understanding the mechanisms of epilepsy – part 1. J Clin Neurosci. 2009 Mar; 16(3):355-65.
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* Olejnlcz P. Neurophysiologic Basis of EEG. Journal of Clinical Neurophysiology. 2006; 23(3): 186-189.
* McCormick DA, Contreras D. On the cellular and network bases of epileptic seizures. Annual Rev Physiol 2001 63: 815-46
* Amzica F. Physiology of sleep and wakefulness as it relates to the physiology of epilepsy. Journal of Clinical Neurophysiology 2002; 19(6):488-503

**Engel Outcome Scale**

Class I: Free of disabling seizures

* IA: Completely seizure-free since surgery
* IB: Non disabling simple partial seizures only since surgery
* IC: Some disabling seizures after surgery, but free of disabline seizures for at least 2 years
* ID: Generalized convulsions with antiepileptic drug withdrawal only

Class II: Rare disabling seizures (“almost seizure-free”)

* IIA: Initially free of disabling seizures but has rare seizures now
* IIB: Rare disabling seizures since surgery
* IIC: More than rare disabling seiuzres after surgery, but rare seizures for at least 2 years
* IID: Nocturnal seizures only

Class III: Worthwhile improvement

* IIIA: Worthwhile seiuzre reduction
* IIIB: Prolonged seiuzre-free intervals amounting to greater than half the follow-up period, but not less than 2 years
* Class IV: No worthwhile improvement
  + IVA: Significant seizure reduction
  + IVB: No appreciable change
  + IVC: Seizures worse
* From: Surgical Treatment of Epilepsies, 2nd Edition. Engel J., Editor. Raven Press, 1993. Page 615.

**ILAE Outcome Scale**

* Class 1: Completely seizure free; no auras
* Class 2: Only auras; no other seizures
* Class 3: 1 to 3 seizure days per year; ± auras
* Class 4: 4 seizure days per year to 50% reduction of baseline seizure days; ± auras
* Class 5: Less than 50% reduction of baseline seizure days; ± auras
* Class 6: More than 100% increase of baseline seizure days; ± auras

**Driving Law**

|  |  |  |  |
| --- | --- | --- | --- |
| **Law** | **New York** | **New Jersey** | **Connecticut** |
| DMV Appeal of License Denial | Yes | Yes | Yes |
| Doctors to Report Epilepsy | No | Yes | No |
| Periodic Medical Updates Required After Licensing | At discretion of DMV | Every 6 months for 2 years, thereafter annually | At discretion of DMV |
| Seizure-free Period | 1 year, less at discretion of DMV | 6 months | No set seizure-free period |

**New York Driver Licensing Laws**

For an applicant to be issued a driver’s license in New York, a person with epilepsy must not have experienced a loss of consciousness within the previous 12-month period and must submit a physician's statement confirming this fact. A person who has experienced a loss of consciousness during this period may be licensed at the discretion of the Motor Vehicles Commissioner if: 1) it was due solely to a physician-directed change in medication and the physician submits a statement to that effect, or 2) the person submits a physician's statement confirming his knowledge of all such incidents and recommending licensing despite the medical history, because in his opinion the condition will not interfere with the safe operation of a vehicle and the Department’s medical consultant has no objection to such issuance.

Each case is reviewed individually. As a condition of licensing, a person may be required to submit periodic physicians’ statements as to his or her fitness to drive, unless the person submits a physician’s report that he or she has been seizure-free without medication for 1 year or more. Restricted licenses are not available.

If the Commissioner decides to suspend or deny a person's license because of medical unfitness, the Commissioner shall notify the person of the proposed action with an offer to withhold such action until after a department hearing, if the person requests a hearing. If a hearing is not requested within 30 days of the notice, the denial or suspension shall take effect. Judicial review of the Commissioner's determination after a hearing may be had without an administrative appeal.

**Commercial Driving**

First-time commercial driver license applicants and current commercial licensed drivers applying for renewal are required to certify that they comply with federal Department of Transportation's medical standards for licensing individuals to drive commercial vehicles and that they have a valid medical examiners certificate. Only those applicants who had obtained their commercial driver’s license prior to September 9, 1999 and who had a restriction for “intrastate commerce only,” who had not dropped down in commercial class or had their commercial privileges revoked, are able to retain the restriction without the medical examiner’s certificate. Persons with diagnosed seizure disorders or any condition which is likely to cause loss of consciousness or any loss of ability to control a bus are disqualified from driving a bus.

**New York Identification Card**

Photo non-driver identification cards are available through the local Department of Motor Vehicles.

**New York Reporting**

There is no statutory provision requiring physicians to report patients who have been treated for or diagnosed as having epilepsy.