Medical College of Wisconsin

Department of Neurosurgery

Resident Handbook

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Introduction

The Department of Neurosurgery at the Medical College of Wisconsin provides a broad-based subspecialty, hands-on training program. Residents are exposed to a large volume of clinical cases, covering the full depth and breadth of neurosurgical practice. Operative experience begins early in training. This is supplemented by exposure to and involvement with internationally renowned neurosurgical researchers, utilizing our extensive departmental research resources. This training takes place in a supportive, collegial atmosphere in a major Midwestern city. Our facilities include a nationally recognized children's hospital, a large tertiary care center with an active trauma center, a Veterans' Affairs Administration hospital that is a regional referral center, and exceptional departmental research facilities.

The Neurosurgical Residency Program at the Medical College of Wisconsin is a seven-year program under the direction of the Department of Neurosurgery, the Medical College of Wisconsin, and the Office of Graduate Medical Education. Graduates of this residency program have gone on to become leading clinicians and researchers in the profession.

Educational Goals of the Program

The primary goals of the Medical College of Wisconsin Neurosurgery Residency Program are to produce knowledgeable, skilled, safe, humanitarian, and collegial neurosurgeons that can contribute to their community and to their profession. These men and women are bright, dedicated, and enthusiastic. Providing them with the knowledge and experience necessary to achieve board certification and the education and training to master the six core competencies set by the ACGME, (Medical Knowledge, Patient Care, Practice-based Learning and Improvement, Systems-based Practice, Professionalism, and Interpersonal & Communication Skills), will allow the graduating resident his or her choice of career pathway, including academic practice, private practice, or additional sub-specialty fellowship training.

Application to the Program and Selection of Residents

Our program only accepts applications through the Electronic Residency Application Service (ERAS) and the match is done through the National Residency Match program (NRMP). Details for each process are at their websites, https://students-residents.aamc.org/ and http://www.nrmp.org/. We accept applications from mid-September through October. The Department reviews applications and offers invitations to interview to selected applicants. There are four, one-day interview dates from which to choose. Candidates have the opportunity to have dinner with current residents the evening before their selected interview date. Interviews are usually in November and December each year.

Candidates meet a number of faculty members on the day of the interview. They will also have a guided tour of the hospitals and research facilities. At the conclusion of candidate interviews, the faculty and residents discuss all candidates based upon personal interviews and information provided in their application. The final rank list is submitted to the NRMP for processing to match one or two positions per year. On Match Day, the Program Director contacts the matched candidate(s).

Block Schedule

Model Rotation Block

PGY	Q1	Q2	Q3	Q4
7	FMLH Chief	FMLH Chief	VA Chief	VA Chief
6	VA Chief	VA Chief	FMLH Chief	FMLH Chief
5	Research	Research	Research	Research
4	FMLH Sr	FMLH Sr	FMLH Sr	Elective
3	FMLH Jr	FMLH Jr	Elective	Interventional/SR
2	NCC	CHW	FMLH Jr	FMLH Jr
1	FMLH NS Intern	Neuroscience	CHW	Trauma/Peds

FMLH=Froedtert Memorial Lutheran Hospital, VA=Veterans Administration Medical Center, SR=Stereotactic Radiosurgery , NCC=Neurocritical Care, NS=Neurosurgery, CHW=Childrens Hospital of Wisconsin

This Model Rotation Block is used as a guide for a resident's training program. Rotations are adjusted based on changes in Training Requirements, individual resident interests, and resident numbers. Below are 2 rotation blocks of recent graduates that illustrate this flexibility.

Actual Rotation Block A

PGY	Q1	Q2	Q3	Q4
7	FMLH Chief	FMLH Chief	FMLH Chief	FMLH Chief
6	VA Chief	Elective	VA Chief	VA Chief
5	FMLH Sr	FMLH Sr	Interventional/SR	NCC
4	Research	Research	Research	Research
3	FMLH Jr	Neuropath/radiology	CHW	CHW
2	CHW	FMLH Jr	FMLH Jr	FMLH Jr
1	FMLH NS Intern	NCC/neurovascular	Gen surg/ ENT/trauma	Anesthesia/ vascular/peds

Actual Rotation Block B

PGY	Q1	Q2	Q3	Q4
7	FMLH Chief	FMLH Chief	Elective	VA Chief
6	VA Chief	VA Chief	FMLH Chief	FLMH Chief
5	NCC	Interventional/GK	Elective	FMLH Sr
4	Research	Research	Research	Research
3	CHW	Neuropath	FMLH Jr	SR
2	FMLH Jr	FMLH Jr	CHW	Neuroradiology
1	FMLH NS Intern	NCC	ENT/trauma/peds	Anesthesia/ vascular/gen surg

Resident Supervision

The Neurosurgery Residency Program follows MCWAH's Institutional Policy, Supervision of Housestaff that is on the MCWAH InfoScope site.

Additional program-specific guidelines are as follows:

- Residents may perform inpatient or outpatient consultations on a routine or emergency basis. The resident will communicate with the supervising faculty regarding the patient's condition and diagnostic studies to formulate treatment plans. The faculty will directly confirm the examination and interpretation of imaging studies as needed. Communication with faculty should occur at the time of initial consultation for critically ill or unstable patients, patients with unexpected deterioration, patients with need for ICU care, and patients under consideration of surgery, or when requested by patient or family members.
- Residents may perform daily assessment of hospitalized patients. Communication with faculty should occur for critically ill or unstable patients, patients with unexpected deterioration of condition, patients with need for ICU care, and patients under consideration of surgery, unexpected deaths, or when requested by patient or family members. Faculty will evaluate patients daily or more frequently as needed to confirm resident assessments and collaboratively establish treatment plans with the residents.
- No major or minor procedures is performed without discussion and approval of the attending physician. Residents may perform procedures when their skill level has been determined to be "independent" for the procedure. Otherwise, the procedure must be directly supervised by the faculty, or by another resident with skill at the "instructor" level for that procedure.
- Patients requiring admission to the hospital must be discussed with the Attending Faculty as outlined above or with the Chief Resident when above conditions do not apply.
- The resident will provide documentation of faculty participation in patient care in the medical record. Faculty will provide documentation of their participation in patient care in the medical record.
- All residents will comply with hospital policies and procedures as they pertain to patient care and documentation.
- In the Department of Neurosurgery, the default level of supervision is Direct, unless the patient's attending neurosurgeon has previously designated otherwise.

<p align="center">**Transitions of Care/Hand-offs**</p>

The Neurosurgery Residency Program follows MCWAH's Institutional Policy, Transitions of Care found on the MCWAH InfoScope site.

Additional program-specific guidelines are as follows:

- Froedtert Memorial Lutheran Hospital:
    - Morning rounds - All in attendance will have an updated patient list printed daily each morning prior to beginning AM rounds. Overnight events/consults/operations/new patients and pertinent lab/radiology findings are discussed with FMLH Chief, residents, rotating interns, medical students, etc. This is followed by rounds to see patients, discuss plans for the day, and integrate care with the mid-level provider team. The chief and senior residents will communicate with the attending neurosurgeons regarding their patients during this time and update the plans for each patient. Similar sessions of updating the patient list occur throughout the day between the residents and the mid-level providers.
    - Evening sign-out -This will occur when the resident covering the night is available to meet with the FMLH resident holding the 'hot' pager. The chief resident will be present unless otherwise unavailable. Each patient will be discussed in detail including events of the day, pertinent lab and radiology findings, and plans for the following day/future. The chief resident will contact the resident holding the pager for any updates if unable to attend the evening sign-out. Residents also round daily on patients whose surgery they have assisted on.
- Children's Hospital of Wisconsin/
    - Weekdays - Designated CHW resident coverage from 5:30 AM to 5:30 PM unless the CHW resident is off-duty. Then this responsibility is assumed by the CHW APP staff during that day.
    - Weeknights – The on-call resident covers both CHW and VAMC from home. The CHW resident/PA will sign out to on call resident at approximately 5:30 PM. A printed list of patients is available for the covering resident at time of sign-out. Overnight events/consults/new admits/surgeries are then discussed in similar fashion the following morning between the overnight resident and the designated CHW resident APP.
    - Weekends - On call resident is home call for CHW and VA from Friday 6PM until Monday 6AM. Sign-out occurs as described above on Friday evening and again on Monday morning. During weekends, the same resident will cover the VA as well. Patient information including diagnosis, exam, pertinent lab and radiology findings, plan, and attending physician is shared for each patient.
- Clement J Zablocki VA Medical Center:
    - Weekdays: Monday through Friday the VA Chief Resident covers the service unless off-duty in which case this responsibility is assumed by the APP staff.
    - Weeknights: sign out to on call resident (home call covering both CHW/VA)
    - Weekends: On call resident is home call for CHW and VA from Friday 6PM until Monday 6AM. Sign-out occurs as described above on Friday evening and again on Monday morning. During weekends, the same resident will cover CHW well.

The Neurosurgery Residency Program will assess residents on their utilization of the standardized transitions of care process and their communication skills using regularly administered departmental evaluations.

Program Evaluation Committee (PEC)

The Neurosurgery Residency Program follows MCWAH's Institutional Policy, Program Evaluation Committee on the MCWAH InfoScope site.

Additional program-specific guidelines are as follows:

- Membership shall include the Department Chair, Residency Program Director, Associate Program Director, and a senior resident (who will serve a term of 1 year).
- The PEC will meet at least once per year. Minutes of each meeting will be taken by the Program Coordinator and distributed to all members.
- The PEC will:
  - plan, develop, implement, and evaluate the educational activities of the Neurosurgery Residency program;
  - review and make recommendations for revision of curriculum goals and objectives;
  - address areas of non-compliance with the requirements of the Accreditation Council for Graduate Medical Education (ACGME),
  - conduct an annual program evaluation (APE) and monitor program progress in addressing areas in need of improvement identified during the APE.

Clinical Competency Committee (CCC)

Programs must comply with the MCWAH policy, Clinical Competency Committee. Should there be a conflict between the MCWAH policy and the program information outlined below, MCWAH's policy takes precedence.

- The program director appoints the Clinical Competency Committee.
- At a minimum, the Clinical Competency Committee is composed of three members of the program faculty, including the Department Chair and Residency Program Director.
  - Others eligible for appointment to the committee include faculty from other programs and non-physician members of the health care team.
- The responsibilities of the Clinical Competency Committee include:
  - review of all resident evaluations semi-annually;
  - preparation and reporting of Milestones evaluations of each resident semi-annually to ACGME;
  - advising of the program director regarding resident progress, including promotion, remediation, and dismissal.

<p style="text-align:center">Evaluation Process</p>

The Neurosurgery Residency Program follows MCWAH's Institutional Policy, Evaluation of Housestaff on the MCWAH InfoScope site.

Additional program-specific guidelines are as follows:

1. Evaluation of Residents

Evaluation of Residents by Neurosurgery Faculty (every six months)

Every six months a resident evaluation form is sent to the Neurosurgery clinical faculty and staff via New Innovations Software. A 10-point rating system for core categories and free text for refinements and elaborations is used. The numerical ratings are collated and trended. The Clinical Competency Committee (CCC) then meets to review the evaluations.   Other elements of the residents performance are reviewed including primary written board examination, conference attendance, research progress, teaching and administrative responsibilities. The resident operative logs for the time period are also reviewed. Based on all the information, milestone levels are set for each resident and submitted to the ACGME. The evaluations are reviewed with each resident individually by the program director and documented in a written report.

Evaluations of Residents by Non-Neurosurgery Clinical Faculty (at the completion of non-neurosurgery clinical rotations)

One week before a resident completes a non-neurosurgery clinical rotation, the non-neurosurgery clinical faculty responsible for the rotation receives an evaluation form via New Innovations software. A 10-point rating system for core categories and free text for refinements and elaborations is used. The numerical ratings are collated and trended. The evaluations are discussed with the residents during the individual evaluation meetings with the program director.

2. Evaluation of Faculty

Annually, residents perform anonymous evaluations of each of the faculty members via New Innovations software. The tool includes numerical ratings of core categories and free text for elaboration. The department chair reviews the results.

3. Loop Closure

Regular meetings are held with the all the residents (in a group) with the Program Director. Discussions cover anything related to the residency program, including, but not limited to: rotations, policies, duty hours, on-call schemes, and conferences. In addition, the Program Director and Associate Program Director are readily available throughout the year to address the residents' questions or concerns regarding program activities or personal issues.

Duty Hours

The Neurosurgery Residency Program follows MCWAH's Institutional Policy, Duty Hours on the MCWAH InfoScope site.

Additional program-specific guidelines are as follows:

Residents are expected to log their hours in New Innovations within two days of working.

Maximum Hours of Work per Week
- Duty hours must be limited to 80 hours per week, averaged over a four-week period (or month for a month-long rotation), inclusive of all in-house call activities.

Mandatory Time Free of Duty
- Residents must be scheduled for a minimum of one day free of duty every week (when averaged over four weeks or month in a month-long rotation). At-home call cannot be assigned on these free days.

Maximum Duty Period Length
- Duty periods of PGY-1 residents must not exceed 16 hours in duration.
- Duty periods of PGY-2 residents and above may be scheduled to a maximum of 24 hours of continuous duty in the hospital.
- The program encourages residents to use alertness management strategies in the context of patient care responsibilities. Strategic napping, especially after 16 hours of continuous duty and between the hours of 10:00 p.m. and 8:00 a.m., is suggested.
- It is essential for patient safety and resident education that effective transitions in care occur. Residents may be allowed to remain on-site in order to accomplish these tasks; however, this period of time must be no longer than an additional four hours.
- Residents must not be assigned additional clinical responsibilities after 24 hours of continuous in-house duty.
- In unusual circumstances, residents, on their own initiative, may remain beyond their scheduled period of duty to continue to provide care to a single patient. Justifications for such extensions of duty are limited to reasons of required continuity for a severely ill or unstable patient, academic importance of the events transpiring, or humanistic attention to the needs of a patient or family.
- Under those circumstances, the resident must:
  - appropriately hand over the care of all other patients to the team responsible for their continuing care; and,
  - document the reasons for remaining to care for the patient in question and submit that documentation in every circumstance to the program director. This should be documented in New Innovations and the Program Director will review and if the violation is justified, it will be removed from the duty hour log.
  - The program director will review each submission of additional service, and track both individual resident and program-wide episodes of additional duty.

Minimum Time Off between Scheduled Duty Periods
- PGY-1 residents should have 10 hours, and must have eight hours, free of duty between scheduled duty periods.
- Intermediate-level residents (PGY-2 residents) should have 10 hours free of duty, and must have eight hours between scheduled duty periods. They must have at least 14 hours free of duty after 24 hours of in-house duty.
- Residents in the final years of education (residents at the PGY-3 level and beyond) must be prepared to enter the unsupervised practice of medicine and care for patients over irregular or extended periods.
  - This preparation must occur within the context of the 80-hour, maximum duty period length, and one-day-off-in-seven standards. While it is desirable that residents in their final years of education have eight hours free of duty between scheduled duty periods, there may be circumstances when

these residents must stay on duty to care for their patients or return to the hospital with fewer than eight hours free of duty.

- o Circumstances of return-to-hospital activities with fewer than eight hours away from the hospital by residents in their final years of education must be monitored by the program director. Duty hours reports will be periodically reviewed by the program director and program coordinator.
- o Residents at the PGY-3 level and beyond may stay on duty or return to the hospital with fewer than eight hours free of duty under specific circumstances: required continuity of care for a severely ill or unstable patient, or a complex patient with whom the resident has been involved; events of exceptional educational value; or, humanistic attention to the needs of a patient or family.

Maximum Frequency of In-House Night Float
- The Program does not currently use a night float system. However, should one be implemented:
  - o Residents must not be scheduled for more than six consecutive nights of night float
  - o Night float should be limited to four months per year, and must not exceed six months per year.

Maximum In-House On-Call Frequency
- PGY-2 residents and above must be scheduled for in-house call no more frequently than every-third-night (when averaged over a four-week period or month for a month-long rotation).

At-Home Call
- Time spent in the hospital by residents on at-home call must count towards the 80-hour maximum weekly hour limit. The frequency of at-home call is not subject to the every-third-night limitation, but must satisfy the requirement for one-day-in-seven free of duty, when averaged over four weeks.
- At-home call must not be so frequent or taxing as to preclude rest or reasonable personal time for each resident. In the event that this were to occur the resident should notify the chief resident and on-call faculty to make immediate accommodations.
- Residents are permitted to return to the hospital while on at-home call to care for new or established patients. Each episode of this type of care, while it must be included in the 80-hour weekly maximum, will not initiate a new "off-duty period".

Managing Fatigue
- All incoming housestaff are required to take an online course on Sleep-Related Fatigue (Desire2Learn). Compliance is tracked by MCWAH.
- Residents who feel that excessive fatigue is compromising their ability to participate in patient care are required to notify the Chief Resident and/or faculty immediately in order to make safe accommodations

Residents are expected to notify the chief resident, attending or program director if they are concerned they may soon violate a duty hour rule.

Scheduling/Vacations/Travel/Courses

1. The clinical rotation schedule will be made by the Program Director (PD). All requests regarding elective rotations should be submitted in writing to the PD. All adjustments to the clinical rotation schedule will be at the discretion of the PD with input from the Clinical Competency Committee.
2. The monthly call schedule will be created by the Program Director/Program Coordinator (PC). The monthly call schedule will be disseminated no later than 2 weeks prior to the first day of the relevant month. Any requests for alterations in the schedule should be made in writing to the PD/PC. With the exception of the Chief Resident, all residents are expected to be on call and have generally equivalent call schedules each month. (When the compliment of housestaff permits, the call burden of the resident on the research year will decrease or be eliminated.)
3. Programs must comply with the MCWAH leave policies outlined in the MCWAH Housestaff Handbook. Should there be a conflict between a MCWAH policy and the program information outlined below, MCWAH's policy takes precedence.
4. Points of emphasis from the MCWAH Housestaff Handbook (2015-2016) include:
   a. *Housestaff are considered to be available to be scheduled 365 days a year including all religious and secular holidays. Due to variations among programs' training and clinical requirements, requests for time off will be granted based on specific policies of each program regarding scheduling, requesting time off and vacation.*
   b. *Housestaff are allowed annual paid vacation of three weeks. Vacation time is not cumulative from year to year.*
   c. *Housestaff (PGY-2 and above) are allowed up to one week of educational leave, without interruption of pay or benefits, contingent upon the approval of the PD. Educational leave time is not cumulative from year to year.*
5. There will be a semi-annual meeting (Spring and Fall) between the PD/PC and the housestaff for scheduling vacation time. In Spring (April/May), the meeting will allocate vacations for the following July-December time period. In the Fall (October/November), the meeting will allocate for the following January-June. Incoming residents will submit their requests shortly after arrival for the July-December block.
6. Vacation requests will be for a contiguous 7-day block, Monday through Sunday. The ability to break up a week may be done for one of the three weeks for a valid reason (e.g. job interviews) at the discretion of the PD. The resident will not be post-call on the first day of vacation, but is likely to be on duty the Saturday prior to vacation.
7. Time away for job interviews may require the use of vacation time or monthly off-days.
8. Resident vacations generally cannot overlap, however exceptions can be made at the discretion of the PD. If there are conflicting contemporaneously requested vacation requests they will be awarded based on seniority.
9. Vacations are limited to no more than one 7-day block during a clinical rotation unless that rotation exceeds 3 months, in which case the vacation weeks should not be within the same 3 month period. Exceptions can be made at the discretion of the PD.
10. Vacations can be taken during any neurosurgical rotation. If vacation time is desired while on a rotation within another department, written permission must be obtained from that department and provided to the PD/PC.
11. Vacations will not be permitted during the 1st two weeks of July, the last 2 weeks of June, the weeks of the main AANS and CNS meetings, the week of the board exam, the weeks of Thanksgiving and Christmas, and the week of the Chicago Review Course in Neurosurgery. Exceptions can be made at the discretion of the PD.
12. Holiday call days will be tracked by the PD/PC. These will include Labor Day, Memorial Day, July 4, Thanksgiving, Christmas Eve, Christmas Day, New Year's Eve, and New Year's Day. These counts will be provided to all the residents on a regular basis and used by the PD/PC to encourage a relatively even distribution of holiday call.
13. If a resident would prefer to observe other holidays (e.g. Yom Kippur, Rosh Hashanah), the program will try to accommodate the request with the expectation that said resident would be more likely to cover other holidays to compensate his/her peers. These alternate holidays would also be monitored by the PD.

14. Sick days will be tracked by the PD/PC. Residents should notify the PD, Chief Resident (CR) and PC when a sick day is being taken.
15. Residents who have passed their boards are expected to cover call the day before and the day of the board exam. If there are not enough passed residents to cover the two days of call for all the services, residents who are not taking the exam for credit may be required to take call as well.
16. Certain courses will be provided throughout the residency. These currently include but are subject to change based on evolving curriculums: SNS Boot Camp (2 days, PGY-1), AANS Junior Residents Course (3 days, PGY-1), SNS RUNN Course (7 days, PGY-3, 4,or 5), ABNS Board Review Course (10 days, variable PGY, same year as taking primary exam for credit).
17. Residents are encouraged to submit research to the major neurosurgical meetings (AANS, CNS, Joint Section Meetings). Exceptions can be made by the PD for major non-AANS/CNS affiliated meetings.
18. If a presentation is accepted, the resident may attend the meeting. If the resident is already exceeding the allotted one week of academic leave for the year (this includes the provided courses in #16), he/she may stay for only one night either before or after the presentation to minimize time away.
19. Any additional time away for meetings beyond the 7-day limit will require use of vacation time or off-days within a given month.
20. Reimbursement for expenses from meetings (excluding provided courses above in #16) will be limited to $3000/meeting, and $4500/resident/year.
21. No more than 2 residents can attend the same meeting. All meeting submissions must be sent first to the PD/PC to prevent conflicts at least one month prior to the abstract deadline. Conflicts will be prioritized by seniority if more than 2 abstracts are submitted by this deadline. Within a month of the abstract deadline, submissions will be prioritized by timeliness of submission.
22. During the PGY-7 year, the CR(s) may attend a major meeting without the requirement of a presentation, with the same restriction of no more than 7 days total academic leave. If there are two CRs, they cannot attend the same full-length meeting.
23. Regional cadaver labs/workshops participation will also be tracked by the PD/PC. These courses are encouraged for all residents. Once residents have attended a particular course it will be expected they cover call during subsequent courses as needed to allow other residents to attend the same in following years.

Publishing Support

1. Publishing fees less than or equal to $200 will be reimbursed without requiring approval.
2. Fees greater than $200 will require endorsement by a faculty member and review by the PD.
   a. Article processing charges >$200 will not be reimbursed for journals with impact factors <1.0.
   b. Extra fees for supplementary material (e.g. video), color photographs, etc. to journals with measurable impact factors (>0.3) will be reimbursed.
   c. Extra fees to make an article open access will not be approved.

Moonlighting

The Neurosurgery Residency Program follows MCWAH's Institutional Policy Moonlighting, which can be found on the MCWAH InfoScope site.

Additional program-specific guidelines are as follows:

The MCWAH Moonlighting Policy gives the Program Director the discretion to prohibit moonlighting for all housestaff in his/her program. The Program Director has determined that moonlighting by Neurosurgery Residents is not permitted.

Other MCWAH Institutional Policies

Other MCWAH Institutional Policies are at https://infoscope.mcw.edu/GME-Intranet/MCWAH-Institutional-Policies.htm, including the following policies.

Accommodation for Disabilities (PDF)
Alcohol and Controlled Substance Abuse (PDF)
Annual Institutional Review (AIR)
Appeal of Adverse Academic Decisions (PDF)
Combined Programs with Components Individually Accredited (PDF)
Complaints and Grievances by Housestaff Regarding the Educational and Professional Environment (PDF)
Designated Institutional Official (DIO) (PDF)
Educational Resources Committed to a Program
Eligibility and Selection of Residents and Fellows
Eligibility Exception Committee
Encryption for Electronic Protected Information- Mobile Devices
Evaluation of Faculty
Fitness for Duty Evaluations (PDF)
Graduate Medical Education Committee (GMEC)
Harassment or Discrimination
Health Care Industry Product Interactions
Housestaff Fatigue
Housestaff Health and Welfare Committee (HHWC) (PDF)
Housestaff Substandard Performance (PDF)
Immunization and TB Testing
Intellectual Property
Licensure Requirements for OMS
Licensure, Resident Educational License and DEA Number Requirements
Management of Substandard Housestaff Performance (PDF)
Non-Competition Guarantee
Offsite Elective Rotation
Part-Time Housestaff Training
Professional Behavior
Professional Personal Appearance
Program Administration
Program Director Qualifications and Responsibilities (PDF)
Program or Sponsoring Institution Reduction/Closure
Records and Record Retention
Scholarly Activity
Social Media Policy
Support For GME Programs During Disasters
Teaching of Medical Students by Housestaff
Transfers to and from Graduate Medical Education Programs
Vacation and Leave of Absence
Visiting Housestaff Rotations

ACGME Case Logs

Each resident must record, in the ACGME Case Log System, the number and type of each procedure he or she performs as either assistant resident surgeon, senior resident surgeon, or lead resident surgeon.

Resident cases must be entered into the ACGME Case Log System. Residents must indicate their major role in each case: assistant resident surgeon, senior resident surgeon, or lead resident surgeon. The definitions for these roles are:

- Assistant resident surgeon: includes positioning, sterile preparation, monitoring devices, microscope preparation, participation in the initial (opening) or final (closing) portions of the case, and/or assisting the resident or staff surgeon(s). **This category does not accrue case numbers for residents.**
- Senior resident surgeon: may include aspects of all of the above, and must include participation in the surgical procedure between opening and closing.
- Lead resident surgeon: may include aspects of all of the above, and must include participation in the critical portion of the case.

To claim a case, a resident must 'scrub in' (i.e., scrub hands, use sterile gloves, with or without gown). There can be several residents per case but each resident may claim only one role per case (assistant, senior, or lead). There can be only one lead resident surgeon per case, but the assistant and senior resident roles are not limited in number per case. Each resident may enter one or more CPT codes per case but may claim credit for only one CPT code per case. If two residents participated in the same case, each resident may claim the same CPT code for credit for that case as appropriate and as long as the claimed roles are not the same.

Only those cases completed in the role of senior resident surgeon or lead resident surgeon will count towards the required minimum Case Log numbers. However, the Review Committee expects that the Case Log data will demonstrate increasing participation and progressive responsibility. Programs must monitor the accurate and timely entry of cases into the system. As part of monitoring resident progress towards developing competence in surgical skills, cumulative operative experience reports should be generated from the Case Log System and reviewed with each resident as part of his or her semiannual review.

The Review Committee defines a pediatric patient as one who is less than 18 years old at the time of the procedure. An adult patient is defined as one who is 18 years or older at the time of the procedure. A pediatric patient who is 18 years or older at the time of a follow-up procedure must be logged as an adult patient.

Defined Case Categories and Minimum Numbers
- Adult Cranial (205)
- Adult Spinal (95)
- Pediatric (30)
- Adult and Pediatric Epilepsy (10)
- Critical Care (60)
- Total All Defined Case Categories = 400

ACGME Neurological Surgery Milestones

Brain Tumor – Medical Knowledge
Level 1 • Correlates neurological deficits with tumor location
  • Correlates radiographic tumor location with ventricular, cranial nerve and vascular anatomy
  • Describes the pathophysiology of mass lesions and obstructive hydrocephalus
  • Describes acute symptomatic medical therapy for neoplastic mass lesions (e.g., steroids, ventricular drainage)
Level 2 • Describes the use of radiation and chemotherapy for brain and spinal cord tumors
  • Lists indications for biopsy or resection of brain and spinal cord tumors
  • Categorizes brain and spinal cord tumors by age, histology, and radiographic appearance
  • Describes the non-neoplastic differential diagnosis of various mass lesions
  • Describes the natural history of common intrinsic brain tumors
Level 3 • Describes the genetics of brain tumors and genetic markers that impact prognosis
  • Describes the use of advanced imaging in tumor evaluation and surgical planning (e.g., magnetic resonance [MR] tractography, functional imaging, spectroscopy)
  • Describes the use of neuro-navigation and intra-operative imaging for brain tumor surgery
  • Describes the role of skull-base surgical approaches in tumor resection, attendant complications, and
Level 4 • Describes expected outcomes after surgery for brain and spinal cord tumors
  • Describes the role of radiosurgery in brain tumor therapy
  • Describes the role of palliative care for brain tumor patients
  • Describes personalized medicine approaches for brain tumor treatment
Level 5 • Contributes to the peer-reviewed literature in brain and spinal cord tumors
  • Participates in brain tumor research and clinical trials

Brain Tumor – Patient Care
Level 1 • Performs a history and physical examination in patients with brain or spinal cord tumors
  • Provides routine peri-operative care for patients with brain or spinal cord tumors
  • Initiates the work-up of a patient with a brain or spinal cord tumor
  • Recognizes signs of and initiates work-up for neurological deterioration
Level 2 • Explains risks and benefits of neurosurgical procedures for brain and spinal cord tumors
  • Interprets diagnostic studies
  • Assists with routine procedures (e.g., resection of non-eloquent glioma or metastasis, stereotactic biopsy)
  • Recognizes and initiates work-up of complications (e.g., hematoma, infection, seizure, hydrocephalus)
Level 3 • Formulates a work-up and treatment plan for patients with brain, skull base, or spinal cord tumors
  • Independently performs routine procedures
  • Performs complex procedures with assistance (e.g., resection of eloquent glioma, ventricular or posterior fossa tumor)
  • Manages unexpected intra-operative events (e.g., sinus bleeding, cerebral edema)
  • Manages complications with assistance
Level 4 • Independently formulates a treatment plan for patients with comorbidities or other complicating factors (e.g., systemic illness, radiation, chemotherapy)
  • Independently performs complex procedures
  • Adapts standard treatment plans to special circumstances (e.g., previous surgery, anticipated neurological morbidity)
  • Independently manages complications
Level 5 • Systematically reviews treatment outcomes for brain and spinal cord tumors
  • Participates in quality improvement for brain and spinal cord tumors
  • Participates in or lead a multidisciplinary brain tumor team or program

Critical Care – Medical Knowledge
Level 1 • Describes intracranial pressure (ICP), cerebral perfusion pressure (CPP) and cerebral blood flow (CBF) physiology
  • Describes respiratory and ventilator physiology and effects on the central nervous system (CNS)
  • Describes the pathophysiology of myocardial infraction (MI) and congestive heart failure (CHF)
  • Describes physiology of coagulation and hemostasis
  • Describes principles of nutritional support
  • Lists indications for ICP monitoring and hematoma evacuation

• Describes cerebral autoregulation

Level 2 • Describes the pathophysiology and medical management of intra-cranial hypertension and cerebral edema

• Describes modes of mechanical ventilation and management of pulmonary shunting and dead space

• Describes prophylaxis for deep vein thrombosis (DVT)

• Describes the pathophysiology and treatment of diabetic ketoacidosis (DKA)

• Describes the etiology and imaging of traumatic intra-cranial hemorrhage and parenchymal injuries

Level 3 • Describes indications for electroencephalography (EEG) monitoring

• Discusses indications for and risks of endotracheal intubation/ventilation

• Describes the pathophysiology and treatment of systemic critical illness (e.g., hypertension, coagulopathy, electrolyte imbalance, alcohol withdrawal)

• Lists indications and complications for decompressive craniectomy, cerebral spinal fluid (CSF) drainage, and barbiturate coma in traumatic brain injury (TBI)

Level 4 • Describes expected outcomes after TBI and the impact of intra-cranial hypertension and of surgical intervention

• Understands trans-cranial Doppler (TCD) sonography and its role in monitoring

• Discusses the risks of CSF drainage, hyperosmolar therapy, and hyperventilation

• Describes methods to assess intra-vascular volume and tissue perfusion

Level 5 • Contributes to the peer-reviewed literature in TBI

• Describes advanced intra-cranial monitoring (e.g., brain tissue oxygenation, jugular venous oxygen saturation, microdialysis)

• Describes advanced imaging for TBI (e.g., cerebral metabolism, perfusion

• Describes indications and risks for various methods of hemodialysis and extracorporeal membrane oxygenation (ECMO)

Critical Care – Patient Care

Level 1 • Performs a history and physical examination in critically-ill patients

• Orders positioning, analgesics, sedation, neuromuscular blockade, intravenous (IV) fluids and nutrition in critically-ill patients

• Diagnoses and formulates treatment plans for common pulmonary diseases

• Use electrocardiogram (EKG) to diagnose cardiac arrhythmia; initiates hemodynamic monitoring

• Performs a brain death examination

Level 2 • Explains risks and benefits of ventilatory support

• Interprets diagnostic studies (e.g., chest x-ray [CXR], brain computed tomography [CT], echocardiogram)

• Manages intra-cranial hypertension (e.g., hyperosmolar agents, CSF drainage)

• Manages airway and performs endotracheal intubation

• Inserts arterial and central venous catheters

• Diagnoses and manages spinal or hypovolemic shock

Level 3 • Formulates work-up and treatment plan for a comatose patient

• Manages refractory intra-cranial hypertension (e.g., blood pressure, CPP)

• Obtains confirmatory tests and make an accurate diagnosis of brain death

• Initiates management of pneumonia or systemic infection

Level 4 • Independently formulates a treatment plan for complex patients (e.g., failure of cerebral autoregulation, multi-organ failure, non-recoverable CNS injury)

• Diagnoses and initiates management of adult respiratory distress syndrome

• Manages difficult and emergency airways

• Diagnose and manages CSF leak

• Initiates management of cardiac rhythm disturbances

Level 5 • Systematically reviews outcomes for neurocritical care patients

• Participates in quality improvement for a neurocritical care unit

• Develops a standard neurocritical care unit management protocol

• Leads multidisciplinary neurocritical care team

• Manages respiratory failure (e.g., mechanical ventilation, bronchoscopy)

• Manages cardiac rhythm disturbances

Traumatic Brain Injury – Patient Care

Level 1 • Performs a history and physical examination of a comatose patient and assign Glasgow Coma Scale (GCS) score

• Evaluates a polytrauma patient and assign Injury Severity Score

- Provides initial management of a polytrauma patient
- Provides routine peri-operative care for patients with TBI
- Detects an altered neurological examination
- Places an ICP monitor and external ventricular drain

Level 2
- Explains risks and benefits of neurosurgical procedures for TBI
- Interprets diagnostic imaging for a neurotrauma patient
- Organize emergency surgical team; position for craniotomy with cervical precautions
- Assist with routine procedures (e.g., burr hole, craniotomy for hematoma or penetrating injury)
- Recognizes and initiates work-up of complications (e.g., hematoma, seizure, sepsis, monitor drift)

Level 3
- Formulates an interdisciplinary treatment plan for patients with polytrauma
- Selects patients for operative intervention
- Independently performs routine procedures
- Performs complex procedures with assistance (e.g., repair of vascular injury or CSF fistula, posterior fossa hematoma)
- Manages complications with assistance
- Manages ventricular drain

Level 4
- Prioritizes the management of injuries in a polytrauma patient
- Independently performs complex procedures
- Manages unexpected intra-operative events (e.g., cerebral edema, hemorrhage, air embolus)
- Adapts standard treatment plans to special circumstances (e.g., medical comorbidity, coagulopathy)
- Independently manages CNS complications

Level 5
- Systematically reviews treatment outcomes for TBI
- Participates in quality improvement for TBI care
- Participates in developing a plan for triage in a disaster management scenario
- Reconstructs complex craniofacial injuries

Surgical Treatment of Epilepsy and Movement Disorders – Medical Knowledge

Level 1
- Describes the embryology and functional anatomy of the basal ganglia, thalamus, and cortex
- Describes the physical findings and differential diagnosis of common movement disorders
- Describes the semiology and pathophysiology of common seizure disorders
- Describes medical therapy for status epilepticus

Level 2
- Describes medical therapies for epilepsy and movement disorders
- Lists surgical indications for patients with epilepsy or movement disorders
- Describes imaging findings in common epilepsies and movement disorders (e.g., magnetic resonance imaging [MRI], Single Proton Emission Computerized Tomography [SPECT], and position emission tomography [PET])
- Describes the principle of arc-centered stereotaxy
- Describes sources of inaccuracy in stereotaxy (e.g., brain shift, human error)

Level 3
- Describes the pathophysiology, including genetics, of the common movement disorders
- Describes the pathophysiology and pathoanatomy of common epilepsies
- Identifies on MRI the structures targeted for movement disorder surgery
- Describes the use of surface and invasive EEG in seizure focus localization
- Identifies common patterns of EEG abnormality

Level 4
- Describes expected outcomes after surgery for epilepsy and movement disorders
- Describes responses to electrical stimulation around intended deep brain simulation (DBS) targets and in various regions of eloquent cortex
- Describes indications for lesional vs. neuromodulatory interventions
- Describes the role of radiosurgery for functional lesions
- Describes indications for vagus nerve stimulation (VNS), callosotomy, and hemispherectomy

Level 5
- Contributes to the peer-reviewed literature in epilepsy and/or movement disorder treatment

Surgical Treatment of Epilepsy and Movement Disorders – Patient Care

Level 1
- Performs a history and physical examination in patients with epilepsy or movement disorders
- Evaluates and treat a patient for medical comorbidities affecting functional neurological surgery
- Provides routine peri-operative care for functional neurosurgical patients
- Initiates the work-up of a patient with an apparent seizure
- Recognizes and initiates treatment of status epilepticus

Level 2
- Explains risks and benefits of neurosurgical procedures for epilepsy and movement disorders

- Interprets diagnostic studies
- Assists with routine components of functional procedures (e.g., burr hole, craniotomy, generator change)
- Recognizes and initiates work-up of complications (e.g., hematoma, seizure, infection, device malfunction)
- Places stereotactic head-frame

Level 3 • Formulates a work-up and treatment plan for patients with epilepsy or a movement disorder (e.g., Parkinson disease, essential tremor)
- Independently performs routine functional procedures (e.g., DBS placement, subdural electrode placement, topectomy)
- Performs complex functional procedures with assistance (e.g., temporal lobectomy)
- Manages complications with assistance
- Performs stereotactic targeting using frameless and frame-based systems

Level 4 • Independently formulates a treatment plan for patients with comorbidities or other complicating factors (e.g., eloquent seizure focus)
- Independently performs complex procedures
- Adapts standard treatment plans to special circumstances (e.g., previous surgery, neuropsychological limitations)
- Independently manages complications

Level 5 • Systematically reviews treatment outcomes for epilepsy and/or movement disorders
- Participates in quality improvement for epilepsy and/or movement disorders

Pain and Peripheral Nerves – Medical Knowledge

Level 1 • Describes the anatomy of spinal cord and thalamic pathways for pain and pain modulation
- Describes the anatomy of the brachial and lumbar plexi and major nerves of the extremities
- Describes nerve injury classifications and the prognosis and time course for recovery of each

Level 2 • Lists medical therapies for chronic pain (e.g., trigeminal neuralgia, brachial plexus neuritis)
- Describes the anatomy and physical findings of common upper extremity entrapment neuropathies
- Describes the clinical findings and differential diagnosis of trigeminal neuralgia
- Lists surgical indications for patients with chronic pain or peripheral nerve disorders

Level 3 • Describes the pathophysiology of chronic pain disorders
- Describes non-operative therapies for nerve entrapment disorders
- Describes the anatomy and physical findings of common lower extremity entrapment neuropathies
- Describes the findings of electromyography (EMG) and nerve conduction studies in peripheral nerve disorders
- Obtains and interprets diagnostic studies for chronic pain and peripheral nerve disorder patients

Level 4 • Describes expected outcomes after surgery for chronic pain (e.g., microvascular decompression [MVD], dorsal root entry zone [DREZ] lesions, cordotomy)
- Describes expected outcomes after surgery for peripheral nerve disorders (e.g., neurolysis, direct anastomosis, grafting)
- Describes the anatomy and physiology of spinal cord lesioning for pain (myelotomy, cordotomy)

Level 5 • Contributes to the peer-reviewed literature in chronic pain and/or peripheral nerve disorders

Pain and Peripheral Nerves – Patient Care

Level 1 • Performs a history and physical examination in patients with chronic pain or peripheral nerve disorders
- Provides routine peri-operative care for patients with chronic pain or peripheral nerve disorders
- Initiates the work up of a patient with a peripheral nerve injury
- Recognizes and initiates treatment of baclofen withdrawal or morphine overdose

Level 2 • Explains risks and benefits of neurosurgical procedures for pain and peripheral nerve disorders
- Interprets diagnostic studies
- Assists with routine procedures (e.g., carpal tunnel release, spinal cord stimulation, intrathecal pump)
- Recognizes and initiates work-up of complications (e.g., hematoma, infection, device malfunction)

Level 3 • Formulates a work-up and treatment plan for patients with chronic pain or peripheral nerve disorders (e.g., trigeminal neuralgia, carpal tunnel syndrome)
- Independently performs routine procedures
- Performs complex procedures with assistance (e.g., DREZ lesions, cordotomy, neuroma in continuity, brachial plexus repair, nerve graft, nerve transfer)
- Manages complications with assistance

Level 4 • Independently formulates a treatment plan for patients with comorbidities or other complicating factors (e.g., recurrent trigeminal neuralgia)
  • Independently performs complex procedures
  • Adapts standard treatment plans to special circumstances (e.g., previous surgery, deafferentation pain)
  • Independently manages complications
Level 5 • Systematically reviews treatment outcomes for pain and/or peripheral nerve disorders
  • Participates in quality improvement for pain and/or peripheral nerve disorders

Pediatric Neurological Surgery – Medical Knowledge
Level 1 • Describes the embryology of common CNS congenital anomalies
  • Describes normal CSF physiology
  • Describes the response of the developing brain to injury
  • Describes developmental changes in cardio-pulmonary function and vital signs
  • Describes proper utilization and dosing of narcotics in children
  • Calculates circulating blood volume in infants and children
Level 2 • Describes abnormal CSF physiology and anatomy in various forms of hydrocephalus
  • Describes the radiological and clinical features of CNS tumors in children of various ages
  • Describes the radiological and clinical features of hydrocephalus, benign macrocephaly, and subdural hygroma
  • Describes the physical findings and mechanisms of head shape abnormalities
Level 3 • Describes the natural history of congenital CNS anomalies
  • Describes the implications of spinal column development for patterns of injury and treatment choice in children
  • Describes the impact of refractory epilepsy and spastic cerebral palsy on development and function
  • Describes treatment strategies for CNS tumors in children
  • Identifies methods to limit radiation exposure in children during imaging
Level 4 • Describes the effects of surgical diversion on CSF physiology
  • Describes the risks, screening, incidence, and management of late effects from chemotherapy and radiation for childhood CNS tumors
  • Describes the natural history of cranial synostosis and tethered cord with or without surgical intervention
  • Describes expected medical and functional long-term outcomes in patients with myelomeningocele
Level 5 • Contributes to the peer-reviewed literature in pediatric neurological surgery
  • Describes molecular abnormalities associated with CNS congenital anomalies and tumors
  • Describes the differential diagnosis and pathophysiology of acquired and congenital movement disorders

Pediatric Neurological Surgery – Patient Care
Level 1 • Performs an age-appropriate history and physical examination with developmental assessment
  • Provides routine peri-operative care for pediatric neurosurgical patients
  • Programs shunt valves and tap shunts
  • Evaluates CSF shunt function
  • Recognizes and initiates notification and evaluation of non-accidental trauma
Level 2 • Explains risks and benefits of neurosurgical procedures to parents and older children
  • Interprets diagnostic studies with accurate identification of age-related variations
  • Assists with routine procedures (e.g., CSF shunt, baclofen pump, Chiari decompression)
  • Recognizes in pre-verbal children, and initiates work-up of, complications (e.g., hematoma, infection, device malfunction, acute mental status decline)
Level 3 • Formulates a work-up and treatment plan for pediatric patients (e.g., hydrocephalus, synostosis, tethered cord, birth injury)
  • Independently performs routine procedures
  • Performs complex procedures with assistance (e.g., brain tumor, synostosis repair, tethered cord, ventricular endoscopy, indirect vascular bypass, craniotomy for epilepsy)
  • Manages complications with assistance
  • Diagnoses brain death in infants/children
Level 4 • Independently formulates a treatment plan for patients with comorbidities or other complicating factors (e.g., other organ system congenital anomalies)
  • Independently performs complex procedures
  • Adapts standard treatment plans to special circumstances (e.g., previous surgery, developmental delay, coagulopathy)

• Independently manages complications

Level 5 • Systematically reviews treatment outcomes for pediatric neurosurgical patients

• Participates in quality improvement for pediatric neurological surgery

• Formulates a diagnostic and management plans for a patient with a functioning CSF shunt and chronic headaches

• Counsels expectant parents regarding fetal congenital anomalies

• Performs surgical stabilization of the spine in a patient aged less than three years

Spinal Neurosurgery; Degenerative Disease – Medical Knowledge

Level 1 • Describes vertebral and radicular anatomy by level

• Describes the physical findings and differential diagnosis of degenerative spinal disorders (e.g., radiculopathy, neurogenic claudication, spondylotic myelopathy)

• Describes basic principles of spinal biomechanics

Level 2 • Describes medical and physical therapies for degenerative spinal disorders

• Lists surgical indications and options for degenerative spinal disorders

• Describes imaging findings in degenerative spinal disorders (e.g., x-ray, MRI, myelography)

• Describes the natural history of spinal degenerative disorders

• Describes electromyogram (EMG) findings in spondylotic myeloradiculopathy

Level 3 • Describes the pathophysiology of degenerative spondylotic myeloradiculopathy

• Describes and categorize degenerative spinal deformities by imaging (e.g., scoliosis, lumbar spondylolisthesis)

• Describes indications for anterior vs. posterior surgical approaches to the spine

• Describes the role of instrumentation and bony fusion in surgery for degenerative spinal disorders

Level 4 • Describes expected functional and pain outcomes after surgery for spinal degenerative disease

• Describes criteria for reoperation for degenerative spinal disease

• Lists indications for vertebroplasty and kyphoplasty

• Describes the genetics, pathophysiology, and imaging findings of inflammatory spinal disorders

Level 5 • Contributes to the peer-reviewed literature in spinal degenerative disease

• Evaluates and introduce resource efficiencies for surgical spine care

Spinal Neurosurgery; Trauma, Tumor, Infection – Medical Knowledge

Level 1 • Describes spinal cord and cauda equina anatomy

• Describes dermatomal sensory and motor levels and patterns of spinal cord injury

• Defines spinal stability and instability

• Describes the pathophysiology of spine and spinal cord injuries

Level 2 • Describes the medical treatment of spinal infections

• Describes the use and types of external bracing in spinal trauma, tumor, or infection

• Classifies spinal fractures by mechanism and imaging appearance

• Lists surgical indications, contra-indications, and options for spinal trauma, tumor, and infection

• Describes the natural history of primary spinal tumors

Level 3 • Describes the pathophysiology and imaging findings of spinal tumors (e.g., intradural tumor, vertebral metastasis)

• Describes the pathophysiology and imaging findings in spinal infection (e.g., discitis, epidural abscess, tuberculosis, osteomyelitis)

• Describes the role of instrumentation and bony fusion in surgery for spinal trauma, tumor, or infection

Level 4 • Describes expected short- and long-term outcomes and complications after surgery for spinal trauma, tumor, or infection

• Describes factors affecting outcome in spinal tumor surgery (e.g., extent of resection)

• Describes the use of adjuncts during spinal trauma and tumor surgery (e.g., image guidance, ultrasound, monitoring)

• Describes the role of radiotherapy for treatment of spinal tumors

Level 5 • Contributes to the peer-reviewed literature in spinal trauma, tumor, or infection

• Designs a clinical trial in spinal trauma, tumor, or infection

Spinal Neurosurgery – Patient Care

Level 1 • Performs a history and physical examination in patients with spinal disorders

• Evaluates and treat a patient for medical comorbidities affecting elective spinal surgery

• Provides routine peri-operative care for spinal surgery patients

• Initiates the work-up of a patient with myelopathy or radiculopathy

• Safely positions patients for spinal procedures

Level 2 • Explains risks and benefits of surgical spine procedures
  • Interprets diagnostic studies (e.g., imaging, EMG)
  • Initiates management of a patient with acute spinal cord injury
  • Performs cervical traction/reduction
  • Assists with routine procedures (e.g., lumbar or cervical laminectomy, lumbar discectomy)
  • Recognizes and initiates work-up of complications (e.g., CSF leak, infection, radiculitis)

Level 3 • Formulates a work-up and treatment plan for patients with lumbar or cervical degenerative disease
  • Formulates a plan for surgical and adjunctive therapy of a patient with spinal column neoplastic disease
  • Independently performs routine procedures
  • Performs complex procedures with assistance (e.g., Anterior Cervical Discectomy and Fusion [ACDF], posterior lumbar fusion, spinal cord tumor resection, fracture stabilization)
  • Manages complications with assistance

Level 4 • Independently formulates a treatment plan for patients with comorbidities, previous surgery or other complicating factors (e.g., multiple system trauma, coagulopathy)
  • Independently performs complex procedures
  • Performs advanced procedures with assistance (e.g., thoracolumbar or craniocervical reconstruction, reconstruction after infection or vertebral tumor resection)
  • Independently manages complications

Level 5 • Systematically reviews treatment outcomes for spinal disorders
  • Participates in quality improvement for spinal disorders
  • Leads interdisciplinary team in the management of complex spinal disorders
  • Independently performs advanced procedures

Vascular Neurosurgery – Medical Knowledge

Level 1 • Describes intracranial and extracranial vascular anatomy, including vascular territories
  • Describes mechanisms of cerebral autoregulation
  • Describes clinical presentations and imaging characteristics of ischemic and hemorrhagic stroke
  • Describes the embryology and anatomy of vascular lesions (e.g., aneurysms and vascular malformations)
  • Describes the pathophysiology of intracranial and extracranial atherosclerotic disease

Level 2 • Lists indications for intravenous thrombolytic therapy in ischemic stroke
  • Lists indications for carotid endarterectomy and carotid angioplasty/stent
  • Describes the natural history of aneurysms and vascular malformations
  • Lists indications for surgical and endovascular treatment of aneurysms and vascular malformations
  • Describes the clinical and imaging characteristics of delayed cerebral ischemia after subarachnoid hemorrhage
  • Describes imaging findings in common cerebrovascular conditions

Level 3 • Describes the pathophysiology of ischemic stroke (e.g., necrotic and apoptotic cell death)
  • Describes methods for evaluating cerebral perfusion and blood flow
  • Lists indications for surgical and endovascular treatment of complex aneurysms and vascular malformations
  • Describes the imaging and angiographic characteristics of cerebral vasculopathies (e.g., atherosclerotic disease, dissection, vasculitis)

Level 4 • Describes expected outcomes after surgery or endovascular therapy for intracranial and extracranial vascular disease
  • Describes the indications for medical vs. endovascular treatment of intracranial arterial stenosis
  • Describes the molecular mechanisms of ischemic protection strategies
  • Describes the genetics and inheritance of familial cavernous malformations and hereditary hemorrhagic telangiectasia

Level 5 • Contributes to the peer-reviewed literature in cerebrovascular disease

Vascular Neurosurgery – Patient Care

Level 1 • Performs a history and physical examination in patients with ischemic or hemorrhagic stroke
  • Provides routine peri-operative care for patients undergoing extracranial and intracranial vascular surgery
  • Initiates the work-up of a patient with ischemic or hemorrhagic stroke
  • Explains risks and benefits of diagnostic catheter angiography

Level 2 • Explains risks and benefits of surgery and endovascular therapy for aneurysms, vascular malformations, and ischemic stroke

• Interprets CT, MR, and angiographic studies

• Assists with routine components of procedures (e.g., pterional craniotomy, diagnostic catheter angiography)

• Recognizes and initiates work-up of complications after surgery or endovascular therapy (e.g., hemorrhage, ischemic stroke, cardiovascular compromise

Level 3 • Formulates a work-up and treatment plan for patients with aneurysms, vascular malformations, or ischemic stroke

• Independently performs routine components of procedures

• Performs complex procedures with assistance (e.g., carotid endarterectomy, aneurysm clipping, arteriovenous malformation resection)

• Manages complications with assistance

Level 4 • Independently Formulates a treatment plan for patients with comorbidities or other complicating factors (e.g., previous stroke, coronary artery disease, anti-coagulation)

• Independently performs complex procedures

• Performs advanced procedures with assistance (e.g., aneurysm coiling, vascular malformation embolization, extracranial-intracranial bypass)

• Independently manages complications

Level 5 • Systematically reviews treatment outcomes for neurovascular disease

• Participates in quality improvement for neurovascular disease

• Independently performs advanced procedures

Relational – Interpersonal and Communication Skills

Level 1 • Describes the ethical principles of informed consent

• Describes methods to compassionately break bad news

• Identifies elements of safe patient hand-offs and procedural pause

• Prioritizes and conveys simultaneous critical clinical events

Level 2 • Obtains and documents informed consent

• Participates in breaking bad news to a patient or family

• Participates in an advanced directive discussion

• Leads procedural pause

• Uses checklists and informatics to support patient hand-offs

• Communicates effectively with patients and families from varied cultural and socioeconomic backgrounds

• Prioritizes, conveys, and manages simultaneous critical clinical events

Level 3 • Obtains and documents informed consent in challenging circumstances (e.g., language or cultural barrier)

• Breaks bad news to a patient or family member

• Leads and documents an advanced directive discussion

• Supervises patient hand-offs

• Communicates effectively with physicians, health professionals, and health agencies

Level 4 • Quantifies evidence for risk-benefit analysis during informed consent for a complex, elective neurosurgical procedure

• Manages and documents an unexpected outcome (e.g., patient, care team and risk management communication)

• Leads response to an intra-operative or critical care emergency

• Acts in a consultative role to other physicians

Level 5 • Designs consent instrument for a human subject research study; files an Institution Review Board (IRB) application

• Designs and implements a procedural safety or sign-out exercise

• Designs and implements a team building and communications exercise

Technology – Interpersonal and Communication Skills

Level 1 • Uses Electronic Medical Record (EMR) and radiology access systems for timely reporting of clinical information

• Creates accurate patient orders and demonstrate use of EMR dosing and drug interaction safety mechanisms

Level 2 • Completes timely and accurate operative notes and ACGME Case Log entries

• Lists the elements necessary for evaluation and management (E&M) coding at each encounter type/level

Level 3 • Utilizes Health Insurance Portability and Accountability Act (HIPPA) protection safeguards for Protected
Health Information (PHI) and EMR
   • Designs and implements an EMR template
Level 4 • Creates or updates a neurosurgical care pathway and order set; implements use
Level 5 • Utilizes EMR with IRB approval to conduct formal clinical research and/or quality improvement (QI);
reports results

Compassion – Professionalism
Level 1 • Demonstrates honest and caring patient interactions; respect privacy and autonomy
   • Describes basic bioethical principles
Level 2 • Forms effective therapeutic bond with patients; receives praise from patients and families
   • Identifies and manages common ethical challenges during patient care
Level 3 • Mitigates impact of cultural, ethnic, or socioeconomic differences on patient care outcomes
   • Responds to patient needs that supersede self-interest
Level 4 • Identifies and manages complex ethical challenges during patient care
   • Acts as a mentor and role model to other residents
Level 5 • Participates in or develop programs to promote equality of care in vulnerable and underserved patient
populations
   • Participates in or design physician wellness programs

Accountability – Professionalism
Level 1 • Is punctual for conferences, rounds, pages, and operating room (OR)
   • Manages fatigue and sleep deprivation
   • Reports duty hours in a timely and accurate manner
   • Presents appropriate attire and respectful demeanor
   • Seeks patient information with reliability, industry, and confidentiality
Level 2 • Recognizes individual limits in clinical situations and ask for assistance when needed
   • Manages personal emotional, physical, and mental health
   • Seeks and accepts professional criticism
Level 3 • Demonstrates personal ownership of complications and patient outcomes
   • Acts as effective team leader for physicians and other health care personnel
   • Leads accurate and effective discussions at morbidity and mortality conference
Level 4 • Assumes leadership responsibility for clinical care team decisions and outcomes
   • Mediates conflict amongst members of the health care team
   • Recognizes and responds to physician impairment in self or others
Level 5 • Serves as a role model for other practicing and resident physicians for standards of ethical behavior and
professionalism
   • Participates in or lead institutional ethics board or program, or IRB

Economics – Systems-based Practice
Level 1 • Identifies the range of practice variation (e.g., medication, laboratory tests, imaging, and procedures)
   • Describes U.S. health payment systems
Level 2 • Describes the cost impact of practice variation in the context of system and national health resource
utilization
   • Describes principles of ethical coding (e.g., diagnostic, E&M, and procedural)
Level 3 • Use health care resources responsibly (e.g., test ordering, OR efficiency, timely discharges/transfers)
   • Accurately codes diagnoses and procedures in the ACGME Case Log System
Level 4 • Cites peer-reviewed cost and outcomes data to support resource utilization decisions
Level 5 • Designs and implements cost-effective patient care pathways with monitoring and feedback mechanisms

Safety and Systems – Systems-based Practice
Level 1 • Defines medical errors, near misses, and sentinel events; provides system-based examples of each
   • Assists care coordinator with discharge and outpatient services arrangements
   • Works in interdisciplinary teams to enhance safety and quality
Level 2 • Uses protocols and checklists for patient hand-offs, medication orders, and emergencies
   • Effects inter-facility transfer, including records and physician communication
Level 3 • Reports problematic behaviors, processes, and devices, including errors and near misses
   • Coordinates interdisciplinary inpatient care
Level 4 • Conducts root cause or failure mode analysis of systems-based errors and effect prophylaxis
   • Coordinates team for interdisciplinary procedure

• Establishes timeline and Identifies resources for transition to practice
    • Improves care systems to achieve optimal patient care
    • Works effectively in various health care delivery settings and systems
Level 5 • Leads multi-disciplinary patient safety team or initiative
    • Leads interdisciplinary care team or clinic
    • Mentors colleagues in practice building and administration

Lifelong Learning – Practice-based Learning and Improvement
Level 1 • Identifies limitations in knowledge, skills, and experience; incorporate feedback
    • Demonstrates information technology skills for evidence gathering
Level 2 • Sets learning and improvement goals; identifies resources, and performs appropriate learning activities
    • Participates in informal patient, medical student, and resident teaching
Level 3 • Utilizes data for practice improvement (e.g., systematic reviews, meta-analyses, practice guidelines, clinical outcomes data)
    • Teaches colleagues and other health professionals in both formal and informal settings
Level 4 • Participates in evidence-based practice improvement
    • Organizes educational activities at the program level
Level 5 • Develops educational curriculum and/or assessment tools

Research – Practice-based Learning and Improvement
Level 1 • Describes basic concepts in clinical epidemiology, biostatistics, and clinical reasoning
    • Describes the design and use of clinical registry outcomes data in practice improvement
Level 2 • Categorizes research study designs; evaluates quality and relevance
    • Contributes to the peer-reviewed neurological surgery literature
    • Incorporates evidence into routine clinical care decisions
Level 3 • Contributes systematic clinical or scientific information to the peer-reviewed literature
    • Participates in clinical outcomes data gathering and analysis
Level 4 • Formulates question or hypothesis, design investigation, execute project, and report results
    • Utilizes morbidity and mortality and program-level outcome data to institute systematic clinical practice changes
Level 5 • Independently plans, fund and execute a research program
    • Leads or participates in a clinical research trial
    • Participates in the peer-review and/or research funding review processes
    • Leads or participates in a clinical outcomes registry

Neurosurgery Conference Schedule

Type	Frequency	Day	Required to Attend
Epilepsy	Weekly	Tuesdays	Faculty/Residents
Grand Rounds	Weekly	Fridays	Faculty/Residents
Journal Club	Monthly	Tuesdays	Faculty/Residents
Adult M&M	Monthly	Thursdays	Faculty/Residents
Neuro-interventional	Weekly	Tuesdays	Faculty/Residents
Neuro-Oncology Tumor Board	Weekly	Wednesdays	Faculty/Residents
Neuroscience Lecture Series	Weekly	Wednesdays	Residents
NICU Conference	Weekly	Wednesdays	Faculty/Residents
Pediatric M&M	Monthly	Tuesdays	Faculty/Residents
Pediatric Tumor Board	Weekly	Wednesday	Faculty/Residents
Stroke	Weekly	Thursdays	Faculty/Residents
Spine Tumor Board	Biweekly	Thursdays	Faculty/Residents

Spine Surgery Fellowship

The Spine Surgery Fellowship Program in the Department of Neurosurgery at Froedtert & The Medical College is a one-year integrated clinical and research program for individuals who have completed residency and are contemplating careers in academic medicine. A second year emphasizing research is available.

Clinical Opportunities
A large and varied surgical experience includes spine trauma, tumors, and degenerative diseases, including all types of surgical fixation. The Neurosurgery Department is staffed by one of the most experienced surgical teams in the Midwest, offering surgical specialization in spine surgery. During the program, fellows assume increasing responsibility for operative performance, including teaching of residents in neurological surgery.

Research Opportunities
Fellows participate in both basic and clinical research, and have the opportunity to design limited studies or participate in ongoing efforts. The latter currently include investigation regarding the effects of spinal fixation, models of spondylolisthesis, spine material properties, finite element analysis of the spine, pathophysiology of spinal and spinal cord injury and its modification.
Our facility includes one of the largest crash test facilities in the world. Retrospective clinical reviews of various problems can be performed, as well as limited prospective studies. Presenting research at a national forum as well as producing at least two articles for publication are necessary to enhance this educational opportunity.

Outpatient Clinic

The outpatient clinic is a vital part of resident education. Each resident is expected to participate in the out-patient clinics of whichever service to which they are assigned and to work closely with the attending in the evaluation, work-up, and follow-up of patients in the clinic. It is recognized that this out-patient experience will vary by service, and the resident is expected to work out an arrangement with the faculty on his/her service in this regard. A varied experience with all faculty members is encouraged. Although the resident's highest priority should be the operating room whenever possible, the out-patient clinic is the next highest priority. Residents who are unassigned to a procedure should attend clinic if at all possible.

<center>**Facilities**</center>

Froedtert Hospital is a 536-bed tertiary care medical center designated as a Level I Trauma Center. The fifth floor of the Froedtert Memorial Lutheran Hospital is assigned to neurosurgery critical care, acute neurosurgery, neurosurgery-neurology, and spinal cord injury rehabilitation. There are twelve Neurosurgical Intensive Care Unit beds, eighteen acute spinal cord injury beds and twenty-eight general neurosurgical beds. Overflow patient beds are available. Froedtert outpatient facilities are located in the clinic building adjacent to the hospital. There are thirteen examination rooms and a workroom in the Neurosurgery Clinic.

Children's Hospital of Wisconsin is a 306-bed freestanding hospital dedicated solely to the care of children. It functions as SE Wisconsin's only Level I pediatric trauma center. Children's is one of the busiest pediatric hospitals in the country with 13 inpatient units. For children with serious medical conditions, Children's 72-bed pediatric critical care unit is one of the largest in the nation. The Level IV, 69-bed neonatal intensive care unit cares for more than 700 critically ill babies each year and our Level IV Epilepsy Center and Neurosciences Center has 22 family-oriented rooms, 10 of which are epilepsy monitoring patient rooms.

The Zablocki Veterans Administration Medical Center is a 182-bed tertiary medical facility located approximately five miles from Froedtert Memorial Lutheran Hospital. Neurosurgical patients share a surgical intensive care unit and accommodations on the general surgical floor. Outpatient clinic facilities are in the main hospital building.

<center>**Resources and Support**</center>

The institution assures that appropriate support services, personnel, and facilities are available for its trainees. Call rooms are available for residents who are on overnight call or who are too fatigued to drive home. The residents also have a private workroom, which is located near the NICU that has computers, a printer, and several textbooks for their use. There are eight dining areas on the medical complex. Residents are provided with meal cards that can be used at the dining areas in the corresponding hospitals. Residents are also provided with a set of surgical loupes and a tablet computer in their first year. In addition, the program covers the cost of the residents' cell phone bills. A $1500/year stipend for academic expenses is also available each year for books and to offset the cost of exams and licensing fees.

The Neurosurgery Department also employs Physicians Assistants, Nurse Practitioners, a Patient Liaison Nurse for patient education and telephone triage activities, a Nurse Specialist for stereotactic radiosurgery patients, Clinical Research Coordinators, Medical Assistants, a Residency Program Coordinator and Administrative Support Staff. The Residency Program Coordinator is available to assist residents with program related activities.