

# The Future Practice of Anesthesiology

*By Patricia A. Kapur, M.D.*

Predicting the future is risky at best; however, some general trends can be anticipated, even if not known specifically when they will become manifest. An example would be the evolution from desktop to laptop to handheld computer devices. A tipping point is reached when the next device becomes dominant, although all three technologies coexist for some time. Models of medical care delivery that have technological and human components, such as anesthesiology, are similarly on an evolutionary continuum and are propelled forward with each new technological advance.

Examples of some of the technological advances which are propelling changes in anesthesiology care delivery include such items as better methods for determining the state of patients' comorbidities, for example, advanced non-invasive cardiovascular testing which allows for better anesthesia risk assessments; genetic profiling of patients for drug tailoring; computer-controlled infusion pumps for physiologic feedback-controlled drug administration; rapid advances in noninvasive intraoperative monitoring devices; technology for remote viewing of intraoperative monitor screens, lab results; real-time remote camera and voice contact with ORs; and so on. The question that anesthesiology decision makers need to face in preparing physicians in practice and physicians in training for such a future is not "How long can we make the current situation last?" but, rather, "How can we prepare anesthesiologists appropriately for the career opportunities that anesthesiologists of 2015 or 2025 will face in their professional practice?"

Although classic literature tells us that we see the future "... through a glass darkly ...," it is not all murky, and we can make some extrapolations. We do know that advances in home health infrastructure and home care technology means that hospitals will focus on the acutely and severely ill with increased numbers of critical care units compared to ward-level care. There will be safer drugs with minimal side effects, while pharmacogenetics will allow drug and dose tailoring to improve safety and reduce therapeutic misadventures. Non-invasive monitoring and transdermal- or transmucosal-based "lab" tests may obviate the need for extensive experience with invasive monitor placement and interpretation, and/or for skills for arterial/venous blood or other body fluid sampling. Remote robotics will replace a certain number of in-OR surgeons. Remote physicians with telemedicine-inspired, two-way video techniques already have replaced on-site physicians in ICUs for hard-to-serve hospitals

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and on ICU night-shifts in the United States. Already in the U.S., remote reading of specialty monitors in the ORs, such as EEGs, SSEPs, and TEEs, commonly is done by neurologists or cardiologists, similar to online radiology image interpretation from continents away. Why not have an anesthesiologist remotely overseeing numerous ORs, by way of electronic access to automated anesthesia records, an intranet connection to intraoperative physiologic monitor screens, two-way video/voice communication to each OR, access to instantaneous output from intra-op lab tests machines, among other things.

Additionally, immediate intraoperative anesthetic risks are now much smaller in comparison to the larger risks resulting from:

1. Remaining unresolved patient co-morbidities
2. The increasing age of the population
3. Short-term sequelae of surgical disruptions of anatomy and physiology
4. Long-term effects of intraoperative events on perioperative outcomes

Thus, it can be predicted that the immediate pre-, intra- and postoperative periods will become less technologically challenging to manage, and will rather be subsumed into the broader context of the continuum of care from the onset of surgical illness until the return to baseline after surgical illness. Drs. Roy and Calicott have written that the specialty of anesthesiology needs to broaden its view and take responsibility for participation in that entire continuum of surgical illness to remain strong and viable.<sup>1</sup> Mark Warner, M.D., has similarly asserted that the focus of the specialty should not be limited to immediate perioperative care, but rather on the broad scope of care of the critically ill and of those who face acute and chronic pain, including pain caused by procedures.<sup>2</sup>

There already have been identified numerous ways in which anesthesiology practice can take responsibility and lead in reducing overall perisurgical morbidity:

- A. Reduction of surgical site infection can be fostered by:
  1. Avoiding intraoperative hypothermia
  2. Minimizing perioperative hyperglycemia
  3. Timely antibiotic administration
  4. Minimizing lower oxygen content
  5. Reducing administration of transfused blood, which may include preoperative optimization of any anemia

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- B. Reduction of perioperative ischemic cardiovascular events has been associated with anesthetic factors such as:
  - 1. Close intra- and post-operative cardiovascular monitoring
  - 2. Avoiding swings in blood pressure and heart rate
  - 3. Avoiding emergence hypothermia/shivering
  - 4. Maintenance of adequate hematocrit
- C. Reduced pulmonary complications are associated with:
  - 1. Reducing incidence of aspiration
  - 2. Reducing atelectasis, including:
    - a. Adequate pain relief/blocks to reduce splinting for upper abdominal/thoracic surgeries
    - b. Avoiding persistent subclinical neuromuscular blockade
- D. Reduced tumor recurrence has been associated with:
  - 1. Avoiding blood transfusion
  - 2. Minimizing postoperative pain-induced depression of immune function

Along with these perhaps inevitable advances in practice technology, and the imperative to view the intraoperative period as part of the long-term management of the entire sphere of surgical outcomes is the urgency to relook at the issue of other clinical care providers in anesthesiology. R.D. Miller has stated that, "... the rancor, duration and cost of this battle [with nurse anesthetists] were unmatched in other specialties' dealings with their non-physician counterparts ... With a remarkable degree of safety, midwives manage uncomplicated deliveries under protocols providing for physician consultation ... Why does our specialty's view of the care of low-risk anesthetics differ so dramatically from obstetricians' views of the care of low-risk deliveries?" Dr. Miller went on to state that he views the attempts to hold back the tide against the advent of safer sedative-hypnotics moving into other specialist physicians' hands as similarly misdirected.<sup>3</sup>

The time may well be coming when the profession of anesthesiology needs to face that routine, noncomplex levels of care are not going to be the appropriate setting for solo care by highly trained physician anesthesiologists. Physicians need to orient themselves to:

- 1. Invasive procedure management and postprocedure care
  - a. Oversight of other providers for straightforward and mid-complexity care

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- b. Personal care of the most ill, most complex patients
- c. Subspecialty anesthesiology care
2. Sophisticated care for multi-system, critical illness
3. Pain management
4. Pre-operative evaluation and management
5. Continuum of care from the emergency department to OR to ICU
6. OR management
7. Organization and medical management of acute care support services, such as respiratory therapy, critical care transport teams, invasive procedures teams, TEE teams outside the OR, or other institutional needs for the knowledge and skill sets of anesthesiologists

The proactive futurist would say that trying to hold back these changes in care delivery models is time poorly spent, compared to expanding the anesthesiologists' portfolio of skills to take the lead to become the acute-care, high-level-of-acuity, go-to persons within the healthcare environment. In his 2005 ASA Rovenstine Lecture, Dr. Warner stated: "... we have excellent anesthesiologists who markedly restrict their full potential to provide a positive impact on public ... safety by delivering one-on-one care to [low-risk] patients who do not warrant such physician-intensive, inefficient, and cost-ineffective care. ...” He then challenged us all, “How should we best use our physician skills? ... As proven in a number of diverse practice models and in critical 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 ... while there is still a need for one-on-one or even more intensive care provision to those [specific] patients who need physician skills.” Dr. Warner encouraged us, “... will we ... lead the development of practice models [intensive care model and others] that ensure all patients have the benefit of anesthesiologists involved in their care? ... everything ... 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 ... and must change as our environment changes. ...”<sup>2</sup>

To prepare ourselves for such a future diversified practice model, physicians need to:

1. Remain qualified and capable for broad medical care
2. Prepare for and seek out institutional leadership roles
  - a. Direct and use risk-stratification for anesthesiology staffing of OR suites
  - b. Direct and use appropriate staffing models for interventional and ambulatory suites
3. Direct and staff critical care units

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4. Direct and staff with various providers:
  - a. Preoperative evaluation centers
  - b. In-hospital preoperative optimization services
5. Direct and use various providers to staff Pain Management Centers and in-hospital Pain Consultation Services

Residency training in anesthesiology will be undergoing some retooling as well:

1. Broad training in the fundamentals of medicine
2. Emphasis on the most severely ill and rigorous cases, including advanced subspecialty training
3. Thorough training to become experts in the perioperative care of the most seriously ill hospitalized patients before and after procedures
4. Training in the participation and supervision of team-based care with non-physician providers

Training changes implemented by the Residency Review Committee of the Accreditation Council for Graduate Medical Education, effective July 2008, include:

1. Definitive bedside care in the Clinical Base year
2. More rotation requirements in critical care medicine, pre-operative medicine, post-anesthesia care unit, and pain management
3. More flexibility to incorporate research months and other advanced degree training with a residency; for example, Masters of Clinical Investigation, MBA, MPH, and MHA

The research arm of anesthesiology must remain cognizant of these broader imperatives as well. A consideration for anesthesiologist-investigators is the importance of undertaking research in areas that are relevant to society as a whole. Examples of such areas include, but are not limited to:

1. Physiology/molecular biology of organ systems
2. Surgery as a model of a standardized stress state and what can be learned from that model
3. Effects of anesthetics on the developing brain
4. Interactions of anesthetics with neurodegenerative disorders as well as with the aging brain
5. Pharmacogenetics of perioperative medications
6. Perioperative/peri-procedural outcome studies
7. Advancements in pain management

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Opportunities in the broader areas encompassed by the anesthesiology knowledge and skill set remain tremendous. The opportunities may continue to evolve even further in the coming years, but they will still include the need for talented providers in all areas of acute, sophisticated, and critical care of patients presenting for interventional care, if that is interpreted in the broadest sense with a focus on the most severely ill patients. All anesthesiologists need to remain broadly capable, willing to transform to incorporate new technology and supervisory/management skills, and ready to move aggressively into the new opportunities to contribute their unique knowledge and skills for the optimization of care of the acute patients presenting across the illness continuum.

## References

1. Roy RC, Calicott RW. Anesthesia practice models, perioperative risk and the future of anesthesiology. *ASA Newsletter* October 2007. <http://www.asahq.org/Newsletters/2007/10-07/roy1007.html>
2. Warner MA. Who better than anesthesiologists? The 44th Rovenstine Lecture. *Anesthesiology* 2006; 104:1094-1101.
3. Miller RD. Anesthesiology's choices for the next century. *ASA Newsletter*. 2005 Special Commemorative Issue. <http://www.asahq.org/Newsletters/2005/Centennial/miller100.html>

## Additional Reading

Miller RD. Report from the Task Force on Future Paradigms of Anesthesia Practice. *ASA Newsletter*. October 2005. [http://www.asahq.org/Newsletters/2005/10-05/Miller10\\_05.html#report](http://www.asahq.org/Newsletters/2005/10-05/Miller10_05.html#report)

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