

Who Better Than Anesthesiologists?

The 44th Rovenstine Lecture

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I AM very honored to have this unique opportunity to honor Emery A. Rovenstine, M.D., D.Sc., and to offer my thoughts on anesthesiology and my dreams for its future.

Dr. Rovenstine (Professor of Anesthesiology, New York University College of Medicine, New York, New York; 1895-1960) is well known as a leader who motivated outstanding young physicians and helped them develop into major contributors to our specialty. Not as well known about Dr. Rovenstine are his extraordinary athletic talents. His experiences as a high school basketball player would later influence his contributions to the development of our specialty.

Let me set the stage. As reported by Solomon G. Hershey, M.D. (Professor of Anesthesiology, Albert Einstein College of Medicine, New York, New York; 1914-1992) in his 1982 Rovenstine Lecture¹ and augmented by resources housed at the Dwight D. Eisenhower Public School District office in Chicago, Illinois, it is winter 1913 in Blue Island, Illinois, a southern suburb of today's Chicago. Young Rovey (as he was affectionately called by his mentor, Dr. Ralph Waters, and others) is a high school senior and captain of his team. Late in the second half of a hotly contested game during which Rovey believes that he is repeatedly being hindered by the referee, he heatedly and "accidentally" butts into the referee. This ramming incident proves to be a mistake: The referee is considerably larger and stronger, picking up young Rovey and reportedly spanking him in front of the crowd. Oddly enough, it turns out that the referee is none other than Arthur E. Guedel, M.D., the distinguished anesthesiologist from the University of Indiana Medical School (Indianapolis, Indiana) who would subsequently describe the stages and planes of ether anesthesia.

Ten years later, when Dr. Rovenstine returned from military duty as an Army 2nd Lieutenant on the front lines in France, and after 4 yr of teaching high school in La Porte, Indiana, he enrolled in the University of Indiana

School of Medicine. He took every course offered by Dr. Guedel (subsequently Clinical Professor of Anesthesia, University of Southern California, Los Angeles, California; 1883-1956), and they became close friends. That Dr. Guedel had also served with the American Expeditionary Forces in France provided an additional common bond that cemented their friendship. It was Dr. Guedel who ultimately recommended Dr. Rovenstine for a training appointment with Ralph M. Waters, M.D. (Professor of Anesthesiology, University of Wisconsin, Madison, Wisconsin; 1883-1979), initiating what would become a warm personal and professional relationship between Drs. Waters and Rovenstine.

Dr. Rovenstine remained a strong fan of basketball. Before enrolling in medical school, he even served as the coach of the LaPorte, Indiana High School basketball team, winning the admiration of his team members and other students. The LaPorte High School 1924 yearbook is dedicated to him. "To our loyal coach and athletic director, E.A. Rovenstine, through whose efforts clean sportsmanship has been continually maintained in LaPorte High School, we, the class of Twenty-four, affectionately dedicate this volume . . ."

It is this unique blend of dedicated sportsmanship, teamwork, and leadership development that makes Dr. Rovenstine so intriguing, memorable, and deserving of recognition by this eponymous lecture.

I would like now to describe my dreams for the future of this great specialty. The tragedy of Hurricane Katrina has resulted in a remarkable venue change of this meeting from New Orleans to Atlanta. Clearly, our celebration of 100 yr of the American Society of Anesthesiologists has been muted by Katrina. But our meeting remains a celebration of success—the 100-yr evolution of a medical specialty society that grows and thrives.

Sadly, though, there are skeptics who question the ability of our specialty to survive, much less flourish, in the coming years. Several factors fuel this skepticism. Our country's healthcare costs continue to grow and will soon exceed 15% of our gross domestic product, a level that may not be sustainable. How will our specialty excel when constrained resources limit our ability to produce new discoveries and clinical applications that improve the care of patients or that result in less enthusiastic physicians entering anesthesiology? There is a growing perception that modern anesthesia care is so safe that there is no longer any need for the National Institutes of Health (Bethesda, Maryland) and other funding agencies to share resources with anesthesiologists to develop safer drugs and better anesthetic techniques. We know

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that perception is not true. Yes, we are much safer at anesthetizing patients today than in past decades, but our care is not at the level of safety that we, our patients, and the public should accept. What about the misinformed credence of other healthcare providers, policy makers, administrators, and payors who believe that sedatives, hypnotics, opioids, and muscle relaxants can be administered and monitored safely by individuals other than anesthesiologists and other trained anesthesia providers? How will we respond to the growing swell of support for the use of sedation nurses for “minor” procedures and the use of general anesthetics by emergency room and intensive care physicians? Will we grouse and use any and all political and legal maneuvers in a vain attempt to stem these changing practices, or will we be forthright and confident, leading efforts that will ensure that all patients receive safe, efficient, and cost-effective care?

I have a dream that our specialty will grow, thrive, and attain even greater significance in the House of Medicine. As exciting as our first 100 yr have been, our next 100 yr will be even better.

As noted by Jim Collins and Jerry Porras in their insightful text, *Built to Last*,² there is one overriding factor that determines why great organizations thrive. It can be described in two simple words: core values. They found that organizations that prosper adapt promptly and appropriately to changing environments and elements, with a willingness to change everything except for their core values. Those unwilling to change or that abandon their core values simply die or are subsumed. What ever happened to Teledyne? To Bethlehem Steel? Why did Walgreens thrive when Eckerd Drug did not?

What lesson is there for anesthesiology? I submit that we have two core values—values or principles we hold so dear that they define who we are. Our first core value is an unrelenting, passionate commitment to two types of patients: those who are critically ill, and those facing acute or chronic pain, including pain caused by procedures. Our second core value is a compelling commitment to always improve the care and safety of our patients. Everything else—how we provide care, where we provide care, and how we are recognized for our care—financially, politically, or otherwise—is likely to change.

As long as we maintain these core values, I see golden opportunities for our specialty. Yes, we ride on the shoulders of the giants of our specialty who toiled so hard, so earnestly, and with such dedication and vision to get us to our current prominence as a specialty. But there are amazing changes coming that will dramatically and positively impact the careers of the newest members of this great specialty, that will alter our specialty in unanticipated but wondrous ways, and that will win us an increasingly important and widespread role in medicine.

I am sure that some of you are asking, “OK, Warner, how many times have we had people predict positive changes, only to be disappointed or, alternatively, pleased that their predictions of doom never materialized? Are you a soothsayer?”

I most certainly am not a trained futurist. However, I am an eternal optimist, and I’m not ashamed to say so. I also love this profession and ask—no, actually I plead—that we dedicate ourselves to honoring those who have passed before us by making the difficult transitions necessary to thrive in the future. We can and must change, adapting everything except our core values in our drive to be the very best specialty in medicine.

What lies in the future that is going to impact us so significantly? Let me give you a few examples. They are (1) changing demographics, (2) the human genome, and (3) minimally invasive procedures.

Changing Demographics

Within the United States, two major demographic changes will lead to an overall increase in surgical and diagnostic procedures performed in the next few decades. These changes will clearly result in expanded requests for anesthesia services. The first of these demographic changes is the growing impact of immigration on the US population. These immigrants will bring unique medical challenges, including an increased need for high-risk obstetric services, plus neonatal and infant care. The need for 24-h, on-site availability of anesthesia services to care for high-risk expectant mothers, and the proven safety of providing surgical care for children younger than 2 yr in pediatric-oriented medical centers,³ will drive much of this care from local hospitals to regional centers throughout the country. The second and more significant demographic change is the impending population surge of US residents between the ages of 40 and 60 yr, the “baby boomers.”

How will a bolus of elderly patients influence the demand for anesthesia services? A composite image (fig. 1) developed from multiple sources suggests that there will be approximately 42 million people aged 65 yr or older living in the United States by 2010, and approximately the same number of people, young and old, will undergo anesthetics that same year. By 2040, the time at which many of the younger members of this audience will retire from practice, there may be as many as 85 million elderly Americans. Using the current projected utilization statistics for anesthesia services, it is possible to predict that there may be 100 million anesthetics in the United States in 2040. However, this remarkable number of anesthetics may be modified and reduced by three key changes. These are (1) the increased use of minimally invasive procedures that will not require the services provided by anesthesiologists; (2) the develop-

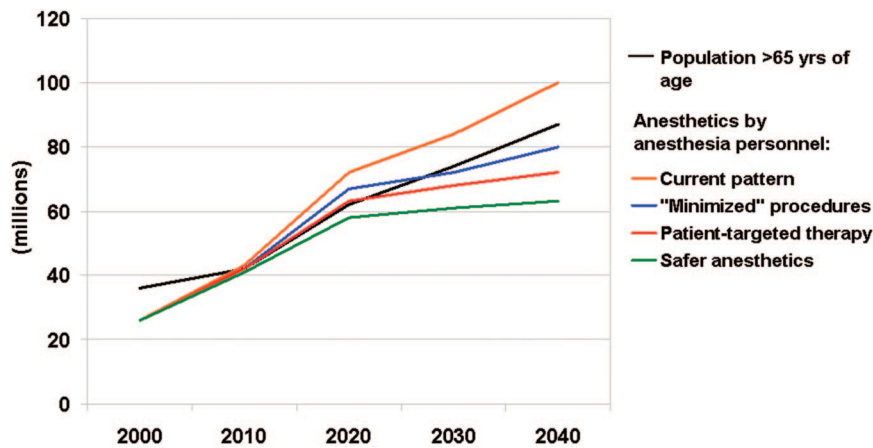


Fig. 1. Projected US population aged 65 yr or older (black line) and utilization of anesthesia services of entire US population (orange line) through 2040. Hypothetical cumulative modifications to anesthesia service projections associated with “minimized” procedures, patient-targeted therapy, and safer anesthetics are shown by blue, red, and green lines, respectively.

ment of patient-targeted sedatives and analgesics that will reduce the need for anesthesia services, especially for minimally invasive procedures; and (3) the introduction of new, safer anesthetics, sedatives, and analgesics that may be administered within a broad range of doses without endangering patients, thus potentially reducing the need for services provided by anesthesiologists. Regardless of the accuracy of these individual projections, it seems clear that expansion of the elderly population represents a dominant characteristic and will dictate increased demand for anesthesia services provided by physicians during the next 35 yr.

The Human Genome

We are blessed to be practicing in a great specialty at a time when medicine will change more rapidly and profoundly than ever before. The elucidation of the human genome and the continued unraveling of its mysteries will alter our profession more than we can imagine. Increasingly, we will be able to tailor perioperative drug therapy to target the unique genetic constitutions of our patients. Rapid preoperative analyses of unique gene markers will be used to determine the anesthetics, pain medications, and other perioperative drugs that patients receive. I would like to present two very real examples of how the advances associated with genetic discoveries may shape our specialty's future. These are (1) β -adrenergic receptor polymorphisms and (2) pharmacogenomics.

The study of β -adrenergic receptor polymorphisms is one of several important new approaches taken to better understand the mechanisms of hypertension and heart failure and to develop novel treatments. Although there is still much to learn about these polymorphisms and how they may impact receptor function and responses, I will give you one example that could—and mind you, I say could—be relevant to our treatment of perioperative patients. A single substituted amino acid, from arginine to glycine, on the β_1 -adrenoceptor position 389 in

an animal model can influence the impact of atenolol on resting heart rate and blood pressure. Atenolol has a much greater effect in subjects who are homozygous for the arginine substitution⁴ (fig. 2). This type of study, replicated, modified, and repeated multiple times in multiple models, may allow us to target perioperative β blockade and better manage the perioperative care of patients with dysfunctional hearts and impaired vascular responsiveness.

Variations in drug metabolism—actually, kinetic variations associated with phenotypic differences—represent the low-hanging fruit, ripe to be picked, in pharmacogenomics. A good example relevant to perioperative medicine is the impact that the enzyme CYP2D6 has on codeine. Some patients have CYP2D6 alleles that cause

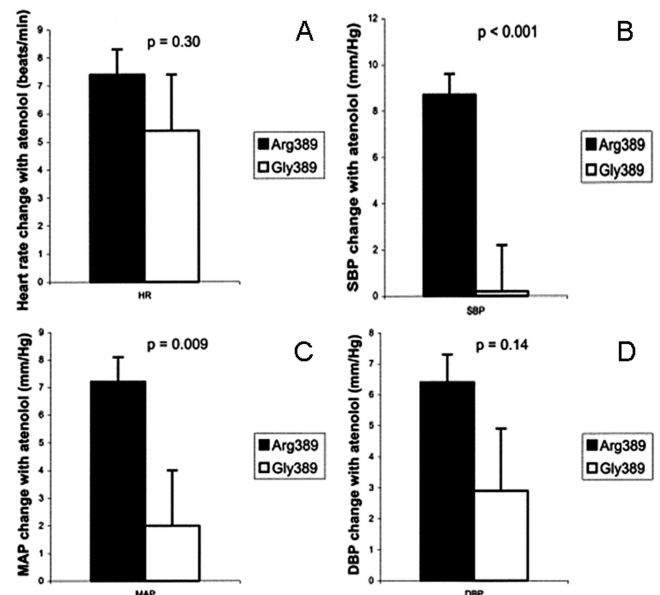


Fig. 2. Effect of atenolol on resting heart rate (HR) (A), systolic blood pressure (SBP) (B), mean arterial pressure (MAP) (C), and diastolic blood pressure (DBP) (D) in subjects homozygous for arginine (Arg) 389 and glycine (Gly) 389. The decrease in SBP (B; $P < 0.001$) and MAP (C; $P = 0.009$) was significantly different between genotypes.⁴ From Sofowora *et al.*⁴; used with permission from the American Society for Clinical Pharmacology & Therapeutics.

them to be poor metabolizers of codeine—they do not readily convert codeine into morphine. Others have alleles that cause them to be rapid metabolizers of codeine—they convert an unexpectedly large percentage of codeine into morphine. A simple case report in the *New England Journal of Medicine* at the end of 2004 offers insight into how preoperative knowledge of the CYP2D6 status of patients might improve their perioperative care.⁵ The case report documents the care of an older man with bronchitis who was given a standard dose of codeine for cough suppression. On his fourth hospital day, he experienced an opioid-induced respiratory arrest. He subsequently was found to have CYP2D6 alleles associated with rapid metabolism of codeine into morphine, resulting in an unexpected, very high morphine level and respiratory arrest. Imagine if we could readily evaluate the opioid metabolism or receptor function of patients during their preoperative assessments and develop perioperative pain treatment plans targeted specifically to each one.

Similar pharmacogenomic markers may be used to predict the metabolism of common perioperative drugs such as warfarin and ondansetron. There are enzyme alleles that are associated with either poor or rapid metabolism of these drugs. Poor metabolizers of orally administered warfarin have little anticoagulant response to standard doses, and rapid metabolizers have been reported to develop spontaneous perioperative hemorrhage and even intracerebral bleeding from small, single doses of warfarin.⁶ The opposite is true for intravenously administered 5-hydroxytryptamine type 3 receptor antagonists such as ondansetron. Poor metabolizers of ondansetron have much better control of nausea and vomiting than those who rapidly metabolize the drug.⁷

What if we could predict preoperatively how patients might respond to common pain medications, anticoagulants, and antiemetics? In the coming decades, the pharmaceutical industry and others will attempt to develop medications that are specifically designed for patients with unique metabolic capabilities and receptors. Although far from reality at this time, it is possible that someday we will have a 5-min preoperative analysis of buccal mucosal cells or a finger-stick blood sample that will suggest which potent opioid will provide a specific patient with profound perioperative pain relief and without the problematic side effects of respiratory depression, nausea, and pruritus, or which antiemetic would work best for a unique patient. Similar tailored interventions, based on patient-specific genetic analyses, may be possible for hemodynamic management, treatment of perioperative sepsis, and other perioperative issues—and likely will become available within the professional lives of many of us.

Minimally Invasive Procedures

We are all familiar with laparoscopy, arthroscopy, thoracoscopy, hysteroscopy, and everything else “-oscopy.” We know about magnetic resonance-guided procedures and the other remarkable interventions made possible by our radiology colleagues. All of these have dramatically impacted perioperative and periprocedural care during the past several decades. But many procedures still require anesthesia services to negate pain, reduce anxiety, and provide comfort to patients.

Are we ready for newer procedures that may no longer require our services? I am talking about nonincisional, microinvasive, and noninvasive procedures. An example of a nonincisional procedure would be transgastric appendectomy. Transgastrointestinal ultrasound and virtual colonoscopy are examples of microinvasive and noninvasive procedures, respectively. Currently, a few of these nontraditional procedures are either in clinical trials or in laboratory investigations that will soon lead to clinical trials. Let us take one example: transgastric procedures.

Transgastric procedures are endoscopically performed. As procedures that use an emerging technology, they are limited thus far only by the lack of adequate endoscopic surgical tools. You can think of transgastric technology at this time to be similar to the early days in which laparoscopy and arthroscopy were introduced into clinical practice. As the endoscopic tools and abilities of the proceduralists improve over the next few years, the number and complexity of the intraabdominal and intrapelvic procedures treatable with transgastric approaches will expand.

Currently, transgastric procedures in humans have been limited to appendectomies. In animal trials, however, endoscopists have been able to perform tubal ligations, cholecystectomies, bowel resections, fundoplications, hysterectomies, oophorectomies, and a number of other intraabdominal and intrapelvic procedures—all without a single skin incision. Here is an example of how this new technology and procedural approach works.

The sequence shown in figure 3 dramatizes the capabilities of current and anticipated technology. In it, an endoscopic appendectomy is performed by micro-robots. To date, endoscopic appendectomies have been performed with tools inserted through endoscopes that have been passed distally through the anterior wall of the stomach and through the abdomen to the pelvic brim. However, the use of micro-robots to perform appendectomies and other intraabdominal and intrapelvic procedures has been validated in a number of animal models. To set the scene for this animation sequence, the view starts from the lower abdomen, looking cephalad at the lower anterior surface of the stomach. As the endoscope passes through the esophagus and into the stomach, the light of the endoscope is visualized (fig.

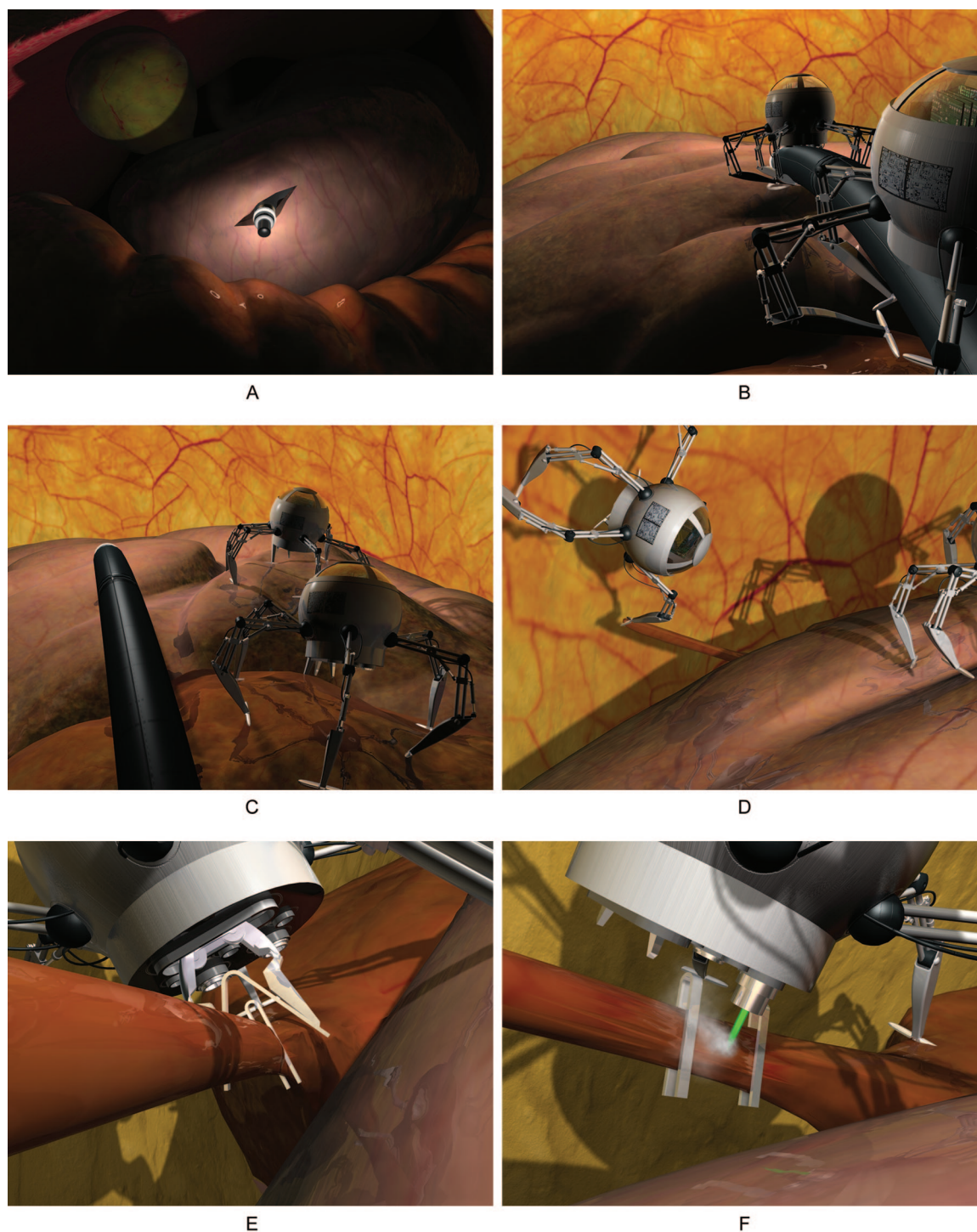


Fig. 3. Dramatization of appendectomy performed by micro-robots using a transgastric endoscopic approach. See text for description.

3A). The endoscope punches through the anterior stomach lining and passes into the mid abdomen. At this point, the endoscopist introduces two micro-robots that slide down the endoscope (fig. 3B). A second endoscope is passed through the stomach into the upper left abdominal quadrant to function as a video camera and is pointed towards the right lower abdomen. The robots are activated and transverse the abdomen into the right

lower quadrant with Star Wars-like movements (fig. 3C). The lead robot identifies the inflamed appendix, grabs its distal end, and pulls it taut while climbing the abdominal wall (fig. 3D). The second robot applies a clip to the appendix at its proximal end near the cecum. Another clip is applied distal to the first clip, thus securing the contents of the appendix (fig. 3E). An argon laser is then used to excise the appendix (fig. 3F). The procedure

ends with the robots marching back to their home endoscope to be retracted through the stomach, ultimately delivering the appendix orally. All in all, it is a pretty remarkable procedure.

A few of the patients who have undergone transgastric appendectomy thus far have been fully anesthetized with their airways protected. However, most of them have undergone these procedures with propofol sedation and no airway protection. These patients have minimal postprocedural pain, primarily limited to a very mild, transient left upper quadrant irritation. This discomfort often has been successfully treated with acetaminophen only. Young adults undergoing this procedure typically have recovered quickly and been released to home within 2 h of their procedures. Most have returned to school or work the next day.

Why is this important to know? Only to describe how miniaturization and minimalization of surgical procedures may modify our anesthesia practices. Most of the patients who have thus far undergone transgastric appendectomy have not needed general anesthetics. As a number of common surgical procedures become increasingly less invasive, and as providing intravenous sedation becomes increasingly safe, the need for one-on-one personal provision of anesthetics by physicians may be mitigated.

Models of Care

For the remainder of my lifetime and for the professional lives of the medical practitioners in this audience, there will not be enough anesthesiologists to deliver care to all of the patients in this country who need our services. So how will we ensure safe anesthesia care to our public during this period? Clearly, our models for delivering anesthesia care must change.

We have truly outstanding anesthesiologists who provide terrific care in intensive care units across this country. None of them—not a single one of them—are assigned to provide one-on-one care to even the most critically ill patients in these units. They evaluate, diagnose, develop treatment plans, and oversee the implementation of these plans for more than one patient at a time. This approach is what outstanding physicians do so that their unique capabilities are used as efficiently and spread as broadly as possible to serve the public.

In contrast, we have extraordinarily well-trained and excellent anesthesiologists who markedly restrict their full potential to provide a positive impact on public health and safety by delivering one-on-one care to patients who do not warrant such physician-intensive, inefficient, and cost-ineffective care. Do we really need our best and brightest physicians to sedate and monitor patients undergoing cataract procedures when these patients have only an infinitesimal risk of developing a life-threatening problem intra-

operatively? Do we need them to deliver one-on-one care to healthy 20 yr olds who need general anesthetics for simple surgical procedures such as herniorrhaphies and peripheral orthopedic procedures? How should we best use our physician skills?

I want to make sure you do not misunderstand me—I believe that all people in this country who undergo sedation in which there is risk of loss of consciousness or airway compromise, or who require general or regional anesthesia, should have anesthesiologists involved in oversight of their preoperative assessment and treatment, intraoperative care, and postoperative management. However, I also believe that the provision of this care does not require all patients to receive one-on-one administration of the care by anesthesiologists. Personal delivery of anesthesia by physicians simply will not be possible for all patients. There will be too few anesthesiologists, as well as insufficient funds to pay for such physician-intensive care. Further, there are no studies to suggest the need for physicians to personally deliver care to healthy patients undergoing minimally invasive procedures. As proven in a number of diverse practice models and in our intensive care units daily, physician oversight or supervision of well-trained sedation and critical care nurses, nurse anesthetists, and anesthesiologist assistants is a remarkably safe, efficient, and cost-effective model for delivering care to appropriately selected patients. And there is indeed still a need for one-on-one, two-on-one, or even more intensive care provision to those patients who most need our physician skills.

There are not enough anesthesiologists now, and there will likely not be enough anesthesiologists in the future, to deliver one-on-one care to everyone. Will we fight—and eventually lose—efforts to expand sedation and anesthesia practices provided by others? Or will we step forward and lead the development of practice models that ensure all patients have the benefit of anesthesiologists involved in their care? Remember, everything that we do—except for our core values of providing, overseeing, and improving the care of critically ill patients and those with acute procedural or chronic pain—can, should, and must change as our environment changes. Our intensive care model offers one potential approach, and there are others that should be developed, studied, and, if successful, implemented. All patients deserve to have outstanding physicians involved in their care. We have a responsibility to our patients and to those physicians who choose to follow in our footsteps as anesthesiologists. We must lead efforts to match physician skills and resources to the needs of our patients.

Next Steps

Given these opportunities, I will ask you a simple question: Who better than anesthesiologists to lead health care in the coming century?

Few administrators understand the full-scope of the perioperative experience. To many of them, the surgical environment and its upstream and downstream health system processes (*i.e.*, preoperative assessment and preparation, plus postoperative care involving intensive care services and the provision of analgesia) represent black boxes into which they pour institutional money and gamble that their investments will result in profits, good patient outcomes, and acceptable patient satisfaction surveys. In some instances, they get favorable returns; in others, they do not. For some health systems, their very survival depends on obtaining positive results for their surgical enterprises. If you were the leader of a healthcare system, who would you choose to lead the oversight of crucial perioperative services? Very clearly, you would choose an anesthesiologist. But many of us are not prepared to accept this opportunity, believing that we have not been appropriately trained. Some work in a practice model that precludes involvement in medical administrative activities. Others do not step forward because reimbursement for their current anesthesia activities makes their lives comfortable, and they are unwilling to change their practice. Regardless of reason, we can and must better prepare our future anesthesiologists, not just to provide excellent clinical care, but to have the capability and experiences that will allow us to step forward confidently and accept new roles in healthcare administration. We must learn to better manage the complex healthcare processes that so dramatically impact patient care. We must work to adjust reimbursement policies to better provide for those anesthesiologists who put their physician talents to best use.

Hospitals are changing. While major medical centers continue to serve all types of patients, they are serving a growing proportion of the most acutely ill. In the 90-plus academic medical centers that comprise the core membership of the University Health System Consortium in this country, the proportion of their available beds that can be used to monitor acutely ill, physiologically unstable patients has grown from 10 to 22% during the past decade. This proportion is projected to double in the coming decade. Similar changes are occurring in other major general hospitals. Who better than anesthesiologists to care for these very sick patients?

Healthcare systems are changing, and we must, also. How do we ensure that we will have the opportunity to provide the leadership and direct the important work that will be performed within these systems? Certainly it is not by restricting our clinical practices and our participation in these systems. It is crucial for us to be so broadly involved in patient care and healthcare systems that we add great value. We must be judged to be invaluable and irreplaceable. We must embrace every opportunity to expand our sphere of influence and participation in health care.

You may be thinking, "This guy is crazy. We struggle even to staff our operating rooms." If that is true, then I

submit that we must find ways to attract a greater number of outstanding physicians, educators, and scientists into our specialty. We must explore new models that allow us to deliver high-quality care *and* put our physician skills to their best use. Returning to my earlier comments, we must ask ourselves: Are there better anesthesia care models that will allow us to free our physicians to extend their skills to new areas and to expand the influence and scope of our specialty?

There is a role for changing how we train the anesthesiologists of our future. We must develop curricula that offer opportunities to train in new fields—with an emphasis on all of our clinical subspecialties and to include unique experiences in finance, law, healthcare administration, public health, and, of course, discovery. We must produce new anesthesiologists who are better trained than we have been to exploit opportunities and allow our specialty to explore and influence all facets of health care. We must hold our future anesthesiologists to higher standards than we have experienced, because as a specialty, we sadly have not uniformly pushed ourselves to those higher standards.

To effect the scientific and process changes needed to take full advantage of the unique opportunities before us, we must develop, fund, and implement specialty-sponsored fellowships. These fellowships must be developed in conjunction with all of our subspecialty groups and directed toward our brightest and most motivated residency program graduates. They must be competitive and rigorous. They must be designed to produce young anesthesiologists who will have the education and training in emerging and promising fields of science and healthcare administration needed to create a new future for our specialty. Examples of progressive fields of study at this time that should be supported by these fellowships include pharmacogenomics; innovative technologies; and healthcare systems, processes, and management. I challenge our American Society of Anesthesiologists and our American Society of Anesthesiologists foundations to foster meaningful collaborations between the National Institutes of Health (Bethesda, Maryland) and other government healthcare-related agencies; private foundations that support healthcare improvements; leaders of our pharmaceutical, technology, and insurance industries; and our academic anesthesia community. These collaborations should initially focus on developing and supporting exceptional clinical and research training opportunities at the fellowship level that will improve our care of patients and, ultimately, their safety and outcomes. As these collaborations mature, they should be directed toward the creation of a critical mass of uniquely qualified clinician scientists and educators who will be capable of accelerating progressive changes in our specialty to better serve the healthcare needs of our public.

If we are to avoid being considered a "minor" specialty in the future, we must have a meaningful presence in medicine. We must embrace changes in how we deliver

anesthesia care, what we consider to be our scope of anesthesia care, and our roles within medicine in general and within our healthcare systems. We must be leaders—and who better than anesthesiologists to be leaders in medicine in the coming century?

I am extraordinarily proud of our specialty and am amazed at the strides it has made during the first 100 yr in which it has been promoted by this medical society. We are riding on the shoulders of giants—our past and current colleagues who have loved, nurtured, and propelled our specialty forward. We owe as much and more to them and to our future colleagues to ensure that our specialty will adapt to the changing environment, seek new discoveries that will better serve our patients, and expand our practices and leadership roles in healthcare systems—in essence, to ensure that our specialty will thrive in the next 100 yr. There are so many golden opportunities currently available for us, and passionate, dedicated anesthesiologists will take advantage of these opportunities and lead our specialty to an even better place in the House of Medicine.

I look backward and see great accomplishments, and I look forward and see great opportunities. We must—we absolutely must—embrace them. In the House of Medicine of the next 100 yr, no one should be better than anesthesiologists.

References

1. Hershey SG: The Rovenstine inheritance: A chain of leadership. *ANESTHESIOLOGY* 1983; 59:453-8
2. Collins JC, Porras JI: *Built to Last*. New York, HarperCollins, 1994
3. Macario A, Hackel A, Gregory GA, Forseth D: The demographics of inpatient pediatric anesthesia: Implications for credentialing policy. *J Clin Anesth* 1995; 7:507-11
4. Sofowora GG, Dishy V, Muszkat M, Xie HG, Kim RB, Harris PA, Prasad HC, Byrne DW, Nair UB, Wood AJJ, Stein CM: A common β_1 -adrenergic receptor polymorphism (Arg289Gly) affects blood pressure response to β -blockade. *Clin Pharmacol Ther* 2003; 73:366-71
5. Gasche Y, Daali Y, Fathi M, Chiappe A, Cottini S, Dayer P, Desmeules J: Codeine intoxication associated with ultrarapid CYP2D6 metabolism. *N Engl J Med* 2004; 351:2827-31
6. Takahashi H, Echizen H: Pharmacogenetics of warfarin elimination and its clinical implications. *Clin Pharmacokinet* 2001; 40:587-603
7. Kaiser R, Sezer O, Papies A, Bauer S, Schelenz C, Tremblay P-B, Possinger K, Roots I, Brockmüller J: Patient-tailored antiemetic treatment with 5-hydroxytryptamine type 3 receptor antagonists according to cytochrome P-450 2D6 genotypes. *J Clin Oncol* 2002; 20:2805-11