Mr Chairman, members, and guests, thank you for the privilege of presenting the 22nd Samuel Jason Mixter Lecture. I first attended the New England Surgical Society in 1974 as a resident at the Brigham, so I was here before the Mixter Lecture by 10 years! Samuel Jason Mixter was president of this organization in 1917, followed by his presidency of the American Surgical Association in 1918. He was the Chief of Surgery at the Massachusetts General Hospital within the Harvard Medical School, having been educated at the Massachusetts Institute of Technology and Harvard Medical School. Previous Mixter lecturers are indeed a distinguished group beginning with Lord Rodney Smith in 1985 and covering many of the leaders of American surgery. It is, therefore, a distinct privilege to be invited to give this lecture.

At the instigation of your president, my friend and fellow resident, Dr Quinlan, I have chosen to address the issue of surgical education. I do this with some temerity, as those who offer change are usually at a time in their lives when they are least likely to be affected by it! Nevertheless, as Charles Kettering, the inventor whose name adorns the institution from whence I come, said, “The world hates change, yet it is the only thing that has brought progress.”

In a rapidly changing world, much has been argued about the adequacies and inadequacies of current surgical education programs. The United States surgical program has been labeled as the best in the world. However, some severe criticism has been placed on the rigidity of the programs, the failure to adapt to modern trends and changes, the alternating demands for lifestyle, and many others. In an effort to focus the discussion, the American Surgical Association, the American College of Surgeons, and the American Board of Surgery came together in a “blue ribbon committee” to examine these and other aspects of surgical training.1

It is incredibly difficult to know how to create a framework to examine such strengths and weaknesses. In an effort to do that, we examined what was necessary in the context of constituencies that were to be served.2 In the last 2 years, those constituencies have developed and matured to include the patient, the medical student, the surgical resident, the generalist, the specialist, the junior and senior faculty, the leadership of academic departments and hospitals, the payor, and society in general, particularly as it relates to standards of competence and outcome analysis. I trust this will not be a réchauffe of what has been already said.

Under each of these constituents there are multiple variable factors that raise concern. Serious conflicts exist between societal demand for specialization, the availability of comprehensive user-friendly care, increasing costs, and the need for proven outcome and competency measurements. With the increased US population growth there will be increasing demands for physician care. The patient might rightfully ask, “Will a doctor be available?” let alone “Will a surgeon be available?” If the predictions by Cooper3 are correct, then there will be a shortfall of 200,000 physicians by 2020. These analyses, based on

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the increasing demands for health care according to GDP [gross domestic product], are supported by other analyses, but much of the added demand will be taken up by non-MD professional clinical care workers. Forecasting the future demands for health care has been an inherently risky business. The number of Americans over 65 will grow 35 million between 2000 and 2030 and will have increasing demands on medical care. The physician workforce, however, is aging, with the number of physicians under 35 essentially unchanged between 1982 and 2005 (consistent with stable medical school enrollment), but the number over 55 has increased by 100%.4

THE PATIENT

The patient wants it all. Aware of the complexities in medical care, the patient wants a specialist contained within a humanist with appropriate knowledge outside their specialty to allow appropriate referral but without loss of continuity! These seemingly impossible goals can usually be met by multispeciality groups and by an acceptance of population-based availability of specialist care. Once super specialization occurs, even in tertiary care facilities, the patient gets lost in the morass of consultation without leadership. How can we resolve these dilemmas? If the patient demands specialist care, it is unrealistic to demand that it be in walking or driving distance of home!

THE MEDICAL STUDENT

Medical students’ career choices are highly dependent on lifestyle decisions.5 There has been a 100% increase in the appeal of radiology and a 600% increase in anesthetics exceed 50%.4 The medical student no longer looks at a perceived surgical lifestyle based on lifestyle expectation. He or she is concerned about the length of training, is bothered by serious consequences exist for surgery, which is perceived as being lifestyle-unfriendly to the medical student. There is a huge challenge for the surgical workforce to make surgery as lifestyle-unfriendly specialty, continues to decline in attractiveness.6 The medical student no longer makes decisions independent of lifestyle. They are the dominant factor in the majority of choices. Serious consequences exist for surgery, which is perceived as being lifestyle-unfriendly to the medical student. The medical student pool has had a major change in demographics, with diminution in the white male applicant pool and a 4-fold increase in Asian Americans. The Hispanic applicant pool has doubled and the female applicants exceed 50%.4

The medical student looks at a perceived surgical lifestyle as user-unfriendly. Female medical students have historically seen surgery as an unattractive specialty, previously male dominated and often macho driven. It is one of the success stories of the adaptation of the educational process to the needs of the participant that, increasingly, female medical students choose and achieve control is by discipline, or emergency surgery/trauma where time control is obtained with a clear delineation of on/off. An interesting phenomenon in residency matching is the increasing number of physician couples who endeavor to match at similar institutions. As this continues to increase with time, it provides a further complexity to an already difficult situation. In choosing a career path after medical school, the presence of an average debt in excess of $100 000 must influence the choice of a poorly paid training program, with no longer an end financial reward for extra training years. A recent analysis of who are the future surgeons gives some disquieting observations.7 The surgeons and specialist surgeons are less likely to be female, less likely to be MD-PhD students, but they are more likely to desire a surgical career if the quality of the surgical clerkship is high and it takes place in an academic environment. Interestingly, those MD candidates who seek other (non-PhD) additional degrees are more interested in a surgical career, presumptively in outcomes research reinforcing the “ultimate study of man as man” concept.

THE SURGICAL RESIDENT

The surgical resident is increasingly altering his or her lifestyle based on lifestyle expectation. He or she is concerned about the length of training, is bothered by service demands as opposed to educational demands, and rightly perceives the unrealistic goals in the comprehensiveness of training that we propose for them to fulfill.

The increasing utilization of international medical graduates to fulfill the applicant pool is an issue that affects surgery. The current shortfall is approximately 15% to fill the surgical residency positions with US seniors.4 This depletes the international medical graduate pool, often with countries in the West taking from those who can least afford to lose their physicians—a problem in itself worthy of a dissertation.

The progressive increase in the demand for surgical residents, which has been little changed in 20 years, results in a greater demand and increasingly has been filled by the utilization of international medical graduates. In 2004, 87% of initial general surgical training slots were filled by US trained residents, meaning that 13% must come from international medical graduates. This process, where the rich steal from the poor in terms of accessibility and need for medical care, is a major societal challenge requiring balance between the desires of the residents and the desires of the country from where the medical education was provided (often at government expense). The inability, because of infrastructure lack, to take back the more than well-trained resident to an environment where they can excel and where the personal and financial rewards are adequate to allow the surgical resident to utilize the training that they have received compounds the problem. Perhaps the challenge should not be why the IMG [international medical graduate] leaves his or her country of origin, but why does he or she not return. The utilization of international medical graduates, not done with efficiency despite the classic approach where the IMG is entered into a program in a sink
or swim fashion, has finally been realized and programs developed to prepare such graduates for what may be expected and to ensure their success or the decision that a surgical training program is not the appropriate avenue for their development and interest.

Perhaps the greatest concern is the residents' perception that we ask them to see and manage entities that they will never subsequently encounter in their chosen practice. All of this has been compounded by the introduction of the controlled 80-hour workweek, in my mind a reasonable goal, although implemented and enforced in a rigorous no transgression mode, which only harms perception of us as a profession. We should be able to train surgeons with an 80-hour week. We do need to acknowledge that fatigued physicians do not function well, but we also need to educate society that continuity of care is in both the patient and the doctor's best interest. This can only be accomplished by recognizing training as such and acknowledging the limited benefit of service for service sake. Contrasting that to the demands in Europe, where a 48-hour week is anticipated, we should embrace the 80-hour week and utilize it such that we can educate and yet still provide the kind of continuity of care that surgeons historically strive and have been admired for.

**THE SURGICAL GENERALIST**

General surgeons are undergoing an identity crisis; as disease-based care increases, specialization and differentiation are inevitable. The true generalist is not catered for in our training programs, although the intent was to encompass all things complex. The general surgeon is trapped; he or she is judged according to the results of his specialist colleagues and runs the risk of his competency being challenged based on high-volume centers with proven different outcomes. As it turns out, by the time the general surgeon recertifies at 10 years after his or her initial board certification, he or she is doing very few major surgical procedures. With only 2% of surgeons doing more than 3 hepatic resections or 3 pancreatectomies a year, it is absurd to place emphasis on these major cases during the residency training event. Most surgeons appropriately select themselves out of the pool and approximately 80% will not do either a hepatic resection or a pancreatic resection in any one year.

**THE SURGICAL SPECIALIST**

At least 70% of male surgeons and 50% of female surgeons after finishing a general surgical residency apply for specialist training. By the time of recertification, the majority of the remainder are fully differentiated into subspecialty interests. The problem for the specialist surgeon is that the training is long and generally the introduction is considered redundant with a lack of focus on both communication and humanism. The luxury of specialization has a price; if the specialization is purely technique based (eg, minimally invasive surgery in some situations), then we have great risk of being treated as such (ie, technician or service workers). Unless the specialist surgeon is willing to take a leadership role in the disease management process, he or she runs the risk of being marginalized and paid as an assembly-line piece worker.

**THE SURGICAL LEADERSHIP**

Constantly harassed by financial issues, the frustrations of faculty, and the torments of the few, the academic surgical leader has changed markedly in the last 30 years. Gone, along with the dinosaurs, are the true quadruple threat; the superb educator, clinician, investigator, and administrator has been replaced with an administrative super-chief with huge demands largely related to issues of legislative compliance, financial stability, and the oversight of quality care. Many senior surgeons appropriately bridle at the bureaucratization of surgery and the enormous amount of time and effort required to fulfill well-meaning, but superbly insensitive, regulatory approaches to the legislation of clinical care. The once attractive position of surgical department chair has been replaced as a frustrating exercise in bureaucratic rigidity. Nevertheless, leadership of surgical divisions remains an exciting prospect where the surgeon can continue his or her leadership role in clinical care, translational research, and primary education.

**THE JUNIOR FACULTY**

There is a major conflict between demands for patient care and patient care revenue and academic progression based on scholarly activity. We consistently fail to reward efforts for education, especially organized education. Perhaps nowhere is greater consternation expressed than by the young surgical faculty. Fired with enthusiasm, drive, and superb training, they look to practice what they have been trained for. Many with great interest in clinical translation and basic science research find their efforts frustrated by lack of financial resources or infrastructure and have a constant demand for increased clinical care delivery to ensure the financial stability of division, department, institution, and medical school.

**THE PAYOR**

The payor, facing ever-increasing costs, increasing use of technology, and perceived failure to justify technological use in the transmission of costs of industrial prod-
ucts, looks for ways to both improve the quality and efficiency of care and to also limit costs. Ultimately, this may be the downfall of medicine as we know it, our own professional unwillingness to confront the cost of technology, particularly the ever-escalating technical wizardry. As surgeons we are readily critical of the enormous amounts expended on adjuvant chemotherapy for minimal benefit, and yet we turn a blind eye to the utilization of sophisticated intraoperative instruments designed for minimally invasive surgery but conveniently used in open cases at very significant costs and no demonstrable benefit. The proven advantages of simple stapling devices over hand-sewn anastomoses are very limited.

The constant willingness to provide the results of one test with a concluding statement that it is an indication for another test is frustrating and difficult and escalates care with limited benefit. The paralyzing final report statement “suggest for confirmation” traps doctor and patient into unnecessary testing. How much simpler to add “if clinically indicated.” Not every patient needs an MRI [magnetic resonance imaging] and a CT [computed tomography]!

The payor is also sensitive to the awareness of the public that specialization and treatment in high-volume hospitals is both patient-effective and cost-effective. It is now clear from the Leapfrog criteria that lives can be saved when low-volume hospitals forego elective cardiovascular procedures or extensive procedures, such as esophagectomy, and allow them to be performed in more high-volume institutions with high-volume surgeons.

SOLUTIONS

I see all of these as opportunities. As Churchill said, “A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty.” Many of the problems are either articulated or already actively being addressed. Organizations such as the American College of Surgeons are actively involved in educating the public about what they can and cannot expect from surgical care. The American Medical Association is actively pursuing the idea of “brand naming.” More and more of this active professional involvement in educating the public as to the strengths and indeed the limitations of medical and surgical care are firmly needed. Regional organizations can play a great role in developing such programs. One wonders whether more active involvement of the public in surgical regional meetings would not be an effective method. State organizations and federal lobbying endeavors continue to address this most important issue.

For the medical student, and our desire for them to become surgical trainees and subsequently surgeons, much does indeed revolve around our own endeavors. While many complain about the difficulties of increasing their surgical exposure in core curricula within medical schools, it is clear that if we provide the kind of surgical clerkships that are attractive, that is a primary inducement to be interested in our specialty. It is difficult when as individuals we are frustrated or hampered by our own endeavors, but then again that was true when we started, and if we do not believe that surgery is an enterprising profession, then why should we expect people to follow our role? We can see that this is not easy and is often fraught with challenges hard to overcome. We can never underestimate the value of identified role models and subsequent mentors. If we want students to embrace surgery, then we need to give them the experience of seeing the rewards of surgical care and of our own delight and enthusiasm for what we do.

We are embracing the concept of alteration in surgical training. The American Board of Surgery is actively involved in redefining critical core curricula in consideration of modular training programs. The concept of shortening the already long general surgical component of training has been favorably reviewed, with programs already in place for combined 3 + 3 certification in vascular surgery, 4 + 2 or 3 in cardiac surgery, while the converse in urology and orthopedics of a 1 + 4 or 5 present a dichotomy of training which could readily be encompassed. Modular training programs for all specialties for all areas of interest where a basic component is uniform to the understanding of clinical diagnosis and management and specialization is built at least on some framework of shared interest and essential information.

It is inevitable that we will progressively focus more and more on training programs that are designed for what surgeons will ultimately practice. This means that we must embrace the concept of specialization because the patient has already worked it out. Conversely, if that is to be so, then the need for the budding cardiac surgeon to be educated in the intricacies of pancreatic surgery should disappear. We must accept that there is a real obligation when one accepts certain technical specialist training. If we are to specialize in anatomical areas of surgery, it has to be disease based and not discipline based or we will indeed lose the opportunity to retain a leadership role in the management of the patient.

We should embrace some of the cost containment endeavors of the payor and indeed the institution. Why are we so frightened to evaluate applications of technology? Why must we allow the person who invents a new technology to be the one to promulgate it, when, in fact, it is the clinician and patient who utilize such technology who should be defining its relative value? We must be willing to perform the studies that ask questions of the relative merits in terms of patient satisfaction and, more importantly, cost with every new introduction of technology. We are willing to criticize other specialties for inappropriate application of technology, why not our own?

I have, therefore, addressed the issues of making surgery a more attractive prospect, never underestimating the value of an attractive and exciting clerkship. We have begun to address the issues of the surgical residency, making it both more realistic and more attractive, but we have yet to come to grips with the limitations on the junior faculty. Many of our junior faculty came into surgery with the thought that they could remain as a translational surgeon-scientist and find that exercise incredibly difficult. We must continue to promulgate time control and access to the translational aspects that make surgery such a rewarding career. We need to educate that as surgery
becomes more complex and the time demands more comprehensive, if we are going to have creative, thoughtful innovators, then time must be provided for that intellectual cognitive exercise. It can be done! More and more examples are being identified of young people with the mind-set and drive. We should not fear that many will focus on outcomes research rather than on molecular diagnostics. One of the issues that have set us apart as surgeons is our ability to perceive and examine the patient in his or her entirety. Within a generation, we have lost track of that, but it can easily be redeemed. Where 3 decades ago the challenges were those of total parenteral nutrition, organ transplantation, control of shock and hemorrhage, we can see many of these problems having been solved on a macro level, and now we can come back to looking at what best serves the patient in terms of outcome, applying the end model of a comprehensive “the study of man is man” to allow an evaluation of both diagnostic and therapeutic endeavors as they translate into long-term outcome. This takes back our independence and belief that we can foster an entire field of science as we continue to try to manage the patient in his or her entirety. The ability to do this will change the way that the junior faculty expend their endeavors but preserve, in the end, a wonderfully attractive existence. Some of the senior faculty may not be able to be rescued having grown in an environment so different from the one they are expected to cope with at the present time. We can only hope that with utilization of institutional resources, we can protect our most productive surgeons from being hobbled with administrative restrictions that show little benefit other than in the minds of the compliance police. Leadership changes have to occur in terms of patient care delivery. Many of the advances will come not from the overall leader of a department but more from a division head, where the dimensions of the issues are small enough that they can be comprehensively encompassed and dealt with with diligence and attention to detail.

We already are seeing the results as we examine our utilization of medical resources. This has begun actively in the limitations of what is available, for example, in chemotherapeutic treatment of patients who have failed multiple regimens; no longer can we move to drugs that are often not formally evaluated for efficacy. We can only expect this to come to surgery as a discipline and we must take a role in becoming cost conscious if we are going to preserve what we like to do best.

So, the issue is not whether we should change but just how we should change and how best we should change. I remain an optimist, believing that surgery remains a great profession with great opportunity for personal and professional satisfaction. We must understand that our best approach to societal demands is in education as to what we can provide with the delineation that there is always a cost for progress and innovation.

I thank you for the opportunity to present these comments and look forward to the critique of others more insightful than I.

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