

# The Effect and Use of Milestones in the Assessment of Neurological Surgery Residents and Residency Programs ☆, ☆ ☆

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**OBJECTIVES:** The purpose of this study was to determine the effect of the Accreditation Council for Graduate Medical Education Milestones on the assessment of neurological surgery residents. The authors sought to determine the feasibility, acceptability, and utility of this new framework in making judgments of progressive competence, its implementation within programs, and the influence on curricula. Residents were also surveyed to elicit the effect of Milestones on their educational experience and professional development.

**DESIGN, SETTING, AND PARTICIPANTS:** In 2015, program leadership and residents from 21 neurological surgery residency programs participated in an online survey and telephone interview in which they reflected on their experiences with the Milestones. Survey data were analyzed using descriptive statistics. Interview transcripts were analyzed using grounded theory.

**RESULTS:** Response themes were categorized into 2 groups: outcomes of the Milestones implementation process, and facilitators and barriers. Because of Milestones implementation, participants reported changes to the quality of the assessment process, including the ability to identify

struggling residents earlier and design individualized improvement plans. Some programs revised their curricula based on training gaps identified using the Milestones. Barriers to implementation included limitations to the adoption of a developmental progression model in the context of rotation block schedules and misalignment between progression targets and clinical experience. The shift from time-based to competency-based evaluation presented an ongoing adjustment for many programs. Organized preparation before clinical competency committee meetings and diverse clinical competency committee composition led to more productive meetings and perceived improvement in promotion decisions.

**CONCLUSIONS:** The results of this study can be used by program leadership to help guide further implementation of the Milestones and program improvement. These results also help to guide the evolution of Milestones language and their implementation across specialties. (J Surg Ed ■■■■■). © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** Competency-based assessment, Assessment and evaluation in graduate medical education, Neurosurgery, ACGME competencies

**ACGME COMPETENCIES:** Medical knowledge, Patient care, Professionalism, Interpersonal and communication skills, Systems-based practice, Practice-based learning and improvement

## INTRODUCTION

North American medical and surgical training is transitioning to competency-based medical education. Consistent

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with this shift, in 2012 the Accreditation Council for Graduate Medical Education (ACGME) introduced the next accreditation system (NAS), which emphasizes competency-based Milestones as a means of detailed monitoring of the progression of individual residents.<sup>1</sup> The ACGME Milestones are organized by 6 general competency domains: medical knowledge (MK), patient care (PC), professionalism, interpersonal and communication skills, systems-based practice, and practice-based learning and improvement. This new focus aims to assure that graduating resident physicians attain the abilities needed to match evolving patient and health care system needs.

Recently, neurological surgery (NS) directly addressed this challenge by developing a standard national curriculum that includes uniform educational outcomes, outcomes-compatible assessment systems, and multi-institutional courses.<sup>2-5</sup> The “Matrix Curriculum” was distributed to all residency programs in the United States in early 2014. At the same time, the ACGME asked the 24 principal medical, surgical, and diagnostic specialties to create their own individual outcomes measures. Neurological surgery joined 6 other specialties as an early adopter,<sup>6</sup> publishing its educational outcomes measures in March 2013 for use beginning in July 2013.<sup>2</sup> The NS Milestones cover 24 subcompetencies within the larger 6 ACGME competency domains and are organized into target levels 1 through 5: level 1 demonstrating Milestones expected of an incoming or early-stage learner, level 4 demonstrating Milestones expected at completion of residency, and level 5 demonstrating Milestones that might describe the performance of a subspecialty fellow trainee or early career neurosurgeon.

Although the Milestones have been widely accepted in principle by leaders in the major specialties,<sup>6</sup> their specific benefits to programs and issues regarding implementation remain to be studied. Engagement of program directors (PDs), faculty, and residents is essential for effective uptake, commitment of resources, and meeting consensus national curricular goals. In this study, we explored the nature and range of responses to the Milestones initiative by the NS community including the feasibility and acceptability of the Milestones, the usefulness of the framework in judging resident performance, facilitators and barriers to implementation, influence on program curricula, and the responses of the residents themselves.

## MATERIAL AND METHODS

### Study Design and Approach

This study makes use of survey data and interviews of PDs, clinical competency committee (CCC) chairs, and resident physicians. Interview and survey questions specifically addressed the context and mechanisms by which the Milestones affect the decision-making processes of the CCC, and

how CCCs use multifaceted assessment data to make competence judgments of individual residents.

### Sample and Recruitment

In 2015, we invited a purposeful sample of 59 ACGME-accredited NS residency programs (out of a total of 104) to participate in the study. A purposeful sample selects a group of respondents to provide a diverse array of information.<sup>7</sup> To achieve a balanced sample of programs and to enhance the probability of saturating on key themes, we constructed a stratified sample to account for program size (where large programs had more than 12 total residents and small programs had 12 or less), geographic region, and mean Milestones rating (mean Milestone ratings for each program were calculated by collapsing the final Milestones assessment (represented by a numerical score) submitted by the program for each resident for each competency and subcompetency for the reporting periods between December 2013 and December 2014; [Table 1](#)). [Figure 1](#) summarizes recruitment and participation. The eligibility criterion was ACGME accreditation. We contacted the PDs of these 59 programs with a brief introductory e-mail about the project from one of the authors (N.R.S., Chair of the Committee on Resident Education of the Society of Neurological Surgeons, which comprises academic department chairs and residency PDs). We then followed up using a joint communication from the ACGME and the Society of Neurological Surgeons. Pursuant to PD interest, we followed up with program coordinators for the contact information of 2 residents of postgraduate year (PGY) 2 to 6 from each program. PGY 2 to 6 residents were eligible for interview because they had experienced residency before and during the transition into Milestones. We monitored demographic balance among interested programs in comparison to the purposeful sample and emailed nonrespondent programs matching missing demographics (PDs and program coordinators). We then contacted the PDs, CCC Chairs, and residents directly and invited them to participate. For instances in which a program showed initial interest but then failed to participate, we followed up multiple times by e-mail to encourage their participation or ascertain why they no longer were interested or able to participate. To ensure that programs or residents were not adversely affected because of participating, we de-identified all study data. In addition, written and verbal communications regarding the study emphasized that data collected would not be used for accreditation or certification purposes. All programs reviewed a study information sheet before participation. This study was deemed exempt by the Institutional Review Board of Oregon Health & Science University.

### Data Collection

One participant (either the PD or the CCC Chair) from each participating program completed a 14-question online demographic survey that included questions about their

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