

Neuropathology Milestones

The Accreditation Council for Graduate Medical Education



Implementation Date: July 1, 2021 Second Revision: November 2020 First Revision: May 2014

Neuropathology Milestones

The Milestones are designed only for use in evaluation of fellows in the context of their participation in ACGME-accredited residency or fellowship programs. The Milestones provide a framework for the assessment of the development of the fellow in key dimensions of the elements of physician competency in a specialty or subspecialty. They neither represent the entirety of the dimensions of the six domains of physician competency, nor are they designed to be relevant in any other context.

Neuropathology Milestones Work Group

Kyle Conway, MD, JD

Laura Edgar, EdD, CAE

Annie Hiniker, MD, PhD

Giselle López, MD, PhD

Douglas Miller, MD, PhD

Janna Neltner, MD

Amber Nolan, MD, PhD

Jo Elle Peterson, MD

Suzanne Powell, MD

Martha Quezado, MD

The ACGME would like to thank the following organizations for their continued support in the development of the Milestones:

American Board of Pathology

Review Committee for Pathology

Understanding Milestone Levels and Reporting

This document presents the Milestones, which programs use in a semi-annual review of fellow performance, and then report to the ACGME. Milestones are knowledge, skills, attitudes, and other attributes for each of the ACGME Competencies organized in a developmental framework. The narrative descriptions are targets for resident/fellow performance throughout their educational program.

Milestones are arranged into levels. Tracking from Level 1 to Level 5 is synonymous with moving from novice to expert fellow in the specialty or subspecialty. For each reporting period, the Clinical Competency Committee will review the completed evaluations to select the milestone levels that best describe each learner's current performance, abilities, and attributes for each subcompetency.

These levels *do not* correspond with post-graduate year of education. Depending on previous experience, a junior fellow may achieve higher levels early in his/her educational program just as a senior fellow may be at a lower level later in his/her educational program. There is no predetermined timing for a resident to attain any particular level. Fellows may also regress in achievement of their milestones. This may happen for many reasons, such as over scoring in a previous review, a disjointed experience in a particular procedure, or a significant act by the fellow.

Selection of a level implies the fellow substantially demonstrates the milestones in that level, as well as those in lower levels (see the diagram on page vi).

Additional Notes

Level 4 is designed as a graduation *goal* but *does not* represent a graduation *requirement*. Making decisions about readiness for graduation and unsupervised practice is the purview of the program director. Furthermore, Milestones 2.0 include revisions and changes that preclude using Milestones as a sole assessment in high-stakes decisions (i.e., determination of eligibility for certification or credentialing). Level 5 is designed to represent an expert fellow whose achievements in a subcompetency are greater than the expectation. Milestones are primarily designed for formative, developmental purposes to support continuous quality improvement for individual learners, education programs, and the specialty. The ACGME and its partners will continue to evaluate and perform research on the Milestones to assess their impact and value.

Some milestone descriptions include statements about performing independently. These activities must occur in conformity to ACGME supervision guidelines as described in the Program Requirements, as well as to institutional and program policies. For example, a fellow who performs a procedure independently must, at a minimum, be supervised through oversight.

A Supplemental Guide is also available to provide the intent of each subcompetency, examples for each level, assessment methods or tools, and other available resources. The Supplemental Guide, like examples contained within the Milestones, is designed only to assist the program director and Clinical Competency Committee, and is not meant to demonstrate any required element or outcome.

Supplemental Guides and other resources are available on the Milestones page of each specialty section of the ACGME website. On www.acgme.org, choose the applicable specialty under the "Specialties" menu, then select the "Milestones" link in the lower navigation bar.

The diagram below presents an example set of milestones for one sub-competency in the same format as the ACGME Report Worksheet. For each reporting period, a fellow's performance on the milestones for each sub-competency will be indicated by selecting the level of milestones that best describes that fellow's performance in relation to those milestones.

Practice-Based Learning and Improvement 2: Commitment to Reflective Practice and Personal Growth				
Level 1	Level 2	Level 3	Level 4	Level 5
professional goals, identifying gap(s) between goals and current performance	Demonstrates receptiveness to feedback, analyzing and reflecting on factors contributing to gap(s) between goals and current performance	Seeks feedback episodically, and institutes behavioral change(s) when necessary	Seeks feedback consistently, and sustains behavioral change as necessary	Role models consistently seeking performance data with adaptability and humility, and coaches others on reflective practice
	Designs and implements a learning plan, with prompting	Independently creates and implements an individualized learning plan	Uses performance data to measure the effectiveness of the learning plan and when necessary, improves it	Facilitates the design and implementing learning plans for others
Comments:			Not Yet C	ompleted Level 1
Selecting a re	esponse box in the	Selecting a resi	oonse box on the line in	
	vel implies that	-	indicates that milestones	s
.	that level and in lower	in lower levels h	nave been substantially	
levels have be	een substantially I		ns well as some ne higher level(s).	

Patient Care 1: Autopsy					
Level 1	Level 2	Level 3	Level 4	Level 5	
Performs simple extractions, including removal of the brain and spinal cord, with supervision	Independently performs simple extractions, including removal of the brain and spinal cord	Performs complex extractions, including eye removal, if indicated, with supervision	Independently performs all aspects of gross evaluation including complex extractions	Teaches and serves as a consultant for complex extractions	
Participates in brain cutting conference and identifies basic gross neuroanatomy	Participates in the brain cutting conference and selects tissue samples in simple cases based on gross findings and relevant clinical and imaging data	Leads the brain cutting conference and selects tissue samples in complex cases, with supervision	Independently leads the brain cutting conference and selects tissue samples in complex cases	Performs complex dissections, modifying techniques according to the needs of the case	
Recognizes microscopic	Interprets common	Interprets uncommon	Independently interprets		
anatomy, as well as normal and abnormal	histologic findings and	histologic findings and	histologic findings and chooses relevant		
histologic findings	chooses relevant ancillary testing, with supervision	chooses relevant ancillary testing, with supervision	ancillary testing		
Comments:	Comments: Not Yet Completed Level 1				
			Not Yet F	·	

		Patient Care 2: Surgical Neuropathology				
Level 2	Level 3	Level 4	Level 5			
Performs gross examination, description, and sampling, of complex neurosurgical specimens and prepares nerve and muscle specimens, with supervision	Independently performs gross examination, description, and sampling, of simple neurosurgical specimens	Independently performs gross examination, description, and sampling of complex neurosurgical specimens, and prepares nerve and muscle specimens	Designs novel approaches to complex specimens through collaboration with other members of the health care team			
Performs histologic examination, orders examination, orders encillary testing, and makes a diagnosis for simple cases, with supervision	Independently performs histologic examination, identifies confounding factors, orders ancillary testing, and makes a diagnosis for simple cases	Independently performs histologic examination, identifies confounding factors, orders relevant ancillary testing, and makes a diagnosis for complex or challenging cases	Serves as a consultant for complex or challenging cases			
			ompleted Level 1			
e e e e e e e e e e e e e e e e e e e	erforms gross xamination, description, nd sampling, of complex eurosurgical specimens nd prepares nerve and nuscle specimens, with upervision erforms histologic xamination, orders ncillary testing, and nakes a diagnosis for mple cases, with	erforms gross xamination, description, and sampling, of complex eurosurgical specimens and prepares nerve and auscle specimens, with aupervision Independently performs description, and sampling, of simple neurosurgical specimens Independently performs description, and sampling, of simple neurosurgical specimens Independently performs histologic examination, identifies confounding factors, orders ancillary testing, and makes a diagnosis for simple	Independently performs gross examination, description, and sampling, of complex eurosurgical specimens and prepares nerve and suscle specimens, with supervision Independently performs gross examination, description, and sampling, of simple neurosurgical specimens Independently performs description, and sampling of complex neurosurgical specimens, and prepares nerve and muscle specimens Independently performs histologic examination, identifies confounding factors, orders ancillary testing, and diagnosis for simple cases, with supervision Independently performs description, and sampling of complex neurosurgical specimens, and prepares nerve and muscle specimens Independently performs histologic examination, identifies confounding factors, orders ancillary testing, and makes a diagnosis for complex or challenging cases			

Patient Care 3: Intra-Operative Consultation (IOC), including Frozen Section				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies indications and identifies common neurosurgical procedures and recognizes the indications for IOC, frozen section, and cytologic preparations	Assesses requests for simple IOC and plans workflow, with supervision	For complex cases, addresses requests for IOC with supervision; independently assesses and manages requests for simple IOC and plans workflow	For complex cases, independently manages, prioritizes, and addresses requests for IOC	
Discusses specimen- dependent variability in the approach to IOC	Selects tissue for diagnosis and prepares quality slides on simple specimens, in a timely manner	Selects tissues for diagnosis and prepares quality slides for complex specimens, in a timely manner	Supervises residents and advises technical staff members in the performance of IOC	Develops a plan for process improvement in the performance of IOC
Identifies broad diagnostic categories incorporating all available clinical and imaging data in routine IOC	Interprets and communicates routine IOC, with supervision	Independently interprets and communicates routine IOC	Independently interprets and communicates IOC for complex cases and uses language of uncertainty, as indicated	Serves as a consultant for interpreting and communicating IOC
Comments: Not Yet Completed Level 1 Not Yet Rotated				

Patient Care 4: Reporting				
Level 1	Level 2	Level 3	Level 4	Level 5
Generates a timely report for a simple case, with supervision	Generates a timely report that includes synoptic templates and/or ancillary testing for a complex case, with supervision	Independently generates timely integrated reports for simple cases	Independently generates timely integrated reports for complex cases	Independently generates a report that addresses a discordant diagnosis or clinical discrepancy in complex cases
Identifies the role of comments in a pathology report	Generates comments and makes simple recommendations	Generates comments that include the language of uncertainty, with supervision	Independently generates a nuanced comment that includes the language of uncertainty and complex recommendations	
Comments:			Not Yet Comp Not Yet Rotat	

Medical Knowledge 1: Diagnostic Knowledge				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates basic knowledge of neuropathology	Demonstrates advanced knowledge of the neuropathology of common neoplastic and non-neoplastic diseases	Applies advanced knowledge of the neuropathology of uncommon neoplastic and non-neoplastic diseases	Applies advanced knowledge of the neuropathology of uncommon neoplastic and non-neoplastic diseases, with reference to literature	Demonstrates expertise in neuropathology to a multidisciplinary team
Demonstrates basic knowledge of histochemistry, immunohistochemistry, and molecular techniques	Demonstrates advanced knowledge of histochemistry, immunohistochemistry, and molecular techniques	Applies advanced knowledge of histochemistry, immunohistochemistry, and molecular techniques	Integrates advanced knowledge of histochemistry, immunohistochemistry, and molecular techniques with reference to literature, in nuanced diagnoses	Demonstrates expertise in histochemistry, immunohistochemistry, and molecular techniques
Comments:			Not Yet 0 Not Yet F	Completed Level 1

Medical Knowledge 2: Neuropathology Instruction				
Level 1	Level 2	Level 3	Level 4	Level 5
Presents at interdisciplinary conference, with supervision	Leads instruction of basic neuropathology concepts	Independently presents at interdisciplinary conference	Leads instruction of advanced neuropathology concepts	Independently designs and develops enduring instructional materials
Comments:			Not Yet Comp Not Yet Rotate	

Medical Knowledge 3: Clinical Reasoning				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates a basic framework for clinical reasoning	Demonstrates clinical reasoning to determine relevant information	Synthesizes information to inform clinical reasoning, with supervision	Independently synthesizes information to inform clinical reasoning in complex cases	Serves as a resource for resolving difficult differential diagnoses
Identifies resources to inform clinical reasoning	Selects relevant resources based on scenario to inform decisions	Seeks and integrates evidence-based information to inform diagnostic decision making in complex cases, with supervision	Independently seeks out, analyzes, and applies relevant original research to diagnostic decision making in complex clinical cases	
Comments:			Not Yet Comp Not Yet Rotate	

Systems-Based Practice 1: Patient Safety and Quality Improvement (QI)				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of common patient safety events	Identifies system factors that lead to patient safety events	Participates in analysis of patient safety events (simulated or actual)	Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)	Actively engages teams and processes to modify systems to prevent patient safety events
Demonstrates knowledge of how to report patient safety events	Reports patient safety events through institutional reporting systems (simulated or actual)	Participates in disclosure of patient safety events to clinicians and/or patients and families (simulated or actual)	Discloses patient safety events to clinicians and/or patients and families (simulated or actual)	Role models or mentors others in the disclosure of patient safety events
Demonstrates knowledge of basic QI methodologies and metrics	Describes departmental and institutional QI initiatives	Participates in departmental and institutional QI initiatives	Demonstrates the skills required to identify, develop, implement, and analyze a QI project	Creates, implements, and assesses QI initiatives at the institutional or community level
Comments: Not Yet Completed Level 1				

Systems-Based Practice 2: Systems Navigation for Patient-Centered Care				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of case coordination	Coordinates care of patients/specimens in routine cases, effectively using interprofessional teams	Coordinates care of patients/specimens in complex cases, effectively using interprofessional teams	Models effective coordination of patient-centered care among different disciplines and specialties	Analyzes the process of care coordination and leads in the design and implementation of improvements
Identifies key elements for safe and effective transitions of care and hand-offs	Performs safe and effective transitions of care/hand-offs in routine situations	Performs safe and effective transitions of care/hand-offs in complex situations	Models and advocates for safe and effective transitions of care/hand- offs within and across health care delivery systems	Improves quality of transitions of care within and across health care delivery systems to optimize patient outcomes
Demonstrates knowledge of population and community health needs	Identifies pathology's role in population and community health needs for the local population	Identifies opportunities for pathology to participate in community and population health	Recommends and/or participates in changing and adapting practice to provide for the needs of communities and populations	Leads innovations and advocates for populations and communities with health care needs
Comments: Not Yet Completed Level 1				

Systems-Based Practice 3: Physician Role in Health Care System				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies key components of the complex health care system (e.g., hospital, skilled nursing facility, finance, personnel, technology)	Describes how components of a complex health care system are interrelated, and how this impacts patient care	Discusses how individual practice affects the broader system (e.g., test use, turnaround time)	Manages various components of the complex health care system to provide efficient and effective patient care and transition of care	Advocates for or leads systems change that enhances high-value, efficient, and effective patient care and transition of care
Describes basic health payment systems (e.g., government, private, public, uninsured care) and practice models	Documents testing detail and explains the impact of documentation on billing and reimbursement	Engages with clinicians and/or patients in shared decision making, such as use of preauthorization for complex testing	Practices and advocates for cost effective patient care with consideration of the limitations of each patient's payment model	Participates in health policy advocacy activities
Comments: Not Yet Completed Level 1				

Systems-Based Practice 4: Accreditation, Compliance, and Quality				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge that laboratories must be accredited	Demonstrates knowledge of the components of laboratory accreditation and regulatory compliance (e.g., Clinical Laboratory Improvement Amendments), either through training or experience	Identifies the differences between accreditation and regulatory compliance; discusses the process for achieving accreditation and maintaining regulatory compliance	Participates in an internal or external laboratory inspection	Serves as a resource for accreditation at the regional or national level
Discusses the need for quality control and proficiency testing	Interprets quality data and charts and trends, including proficiency testing results, with assistance	Demonstrates knowledge of the components of a laboratory quality management plan	Reviews the quality management plan to identify areas for improvement	Creates and follows a comprehensive quality management plan
		Discusses implications of proficiency testing failures	Performs analysis and review of proficiency testing failures and recommends a course of action, with oversight	Independently formulates a response for proficiency testing failures
Comments: Not Yet Completed Level 1				

Systems-Based Practice 5: Utilization					
Level 1	Level 2	Level 3	Level 4	Level 5	
Identifies general neuropathology work practices and workflow (e.g., molecular diagnostic, histology, immunohistochemistry stains, chemical tests)	Explains rationale for utilization patterns in own practice setting	Identifies opportunities to optimize utilization of pathology resources	Initiates efforts to optimize utilization	Completes a utilization review and implements change	
Comments: Not Yet Completed Level 1					

Practice-Based Learning and Improvement 1: Evidence-Based Practice and Scholarship				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates how to access and select applicable evidence	Identifies and applies the best available evidence to guide diagnostic work-up of simple cases	Identifies and applies the best available evidence to guide diagnostic work-up of complex cases	Critically appraises and applies evidence to guide care, even in the face of conflicting data	Teaches others to critically appraise and apply evidence for complex cases and/or participates in the development of guidelines
Is aware of the need for patient privacy, autonomy, and consent as applied to clinical research	Develops knowledge of the basic principles of research (demographics, Institutional Review Board, human subjects), including how research is evaluated, explained to patients, and applied to patient care	Applies knowledge of the basic principles of research such as informed consent and research protocols to clinical practice, with supervision	Proactively and consistently applies knowledge of the basic principles of research such as informed consent and research protocols to clinical practice	Suggests improvements to research regulations and/or substantially contributes to the primary literature through basic, translational, or clinical research
Comments: Not Yet Completed Level 1				

Level 1	Level 2	Level 3	Level 4	Level 5
Accepts responsibility for personal and professional development by establishing goals	Demonstrates openness to receiving performance data and feedback in order to inform goals	Seeks performance data and feedback with humility	Actively and consistently seeks performance data and feedback with humility	Models seeking performance data and accepting feedback with humility
Identifies the gap(s) between expectations and actual performance	Analyzes and reflects on the factors which contribute to gap(s) between expectations and actual performance	Institutes behavioral change(s) to narrow the gap(s) between expectations and actual performance	Critically evaluates the effectiveness of behavioral changes in narrowing the gap(s) between expectations and actual performance	Coaches others in reflective practice
Actively seeks opportunities to improve	Designs and implements a learning plan, with supervision	Independently creates and implements a learning plan	Uses performance data to measure the effectiveness of the learning plan and improves it when necessary	Facilitates the design and implementation of learning plans for others

Professionalism 1: Professional Behavior and Ethical Principles					
Level 1	Level 2	Level 3	Level 4	Level 5	
Demonstrates knowledge of the ethical principles underlying informed consent, surrogate decision making, advance directives, confidentiality, error disclosure, stewardship of limited resources, and related topics	Analyzes straightforward situations using ethical principles	Recognizes the need and uses relevant resources to seek help in managing and resolving complex ethical situations	Independently resolves and manages complex ethical situations	Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution	
Describes when and how to appropriately report professionalism lapses, including strategies for addressing common barriers; identifies and describes potential triggers for professionalism lapses	Demonstrates insight into professional behavior in routine situations; takes responsibility for own professionalism lapses	Demonstrates professional behavior in complex or stressful situations	Recognizes situations that may trigger professionalism lapses and intervenes to prevent lapses in self and others	Coaches others when their behavior fails to meet professional expectations	
Comments: Not Yet Completed Level 1					

Professionalism 2: Accountability and Conscientiousness				
Level 1	Level 2	Level 3	Level 4	Level 5
Responds promptly to instructions, requests, or reminders to complete tasks and responsibilities	Takes ownership and performs tasks and responsibilities in a timely manner with attention to detail	Recognizes situations that may impact own ability to complete tasks and responsibilities in a timely manner and describes the impact on team	Anticipates and intervenes in situations that may impact others' ability to complete tasks and responsibilities in a timely manner	Takes ownership of system outcomes, and implements new strategies when necessary
Comments: Not Yet Completed Level 1				

Professionalism 3: Self-Awareness and Help-Seeking				
Level 1	Level 2	Level 3	Level 4	Level 5
Recognizes limitations in the knowledge/skills/ behaviors of self or team, with assistance	Independently recognizes limitations in the knowledge/skills/ behaviors of self or team and seeks help when needed	Proposes and implements a plan to remediate or improve the knowledge/ skills/behaviors of self or team, with assistance	Independently develops and implements a plan to remediate or improve the knowledge/skills/ behaviors of self or team	Serves as a resource or consultant for developing a plan to remediate or improve the knowledge/ skills/behaviors
Recognizes status of personal and professional well-being, with assistance	Independently recognizes status of personal and professional well-being and seeks help when needed	Proposes and implements a plan to optimize personal and professional well-being, with assistance	Independently develops and implements a plan to optimize personal and professional well- being	Coaches others when responses or limitations in knowledge/skills do not meet professional expectations
Comments: Not Yet Completed Level 1				

This subcompetency is not intended to evaluate a fellow's well-being. Rather, the intent is to ensure that each fellow has the fundamental knowledge of factors that affect well-being, the mechanisms by which those factors affect well-being, and available resources and tools to improve well-being

-

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication				
Level 1	Level 2	Level 3	Level 4	Level 5
Uses language and nonverbal behavior to demonstrate respect and establish rapport	Establishes a relationship in straightforward encounters using active listening and clear language	Sensitively and compassionately delivers medical information, with supervision	Independently, sensitively, and compassionately delivers medical information and acknowledges uncertainty and conflict	Mentors others in the sensitive and compassionate delivery of medical information
Identifies common barriers to effective communication (e.g., language, disability) while accurately communicating own role within the health care system	Identifies complex barriers to effective communication (e.g., health literacy)	When prompted, reflects on biases while attempting to minimize communication barriers	Independently recognizes biases while attempting to proactively minimize communication barriers	Models self-awareness while teaching a contextual approach to minimize communication barriers
Comments: Not Yet Completed Level 1				

Interpersonal and Communication Skills 2: Interprofessional and Team Communication					
Level 1	Level 2	Level 3	Level 4	Level 5	
Uses language that values all members of the health care team	Communicates information effectively with all health care team members	Uses active listening to adapt communication style to fit team needs	Coordinates recommendations from different members of the health care team to optimize patient care	Models flexible communication strategies that value input from all health care team members, resolving conflict when needed	
Describes the utility of constructive feedback	Solicits feedback on performance as a member of the health care team	Integrates feedback from team members to improve communication	Communicates feedback and constructive criticism to superiors	Facilitates regular health care team-based feedback in complex situations	
Comments: Not Yet Completed Level 1					

Interpersonal and Communication Skills 3: Communication within Health Care Systems				
Level 1	Level 2	Level 3	Level 4	Level 5
Safeguards patient personal health information by communicating through appropriate means as required by institutional policy (e.g., patient safety reports, cell phone/pager usage)	Selects forms of communication based on context and urgency of the situation	Communicates while ensuring security of personal health information, with supervision	Independently communicates while ensuring security of personal health information	Guides departmental or institutional communication around policies and procedures regarding the security of personal health information
Identifies institutional and departmental structure for communication of issues	Respectfully communicates concerns about the system	Uses institutional structure to effectively communicate clear and constructive suggestions to improve the system	Initiates conversations on difficult subjects with appropriate stakeholders to improve the system	Facilitates dialogue regarding systems issues among larger community stakeholders (institution, health care system, field)
Comments: Not Yet Completed Level 1				