

# Not the Last Word

## Orthopaedic Residency: How Do You Know When the “Cake is Done?”

Joseph Bernstein MD

**W**hen should you take the cake out of the oven? The correct, if somewhat glib, answer is, “When it is done.” In everyday practice, however, pastry chefs do not test the cooking batter every minute.

*Note from the Editor-in-Chief: We are pleased to introduce readers of Clinical Orthopaedics and Related Research® to Not the Last Word, a new quarterly column. The goal of this section is to explore timely and controversial issues that affect how orthopaedic surgery is taught, learned, and practiced. We welcome reader feedback on all of our columns and articles; please send your comments to eic@clinOrthop.org.*

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Rather, the benefit of experience is translated into simple rules, such as, “Bake at 375° for 45 minutes.”

When should residents be allowed to graduate? The correct answer is a variation: “When they are done,” meaning when they are ready for independent practice. And here, too, we do not test for completion continuously, but rather follow the cake-baking rule: apply a certain intensity and duration of training, and confirm “doneness” at the end.

Even amateur bakers realize that when using an oven that does not get hot enough, the cake must stay in the heat a little bit longer. Yet similar logic has not been applied to residency training; specifically, there has been an 80-hour limit on the resident work-week, but the duration of residency training has not increased.

It seems to me that if we cut back the number of hours residents can work each week, and we do not increase the total number of weeks worked, we risk truncating the educational experience. This truncation is probably not a 50% reduction (for only in the “Days of the Giants” did residents routinely work 160 hours per week), but 10% is not an unreasonable estimate. Add to that the inefficiencies of more frequent patient hand-offs, and

I would bet that residents’ traditional clinical experiences have been effectively abbreviated by 6 months or more. We can teach a lot of orthopaedics in 6 months.

The question of why the work restriction rules were not immediately coupled with an extension of the duration of residency has a few possible answers. Cynics would say that this was just one of the many ramifications of the work-restriction rules that were not well thought out. A more neutral position holds that longer residencies would be better in the abstract, but there is no money to fund them. Or perhaps residency programs were unnecessarily long to begin with, and this shortening simply cut them down to proper size—recall that orthopaedic residency was, for most of its history, only 3 years long, following 2 years of general surgery.

Whatever the explanation, we still are left with a key question: What should we do now to best adapt to a de facto, abbreviated course of training?

One simple step would be to insist that future orthopaedic residents learn as much as they can before they even begin residency, and they demonstrate proficiency as a requirement for admission. Specifically, any aspect of orthopaedic surgery education that can be taught in

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medical school should be taught there; by doing so, we free up more time for things that can only be taught in residency. For example, why not insist that all students interested in our field take an advanced anatomy examination? At the same time, why not insist that all applicants complete subinternships in surgical intensive care, emergency medicine, and musculoskeletal radiology? It is not like the senior year of medical school is overly-rigorous as it is. Orthopaedics remains a very popular career choice among students, and we can increase the entrance requirements without creating a shortage of qualified applicants.

Beyond that, we must selectively lengthen residency for those residents who need it. In turn, we need to enhance the power of program directors to identify and hold back from graduation those residents who, while not failing per se, are simply not ready to graduate. Further, this power must be paired with a program that supports those residents who are not ready to be released.

Currently, hospitals are reimbursed by the federal government for residents' salaries but only for the first 5 years of training. When a program currently decides that it must retain a resident for more training, it must pay for this extra year—a substantial cost. This strong incentive for programs to graduate “marginal” residents must be removed.

Training residents is not exactly like baking a cake, though they do have some elements in common, apart from cracking, whipping, and beating. To graduate the best possible residents, or bake the best possible cake, one must start with the best possible ingredients and allow the expert “chefs” enough discretion to get the job done correctly.

## Commentary

### Douglas Dirschl MD

*Professor and Chairman, Department of Orthopaedics, University of North Carolina, Chapel Hill, North Carolina, USA*

It is undeniable that orthopaedic residents today gain less clinical experience than they did in the past, when they are measured by numbers of surgical cases and clinic visits, or the breadths of managed clinical problems. While thoughtful orthopaedic educators have always asked the question Dr. Bernstein poses, the recent downward trend in resident clinical experience has made the question much more pressing. Lying beneath “Is the cake done?” however, is the deeper question, “How do we define and measure adequate orthopaedic training?”

In the era of unrestricted work hours, most orthopaedic educators felt

that completion of 5 years of training endowed residents with sufficient breadths and depths of clinical experience to undertake the independent practice of orthopaedics. In the present era, orthopaedic training programs are faced with an exploding rate of expansion in medical knowledge, increasing subspecialization, changing paradigms of care and practice, and restrictions in resident work hours. It is no wonder that educators are increasingly concerned that the current training paradigm leaves some residents insufficiently prepared for independent practice.

One could argue that the most appropriate scholarly response to this situation would be to approach it in a spirit of inquiry. We might probe the subject to see what kinds of knowledge, competencies, skills, experiences, or elements of the ethical toolkit are lacking or not meeting expected standards in some of our residents. Attempts to answer these questions, of course, require that our profession articulates what these standards are and demonstrates that it can measure performance against those standards, which it currently cannot do, at least not clearly or precisely.

Perhaps this is where the bulk of our energy should be directed. While lengthening training for some residents will always be advisable or necessary, doing so is only a small part of the

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solution. The orthopaedic profession should strive to articulate what it expects from our trainees before they are ready to graduate, in terms of knowledge, proficiency, and professional behaviors.

The future of our profession requires us to have a paradigm for training that is much more specific and substantive than training in an accredited program for 5 academic years. The simplicity of our previous paradigm, however comfortable we are with it, must give way to one in which we can precisely define expectations for, and measure outcomes of, trainees in our educational programs. Changing from a time-based model to an outcomes-oriented set of performance standards will allow us to demonstrate the value of our programs to those who might fund them.

## Commentary

### Gary E. Friedlaender MD

*Wayne O. Southwick Professor and Chair, Yale University School of Medicine, New Haven, Connecticut, USA*

In his provocative remarks, Dr. Bernstein asks a very important question and raises several critical issues we must confront. Central among these is the question, “When is an orthopaedic resident sufficiently trained and ready

for independent practice?” The answers and approaches I suggest differ from those of Dr. Bernstein, but I share his passion and agree with the need for stimulating discussion and encouraging a “call to action.”

Forget the “cake” for a moment, if you can. Early in my residency, an attending asked me how one decides when a fracture is healed. Forty years later, that question still haunts me; I’m comfortable making the clinical decision on one hand, but on the other, I realize that it is somewhat subjective and difficult to know exactly when the cake is done. (See, even I could not forget the cake!)

The “cake” analogy, as presented, allows one to predict the outcome with certainty, but requires the use of standardized ingredients in a well-controlled environment. In the educational arena, almost nothing – and no person – is identical. The story of Passover, which centers on the asking of four questions, reminds us that there are four distinct characters of children (or students): the wise one, the wicked or cynical one, the simple one, and the one incapable of asking a question. Each of these children will ask questions or seek knowledge in different way, and each requires (benefits from) answers provided with different approaches; all these children can learn the answers and benefit from the knowledge. My personal, albeit anecdotal, experience

suggests this diversity of required pedagogy is relevant to resident education.

Therefore, I am uncomfortable with the notion that the act of reducing duty hours, by itself, requires adding years to a training program. Rather, it requires adjusting the educational process. The ingredients (students and teachers), the tools for assessing outcomes, and the definitions of “done” are too variable and poorly characterized, and, consequently, there are few high-level data at this time to answer the critical questions posed. For example, did the reduction in duty hours decrease fatigue, and, if so, did that improve learning and sharpen skills? We don’t yet know.

It is highly unlikely, in my opinion, that all residents reach the threshold for “competency” at the same time. Similarly, it is equally unlikely that all residents plateau with respect to the educational benefits of their training at the same time. And, unquestionably, there are benefits to residency training beyond the achievement of “[readiness] for independent practice.”

I suspect the question Dr. Bernstein poses is more along the lines of, “How do we improve the educational experience of students and house staff in a manner that better prepares them for their career choices, and how do we measure their successes and ours?”

This leads me to suggest two general answers or strategies aimed at this

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question as we move forward. Most importantly, we need a competency-based, rather than time-based, educational approach, as piloted by our colleagues at the University of Toronto. In order to accomplish this, we will need to better understand the specific competencies necessary and find better ways to judge success. The second need involves our educational infrastructure: we must align and improve the musculoskeletal curricula of medical schools with graduate educations, train mentors and teachers, and finance (or invest in) the entire process in a more responsive manner. While a daunting task, the benefits of asking and answering the questions require that we try.

I think I hear the timer going off!

## Commentary

**Robert S. Sterling MD**

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Dr. Bernstein makes several excellent points about the current state and future of orthopaedic resident education. He points out many measures we can use to enhance orthopaedic resident education. Especially compelling is his suggestion that the 4th year of medical school might better prepare students for orthopaedic residencies.

Many medical students have had limited exposure to musculoskeletal medicine; Drs. Freedman and Bernstein [2] found that 82% of Postgraduate Year 1 residents at a single institution failed validated musculoskeletal competency examinations. More recently, Skelley and colleagues [3] found that 41% of 4th year students at a single institution failed the same examination. While many medical schools have adopted a musculoskeletal medicine education curriculum, current medical student education in musculoskeletal medicine provides inadequate preparation for orthopaedic residency.

The 4th year of medical school is an opportunity for future orthopaedic surgeons to better prepare themselves for their careers. We have been told that it takes 10,000 hours of “deliberate practice” to acquire expert performance [1]. Residents who enter programs with proficiencies in anatomy, musculoskeletal examination, musculoskeletal radiology, and bone biology will have running starts to their educational journeys. Dr. Bernstein suggests an advanced anatomy examination as a prerequisite. Taking his idea one step further, we could develop a core medical student rotation in applied anatomy and surgical skills training. This would greatly enhance the preparation of students anticipating careers in orthopaedics or other surgical specialties.

Knowledge of surgical anatomy is the foundation for surgical practice, and it is essential both for patient assessment and treatment. An educational program that tests knowledge of anatomy (learned through independent study) and teaches surgical skills serves both masters essential to competent surgical practice—knowledge and technical skill. Surgical interest groups in medical schools routinely have the highest turnout at programs that provide practical education: suturing, physical exam, and splint/cast labs. Why? The students want to learn! Teaching applied anatomy and surgical skills earlier will jumpstart the educations of our residents. One medical school rotation is but a small step towards the 10,000 hours of mastery; even so, Hour 1 does not have to take place on Day 1 of residency.

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