

# From theory to actual practice: Creation and application of milestones in an internal medicine residency program, 2004–2010<sup>1</sup>

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## Abstract

**Background:** In the USA, the Accreditation Council of Graduate Medical Education, Educational Innovations Project is a partner in reshaping residency training to meet increasingly complex systems of health care delivery.

**Aim:** We describe the creation and implementation of milestones as a vehicle for translating educational theory into practice in preparing residents to provide safe, autonomous patient care.

**Method:** Six program faculty leaders, all with advanced medical education training, met in an iterative process of developing, implementing, and modifying milestones until a final set were vetted.

**Results:** We first formed the profile of a Master Internist. We then translated it into milestone language and implemented its integration across the program. Thirty-seven milestones were applied in all settings and rotations to reach explicit educational outcomes. We created three types of milestones: *Progressive*, build one on top of the other to mastery; *additive*, adding multiple behaviors together to culminate in mastery; and *descriptive*, using a proscribed set of complex, predetermined steps toward mastery.

**Conclusions:** Using milestones, our program has enhanced an educational model into explicit, end of training goals. Milestone implementation has yielded positive results toward competency-based training and others may adapt our strategies in a similar effort.

Postgraduate medical education has been reinvigorated as program faculty and other medical educators address issues in the training of residents to provide both, present, and future, safe patient care. Despite the fact that modern health care systems have increased in complexity, graduate medical education programs have changed little in the past half century (Fitzgibbons et al. 2006; Weinberger et al. 2006; Meyers et al. 2007; McMahon et al. 2010). The Accreditation Council of Graduate Medical Education (ACGME) Educational Innovations Project (EIP) has tasked a small subset of US Internal Medicine programs in good standing to create innovative models for residency training and program certification. Our program, housed at Baystate Tufts Medical Center, was one of the initial 16 programs.

At the time of the initiation of our EIP project in 2004, the following initiatives were influencing graduate medical education: (1) the ACGME outcomes project (Swing 2007); (2) early work in competency-based medical education (CBME; Carraccio et al. 2002); and (3) the charge of the Institute of Medicine to build safer systems in healthcare (Kohn et al. 1999). CBME, grounded in the outcomes movement of the 1990s, focuses on accountability and curricular outcomes organized around competencies (Kohn et al. 1999; Chaudhry et al. 2008; Frank et al. 2010). The core of CBME requires that learners demonstrate competence in the application of their learning to actual patient care. It also enables the residency

## Practice points

- Profiling the Master Internist and developing measurable progression toward it was essential in our creation of milestones.
- Elucidating the terms milestones, descriptors, and fundamentals, were necessary for explicit goal setting.
- Milestones development requires commitment, review, and revision.
- Progressive, additive, and descriptive milestones promote flexibility.
- Milestones add value to assessment, curriculum, and determination of promotion.

program to determine that the newly trained physician is competent for all aspects of future practice (Iobst et al. 2010).

The creation of systematic, standard, measurable approaches to the demonstration of professional growth lies at the heart of postgraduate medical education's current efforts. Completion of a set of milestones by the end of training is one such approach. Milestones describe the developmental progression of observable behaviors and provide more specific feedback to residents, ensuring the acquisition of necessary knowledge, skills, and attitudes for advancement (Swing 2007; Carraccio et al. 2008;

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Green et al. 2009; Varney et al. 2009). Milestones permit educators to more accurately document competency before allowing residents the opportunity to perform specific tasks with indirect supervision. By July 2013, ACGME will implement the Next Accreditation System which will require biannual reporting of milestones (Nasca et al. 2012). Thus far, 7 of 26 US core specialties have completed their milestones with formal publications in internal medicine and pediatrics (Green et al. 2009; Hicks et al. 2010).

The purpose of this article is to describe the practical use of milestones in our Internal Medicine residency program from 2004 to 2010. The milestones used in our program relate to our own framework, called the Learner-Manager-Teacher (LMT) model, but can be applied in any postgraduate program. We have also used both national and international developments in education during the same period as both reference points and comparison data.

## Methods

### Setting

At Baystate Tufts Medical Center, the internal medicine residency program educates 53 categorical and preliminary medicine residents and 32 medicine-pediatric residents. Thirty Tufts University third-year medical students spend their entire clinical year on our campus. We do all of our inpatient training in a single 659 bed tertiary care hospital. Our ambulatory training occurs predominantly at an academic health center that serves more than 7500 primary care patients using a team-based, patient centered medical home model. The Baystate training culture is marked by an explicit commitment to education, incorporating the principles of innovation, adult learning, and transparency.

### Theoretical background

The LMT is a model developed at Baystate Tufts Medical Center for training that systematically and explicitly addresses the continuum of resident supervision to resident autonomy in patient care (Hinchev & Rothberg 2010). The model is built on the assumptions that education and patient care are integrally linked and that progression in training must be competency-based. It parallels the RIME concept in that it stages the role of the learner (Pangaro 1999). This model finds structural expression in a revised second year, the Manager year (Rosenblum et al. 2007; Hinchev et al. 2009). LMT carefully defines a set of explicit tasks for each year of training. We created and implemented our milestones to document our own framework. Milestones can serve as benchmarks for many educational models.

### Participants

Six program faculty leaders with advanced medical education training through General Medicine Fellowship, Stanford Faculty Training, Hartford Faculty Scholar or American Board of Internal Medicine Faculty Development Courses, met weekly for three consecutive years as a working group

to devise an innovative approach to residency training. Thereafter, the group met bimonthly. Resident input was welcomed from the outset and their feedback actively solicited. In the later phase of development, the chief residents were incorporated into the working group.

### The process

Program leaders designed and implemented a curricular segment, solicited feedback from residents, and made necessary modifications or changes. This cycle continued throughout the several year development processes. All programmatic elements have been affected: curriculum, scheduling, evaluation, advising, self-reflection (both residents and faculty), faculty development, and criteria for resident promotion and/or remediation. Our 6 year development sequence can be divided into three phases: Defining the training outcome, the Master Internist; The initial creation of milestones; and Implementation, which includes milestones revisions.

## Results

### Defining the training outcome, the Master Internist

Our first task consisted of answering the question: "What does it mean to practice autonomously? What are the attributes of a Master Internist?" Two sources were used in the final compilation of a set of characteristics of a Master Internist. The first was a series of conversations with each other and other hospital internists as each member of the group created an individual profile. The second was the use of the nominal group process to blend the disparate definitions into an agreed upon final form. The final definition of the Master Internist, the provider of optimal patient care in our current and future complex medical system, reads as follows.

The Master Internist practices in a health care team and is self-reflective with explicit and implicit feedback. This physician is knowledgeable in current medical care, curious, and capable of continuous learning and has respect for a scholarly pursuit. The Master Internist is able to anticipate difficult situations, to avert medical errors with an understanding of personal accountability and to be armed with the recognition that the interdisciplinary system must be engaged for meaningful patient safety.

The importance of completion of this first task can not be overstated, regardless of the classification system or vehicle selected as a benchmarking tool. Creating the definition of Master Internist, reaching common agreement on the program's central mission and its essential components, translated our theory of residency education into a practical, real-time educational effort.

### Initial creation of milestones

The EIP working group's next step was to identify core characteristics in the development of the Master Internist, contrasting and comparing our outcome definition with ACGME competencies and associated subcategories. Developing a common language to describe our work clearly

#	Core Competence	Fundamental <sup>a</sup>	Milestone <sup>b</sup>	Descriptor <sup>c</sup>				
				Failure	Needs Work	Competent	Proficient	Expert
9	Medical Knowledge Patient Care	Analytic Thinking	Demonstrates an elaborated analytic approach to problem representation  Resident demonstrates appropriate analytic thinking to establish the summarizing statement	Reports all (pertinent and extraneous) data but is not able to use information to defend summarizing statement	Reports all data and needs prompting to be able to defend the summarizing statement	Resident gives pertinent data (without extraneous) and is able to organize and summarize that data in order to defend the summarizing statement in simple cases	Gives pertinent data and is able to organize and summarize that data to order to defend the summarizing state in a decompensating or poorly controlled out-patient	Resident gives pertinent data using semantic qualifiers which directly lead to defending summarizing statement

A. Fundamentals are a framework for organizing the milestones. B. Milestones are complex behaviors made up of multiple but complementary specific behaviors, which when consistently present, serve to support the achievement of competence in a given area. C. Descriptors express the clear behavioral steps needed for achievement of each milestone.

**Figure 1.** Fundamental, milestone, and descriptor.

and efficiently to each other, to residents and other attending faculty became paramount. We settled on the terms milestones, descriptors, and fundamentals. In our model, milestones are complex behaviors made up of multiple but complementary specific behaviors, which when consistently present, serve to denote the achievement of competence in a given area. Descriptors are behaviors describing performance along the way to the mastery of a given milestone. They express the clear behavioral steps needed for achievement of each level of competence (Figure 1). Fundamentals are a framework for organizing sets of milestones and linking them back to the broader ACGME competencies.

We initially generated 175 statements of knowledge, skills, and attitudes (KSA) related to the six ACGME core competencies: interpersonal communication (30), medical knowledge (15), patient care (27), practice-based learning and improvement (15), professionalism (30), and system-based practice (39). Because published competencies did not contain outcomes related to teamwork, we added a new competency, teamwork, with 19 additional KSA statements.

As we compared our set of characteristics of the Master Internist with the published set of ACGME core competencies, we found that while many elements of our behavioral profile aligned closely with individual competencies, others were blends of several. Curiosity, for example, combined elements of professionalism, practice-based learning, and improvement and patient care. Lively discussions ensued about which elements could be bundled or split. As we worked together, milestones with their descriptors became the key developmental components that clarified the theory on which the program was based.

We then asked the question, “What is the sequence necessary for becoming a Master Internist?” To depict progression, we adapted the work of Dreyfus and Dreyfus (1980), using their notion of five progression intervals to describe levels of skill acquisition. After much discussion, we chose to modify the first Dreyfus category from novice to failure, as it was more conducive to the legal and practical aspects related to remediation. Our scale used the following: Failure, Needs Work, Competent, Proficient, and Expert. We defined the Expert level as closest to our profile of the Master Internist and worked from those skills backwards.

Of note, this study preceded the work of Carraccio et al. (2008) who propose the addition of a sixth level, Master.

This iterative process helped us calibrate the descriptors for each of a final set of 37 milestones and associate each with a broader fundamental construct. For each of our final set of 37 milestones there are five levels of skills, attitudes and/or behaviors to be mastered during training. Our milestones cover a broad range of clinical, educational, and professional responsibilities. They include both those representing shared goals as well as several that reflect our local culture and its values. For example, “Demonstrates an elaborated analytic approach to problem representation” reflects globally shared goals while “able to manage teaching rounds to maximize teaching and patient care” may reflect a local emphasis.

Whether a program develops its own classification system or adapts work from national sources, the process of comparison and contrast between one’s own program culture and a set of shared national goals is essential. Uniform language used to describe the relationship between resident behaviors and the exercise of grouping a system into a competency-based program sets clear and explicit guidelines for the entire learning community. This reinforces the basic principle of competency-based progression and the educational focus (which in our case is from supervision to autonomy) upon which a program rests.

#### Implementation leads to revision

Our initial set of milestones was integrated into the evaluation, advising, curriculum, and remediation components of our program during the 2008–2009 residency year. Creating our evaluation tools meant answering questions about where and when each milestone would be evaluated during competency-based progression. Decisions of this type required consideration of both ease of evaluation and appropriateness of task. Each milestone was assigned to a particular program element. Milestones for communication were to be mastered early in training and developed most vigorously in the ambulatory setting where there were opportunities for multiple observation, assessment, and feedback. Milestones for patient care within complex disease systems and milestones for teaching seemed to require more resident experience and were most

**Table 1.** Types of milestones: Progressive, additive and descriptive.

Type	Progressive	Additive	Descriptive
Description	This milestone type lists descriptors toward mastery build one on top of the other. There is a pattern of movement from simple to complex behaviors with an ability to anticipate a given outcome at the highest level.	Multiple behaviors added together culminate in mastery of this milestone. Additive milestones begin with behaviors first evaluated in uncomplicated or simple situations and then require performance in more challenging situations until all behaviors described in the milestone are consistently present.	In this milestone, a set of complex, predetermined steps toward mastery are already established as a standard of care. The established body of literature defines the complex steps to achievement of this milestone type. The assessment of this milestone is based in observing the trainee perform in these steps.
Example	In Milestone #15, “ <i>Demonstrates prioritization in patient care,</i> ” a resident starts with no ability to prioritize, then moves to prioritize critical from non-critical problems, then all problems in order of acuity and finally to anticipate subtleties in prioritization.	Milestone #3, “ <i>Effectively Establishes Rapport,</i> ” defines this milestone by four behaviors characteristics: elicits and responds to patient’s concerns; shows positive regard; uses empathetic statements; and uses facilitative non-verbal communication. These four rapport characteristics are not a complete list but instead a representative list. These characteristics are not acquired in any particular order. One can develop empathetic statements and then develop non-verbal communication skills or in the other order.	Milestone #6, “ <i>effectively delivers bad news,</i> ” has an established body of literature which defines complex steps to delivering bad news. We used the 11 behaviors outlined in this literature as descriptors for this milestone and remained true in this predetermined list.

easily evaluated in the inpatient setting. We settled on criteria for progression across the three levels of our educational model by deciding minimum levels of attainment for each milestone needed for promotion to the next phase of training. In doing so, we created an explicit training program map for residents, faculty and program alike.

After our first cycle, we reviewed our progress. It became quickly apparent that future success required consistent use of language across both milestones and program components and further refinement of descriptors related to each milestone. We found that many of our milestones were duplicative or lacked clarity. Descriptive behavior related to one milestone was identical to another, unrelated milestone. In some cases, milestone language, and a descriptor were indistinguishable. A re-examination of the dimensions of our milestones was in order. Where did they sit along the continuum of simple to complex? When was a milestone too detailed (narrow)? Too general (broad)? How easy or difficult was it to evaluate a given milestone in the setting we had selected? We modified our final milestones to a final milestones set.

Progressive, additive and descriptive milestones

The result of our review was a new understanding of the types of milestones we had created. There were three milestones paths; progressive, additive, and descriptive milestones (Table 1). In *progressive* milestones, descriptors toward mastery build one on top of the other. There is a pattern of movement from simple to complex behaviors with an ability to anticipate a given outcome at the expert level. For example in Milestone #15, “*Demonstrates prioritization in patient care,*” a resident may start with no ability to prioritize, then move to prioritize critical from non-critical problems, to prioritization of all problems in order of acuity and finally

to an ability to anticipate when a problem might become higher in acuity (Figure 2).

In the *additive* milestones, multiple behaviors added together culminate in mastery of the milestone. Descriptors for additive milestones are: “demonstration of this group of skills at first inconsistently or in simple situations” and then “consistently and/or in complex situations.” Additive milestones begin with behaviors first evaluated in uncomplicated or simple situations and then require performance in more challenging situations until all behaviors described in the milestone are consistently present. An example of an additive milestone is Milestone #3, “*Effectively Establishes Rapport.*” We defined this milestone as consisting of four behaviors: elicits and responds to patient’s concerns; shows positive regard; uses empathetic statements; and uses facilitative non-verbal communication. For descriptors of progress (and consequently markers for our evaluation tools), we chose representative skills to demonstrate that rapport building skills are developing appropriately (Figure 3).

The *descriptive* milestone is the third type of milestone. In this type, a set of complex predetermined steps toward mastery are already established as a standard of care. An example is Milestone #6, “*effectively delivers bad news.*” There is an established body of literature, which defines complex steps to delivering bad news (Ptacek et al. 1996). We used the 11 behaviors outlined in this literature as descriptors for this milestone and then decided which of them would be appropriate to a given level of training.

Whatever the source of an approach (developed uniquely or application of a national competency set), the review process is both essential and instructive. The language related to competency-based progression becomes more standard and the milestones themselves more explicit and separate. The optimal setting for evaluating particular elements of competency-based progression can be reviewed and/or revised.

#	Core Competence	Fundamental	Milestone	Descriptor				
				Failure	Needs Work	Competent	Proficient	Expert
15	Patient Care	Prioritization	<p><b>Demonstrates prioritization skills in patient care</b></p> <p><b>Demonstrates clinical judgment through prioritization of patient's problems, i.e., able to prioritize critical/emergent, acute and chronic, [Inpatient]e.g., order of importance of patient's problem list changes day to day in presentation and in documentation reflecting changes in status; [Ambulatory] e.g., a patient found by chance to have painful red eye otherwise here for chronic disease management has the priority shifted to the emergent problem while others are triaged appropriately</b></p>	Unable to identify and prioritize problems by acuity	Some ability to prioritize critical from non-critical problems	Able to prioritize critical problems only	Able to prioritize critical and non-critical problems; addressing all problems in order of acuity	Able to anticipate critical situations because of prioritization
<p>In progressive milestones, descriptors toward mastery build one on top of the other. There is a pattern of movement from simple to complex behaviors with an ability to anticipate a given outcome at the expert level.</p>								

Figure 2. Progressive milestone.

#	Core Competence	Fundamental	Milestone	Descriptor				
				Failure	Needs Work	Competent	Proficient	Expert
3	<p>Interpersonal and Communication Skills</p> <p>Patient Care</p>	Communication	<p><b>Effectively Establishes rapport</b></p> <p>To what extent does the resident demonstrate the essential skills of rapport building in interactions with patients and their families?</p> <p><u>Essential Skills:</u></p> <ul style="list-style-type: none"> <li>Elicits and responds to patient's concerns</li> <li>Shows positive regard</li> <li>Uses empathic statements</li> <li>Uses facilitative non-verbal communication</li> </ul>	Fails in any of the essential skills	Inconsistent in any of the essential skills	Consistent with most of the essential skills in uncomplicated interactions	Consistent with all of the essential skills in most interactions	Consistent with all of the essential skills in challenging interactions
<p>In the additive type of milestones, multiple behaviors added together culminate in mastery of the milestone. This type adds up the behaviors first in uncomplicated or simple situations and then in more challenging situations until all behaviors are consistently present.</p>								

Figure 3. Additive milestone.

An unexpected but most worthwhile consequence for the program leadership was a deeper appreciation of the complex nature of our approach and a more fundamental understanding of the variety of ways that benchmarks can be constructed and progression attained.

### A program expressed through milestones

Our training program and the educational model on which it is based is both organized and integrated using milestones. Across settings and rotations, the same set of milestones are used in curriculum, evaluation, resident feedback sessions, and faculty development work. A 30-year institutional history of a commitment to educational innovation and the deeply integrated nature of milestones creation and implementation speak to the likelihood of sustainability of milestones in our program.

Faculty are engaged in the use milestone language in their verbal and written feedback to residents. New faculty joining our program are trained in the use of milestones for instruction and evaluation, often contrasting such explicit

descriptions of progress with less uniform, more general formats used in their previous institutions. Use of a self-evaluation tool with milestone language assists residents in preparing and conducting their biannual sessions with their advisor. For example, during advising a trainee went from a broad goal of “wanting to increase knowledge” to a more explicit goal of “improving summary statements”. Trainees report in their program interviews that they are better able to assess both their current level of progress and future learning needs.

Further evidence of face validity can be found in the integration of the milestones in our Clinical Competence Committee. This committee is charged with promotion, remediation, and/or dismissal of residents on the basis of overall performance. Milestone-based reporting not only provides a useful guide to resident performance but also enables the committee to assess progression toward competency. The use of milestone language enriches and deepens the global or “big picture” impression of resident competence. Remediation plans are easily developed and monitored as a result.

Implicit in using milestones toward competence is the concept that trainees may progress at different rates in the program. Trainees who meet certain milestones early are essential to our learning community as they become our early teachers in the LMT model. Trainees who meet certain milestones late in one phase of training usually close the gap quickly in the next phase. We have not experienced an increase in residents exceeding the USA 3-year training period. Our program has committed to allowing for early and late progress within phases of training without hardship.

With sets of both programmatic and individual outcomes in place, we are beginning to gather evaluation data. Our sources include resident self-assessment, performance on internal and national licensure examinations, national and local surveys of resident feedback, yearly resident interviews by educational consultants to the program, and employer surveys from our recent graduates. In 2013, we will have a 5-year program evaluation experience to report along with an assessment of the utility of evaluation methods used to assess individual progress.

## Discussion

Translating theory into practice using milestones has required both patience and persistence over the past 6 years. Our outcomes have been incremental ones, with change over time being more important than immediate success. Our strategies have not always been successful, but the use of milestones and the participation of residents in the process have identified the need for revision sooner rather than later. There is no dearth of future questions to ask about the role of milestones in our model. What effect do the three types of milestones have on the ease with which a resident attains competency? How does our educational model interact with the current press for efficiency in medical care? How have attending faculty adapted to the new supervision strategies that the use of milestones structure demands? What elements are most important to the longevity of our model? How can milestones as a vehicle for explication of our educational model and its underlying theory be kept vital?

Milestones are an approach to the explication and measurement of competency-based progression. As we developed our approach over the past 6 years, we have used the work in both national and international arenas as reference and comparison points. In particular, the construct of Entrustable Professional Activities uses a predetermined set of competencies to guide the development of autonomous professional practice (Ten Cate & Scheele 2007; Ten Cate et al. 2010; Jones et al. 2011). It will be most interesting to compare our research findings with programs that have used this classification approach.

Our developmental process involved setting an end goal and using a traditional, but essential cycle of creation, implementation, and revision. Uniformity of language was essential to implementation. Milestones became our language of choice. With the publication of a set of Internal Medicine Milestones (Green et al. 2009) accessible to programs comes the challenge of adapting them to their own particular educational models and culture. What will this process

involve? Faculty from our program leadership are among those addressing this question in the Milestones Collaborative Study.

## Conclusion

Through the use of milestones, our Internal Medicine program has transformed an educational model focused on the continuum from supervision to autonomy into explicit end of training goals that enable graduates to practice autonomous patient care. Milestones bring core competencies to a practical level. They are a new, structured variable in the synthesis of the many data points and observations used to assess competence to practice autonomously. We offer encouragement and support to those embarking on a similar journey.

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## Note

<sup>1</sup>A copy of Baystate Internal Medicine Residency milestones can be obtained from the first author at Lauren.Meade@baystatehealth.org

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