Introduction: “From the mountain”

A long time ago, in a medical galaxy far, far away, medical education was a simple matter of apprenticeship:

- You washed up on the shores of a residency.
- For three years, you did anesthesia.
- The residency released you into the wild, with the admonition, “Go ye forth and minister anesthesia unto the people.”

But, alas, as time passed, the educational process grew in complexity.

Enter the Core Clinical Competencies.

Wise men and women gathered themselves together and reconsidered the apprenticeship idea. And thusly they spake, “The doctors know not of what they teach. They are misguided and errant in their ways. For them to teach unto their young charges, they must teach as we, the wise men and women of education, feel you must teach.”

And the wise men and women of education climbed a great mountain, to seek commandments. They sought 10, but found they only 6. And these six commandments, they were writ in stone and given unto the wise men and women of education. From the mountain came they down, bearing six commandments with them. And they showed these six commandments to all who would teach doctors the art of healing the halt and lame.

And the teachers of doctors became sore afraid.

And the teachers of doctors asked, “Whence came these commandments, which we of needs must now employ as we teach the young doctors?”

So the wise men and women of education said, “Ye are not put on this earth to question the commandments given from on high. Ye are to obey the six commandments in all your teaching, and ye are to spend all the hours of the day and all the hours of the night documenting that ye are teaching via the commandments. All those who disobey will be cast aside and their residencies shuttered, their hospitals razed unto the ground, so that one brick no longer lies upon another, and the ground thereon to be sown with salt, so nothing there shall ever grow again.”

And the teachers of doctors trembled before the men and women of education. And these same teachers rent their garments and gnashed their teeth, crying out, “Woe is us, that the daytime and the nighttime will be filled with documenting all we say and all we do. So great is the fury of the men and women of education that we will live all the years of our lives in fear and loathing and documenting.”

Night fell.

The sun rose the next day.

“Ah, what is this on Amazon.com?” a teacher of doctors cried out. “A book, a book which reviews anesthesia cases via the Core Clinical Competencies! As manna from heaven fed those who wandered through the desert, so also this book from three residency directors will feed those who wander through the Core Clinical Competency land. Yea, verily, this is a boon to medical students, residents, and teachers alike.”

And great was the happiness.

And now, as you read on, so also will your happiness be great.

For first we shall review the Core Clinical Competencies, and we shall show ye how these selfsame Core Clinical Competencies are viewed through the prism of anesthesia. Then we will leave off the jabber, for we seek not to be as the cackling of hens or the screeching of monkeys. We will go us forth into actual cases, cases we have done ourselves, and we will explain these cases with great and terrible emphasis on the Core Clinical Competencies.

And lo, your understanding will grow mightily.

And when a dark cloud appears upon the horizon, and a great crash of thunder is heard, and the Four Horsemen of the Residency Review Committee
Introduction: “From the mountain”

(RRC) Apocalypse come pounding up to your door, you will hold up this selfsame book, and you will have no need to avert your gaze or feel ashamed in your Accreditation Council for Graduate Medical Education compliance nakedness. For you will say, "Look, ye terrible Horsemen of the RRC Apocalypse, and note well. Much have we studied, and all through and with and under the benevolent wing of the Core Clinical Competencies, as we have been commanded by the men and women of education."

And the Four Horsemen of the RRC Apocalypse will rein in their furious mounts, and away they will ride, for no citations will they give, and no complaint will they raise.

For the book is good.

And now you may rest under the shade of the tree.
Chapter 1

An anesthetic view of the Core Clinical Competencies

Here are the Core Clinical Competencies with an anesthetic twist. The first two, patient care and medical knowledge, are the traditional things we've always taught. The last four are a bit softer and harder to nail down. But hey, you have to know all six, so let's plow through them.

Patient care
Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. Residents are expected to do the following:

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate information about their patients
- make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- develop and carry out patient management plans
- counsel and educate patients and their families
- use information technology to support patient care decisions and patient education
- perform competently all medical and invasive procedures considered essential for the area of practice
- provide health care services aimed at preventing health problems or maintaining health
- work with health care professionals, including those from other disciplines, to provide patient-focused care

The anesthetic take on patient care
This is the most inherently obvious of the clinical competencies. We are patient care people, after all! You can wax dreamy about all the other educational rigmarole, but if the tube doesn’t find the trachea, or the spinal needle doesn’t splash down in cerebrospinal fluid, or the central line knifes through the pleura, then we’re doing it all wrong.

Patient care means taking care of the patient correctly, and to detail how you take care of a patient correctly, read Miller cover to cover and do a residency. Because it all boils down to taking good care of the patient:

- Secure that airway.
- Get the line in.
- Keep an eye on those vital signs.
- Provide good analgesia.
- React to changes and problems.
- Keep those lines open between you and the surgeon, the obstetrician, and the consultants so you don’t miss anything.

That is the anesthetic take on patient care, and there's not a lot of room for interpretation.

Medical knowledge
Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g., epidemiological and social-behavioral) sciences and the application of this knowledge to patient care. Residents are expected to do the following:

- demonstrate an investigatory and analytic thinking approach to clinical situations
- know and apply the basic and clinically supportive sciences that are appropriate to their discipline

The anesthetic take on medical knowledge
The anesthetic take on medical knowledge is little removed from the anesthetic take on patient care. You need to know the medicine to care for the patient:

- Chest pain, ST segment changes? You have to know the components of ischemia, know the latest
on beta-blockade (good and bad), and know how best to intervene.

• New device for securing the airway safely? You have to know how to use it to care for the patient.

• New block (say, the transverses abdominalus planar (TAP) block for relieving abdominal pain)? You need to know the landmarks, how you can tell the transverses abdominal on echo, and how to lay the local anesthetic in there.

This is just the knowing behind the doing, so there's not much interpretive wiggle room in this Core Clinical Competency.

So far, so good. Now things get a little mushier.

Practice-based learning and improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to do the following:

• analyze practice experience and perform practice-based improvement activities using a systematic methodology

• locate, appraise, and assimilate evidence from scientific studies related to their patients’ health problems

• obtain and use information about their own population of patients and the larger population from which their patients are drawn

• apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness

• use information technology to manage information, access online medical information, and support their own education

The anesthetic take on practice-based learning and improvement

This means looking at the literature. None of us have enough experience in our own individual practice to draw meaningful demographic conclusions. We tend to stew in our empiric juices and say, “Well, I did this once and somehow the patient survived, so gee whiz, this must be the way to do it!”

This n of 1 that we’ve all leaned on doesn’t hold up to statistical scrutiny, so we have to go to the literature. Hillary Clinton told us that “it takes a village” to raise a child. When it comes to interpreting medical information, it takes the global medical village to guide our therapy. Here’s one example that affected our recent thinking:

• Beta-blockers are great! Studies drift out that seem to indicate that one beta-blocker pill given in the perioperative period will stave off death for a thousand years!

• Hey, let's give everyone beta-blockers, and all our patients will live forever.

• This makes inherent sense because slowing down the heart prevents ischemia. Right!

Now, the literature looks at this more rigorously. Out comes the POISE study, looking at 80,000 plus patients and giving them all beta-blockers. And there’s a fly in the soup!

• Ischemia is, indeed, down.

• But death and stroke rates are up.

• Oh, no! The sacred cow of perioperative beta-blockade is slain.

Could any one of us, in our own experience, have come up with these conclusions? I don’t care how fast you turn over a room; you’re not going to rack up 80,000 anesthetics in a short time and study this issue – hence practice-based learning and improvement as a Core Clinical Competency.

What’s the crucial skill you need in this area? You need to answer the question, is the information in the literature valid? Is it meaningful? Should I change my practice based on what the author says?

Every month, the journal articles are filled with studies – do you change your practice every time a new paper comes out? Do you snap up every new procedure because it has an “Oh, that looks neat!” air about it? Obviously not. The connoisseur of the literature knows the good stuff from the bad, the Dom Pérignon from the Listerine.

Interpersonal and communication skills

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients, their patients’ families, and professional associates. Residents are expected to do the following:

• create and sustain a therapeutic and ethically sound relationship with patients
• use effective listening skills and elicit and provide information using effective nonverbal, explanatory, questioning, and writing skills
• work effectively with others as a member or leader of a health care team or other professional group

The anesthetic take on interpersonal and communication skills

This competency and the next one (professionalism) are damned hard to tease apart. I wish they would have checked with me before they split these into two. Here goes, but, as you will see, there’s a lot of overlap here.

You can’t be an oaf, dolt, moron, or insensitive clod with the patient, and you have to get ideas to them and get ideas from them. Same goes for working with nurses, cardiopulmonary bypass techs, doctors, intensive care unit staff, respiratory techs, you name it. Anyone that crosses paths with you in the clinical orbit, you have to work well with them and make sure you get the information right.

Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population. Residents are expected to do the following:

• demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society that supersedes self-interest; accountability to patients, society, and the profession; and a commitment to excellence and ongoing professional development
• demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, informed consent, and business practice
• demonstrate sensitivity and responsiveness to patients’ culture, age, gender, and disabilities

different cultures, being sensitive to gender concerns, being sensitive to different disabilities.

This is the Core Clinical Competency that steams most anesthesiologists (and, I suspect, most other specialties, too). Of course, we know to be professional! God all fishhooks, we went through premed and med school and are now in postgraduate training. Do I need the Core Clinical Competencies to tell me that I have to be ethical? We all took the Hippocratic oath; our whole life has been geared to taking good care of our fellow human beings. Now some educa-tiono-wonk is telling me I have to be sensitive and appropriate around a person of different background, or a person with a disability?

Gimme a break!

Systems-based practice

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to do the following:

• understand how their patient care and other professional practices affect other health care professionals, the health care organization, and the larger society and how these elements of the system affect their own practice
• know how types of medical practice and delivery systems differ from one another, including methods of controlling health care costs and allocating resources
• practice cost-effective healthcare and resource allocation that does not compromise quality of care
• advocate for quality patient care and assist patients in dealing with system complexities
• know how to partner with health care managers and health care providers to assess, coordinate, and improve health care and know how these activities can affect system performance

The anesthetic take on systems-based practice

Money makes the world go round, and medicine is no exception. For anesthesiologists, the main idea we glean from systems-based practice is related to money:

• practice cost-effective medicine
• know how you fit into the great big overall picture
Chapter 1 – An anesthetic view of the Core Clinical Competencies

- do QA things (they don’t call it that anymore – they say continuous quality improvement – but we all know that’s just more administrato–double talk)

There you have it, the Core Clinical Competencies laid out, complete with the anesthetic take on them. Sound jaded?

Yeah, it’s a little jaded. If you pull aside the average resident or attending and ask what he or she thinks about the Core Clinical Competencies, you’ll probably get some variant of my barbed comments.

But they’re here to stay, and we have to know how to teach them, so that’s why this book exists. Rather than sit here and dwell on them and debate their relative merits, let’s do what we’re best at: clinical anesthesia. We’ll lay out a case, then wrap that case around the Core Clinical Competencies. That way, we’ll breathe some life and relevance into these bastards. So grab your hat and mask, and let’s have at it.
Anesthetic cases through the Core Clinical Competencies looking glass

Without further ado, we launch into the meat of the book – clinical cases with interesting twists (we actually did these cases!). And we’ll look at each case through the prism of the Core Clinical Competencies.

The first case, “Pop Goes the Aneurysm,” is over the top/overdone/overkill/too much. I have linked aspects of the case to every single sentence of every single competency. As you will see, this leads to interesting verbal gymnastics as I struggle to find a connection.

Every case will not be so exhaustive. Slavish adherence to each and every sentence in the Core Clinical Competencies is not the purpose of these cases, nor is it the purpose of this book. Different anesthetic challenges provide different areas of emphasis. As you will see, there will be cases in which all we talk about is two or three of the competencies.

So bear with us on this first one. This will show you how you can take a case, or one horrific moment in midoperation, and wrap it around the Core Clinical Competencies.
Contributions from Stony Brook University under Christopher J. Gallagher
Part 1
Case

Contributions from Stony Brook University under Christopher J. Gallagher

Pop goes the aneurysm

Christopher J. Gallagher and Tommy Corrado

The case

A previously healthy 45-year-old man developed headaches and blurry vision. Workup revealed a large cerebral aneurysm requiring a heroic procedure. In effect, his face would be taken apart to get at the aneurysm. The lesion itself was extremely large, and the neurosurgeon was quite concerned about whether he’d be able to “get the clamp around the base.”

After an initial tracheostomy and 5 hours of dissection, a faint and barely audible pop! was heard, followed by a nonfaint and easily audible “oh, shit!” from the surgeon. The patient’s blood pressure rose to 260, and his heart rate fell from 90, to 80, to 70, and didn’t stop until reaching 40.

A glance over the ether screen revealed a brain ballooning out of the skull. The brain was stretched so taut that there were no sulci present, just “lines on a globe” where the sulci used to be.

Patient care

Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.

Communicate effectively and demonstrate caring and respectful behavior when interacting with patients and their families.

No family is in the room, and the patient is under general anesthesia, so we don’t have to sweat about caring and respectful behavior in our interaction. We can show the most respect by reacting like lightning to the developing catastrophe.

Gather essential and accurate information about their patients.

Check those monitors; make sure the transducer didn’t fall on the floor.

Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment.

It doesn’t take a genius to peg this as Cushing’s triad stemming from a catastrophic intracerebral bleed. Clinical judgment says that you have to do everything you can to decrease swelling in the brain, and you have about an eighth of a second to do it.

Develop and carry out patient management plans.

Slam in some Pentathol and go with hyperventilation (to hell with concerns about cerebral ischemia – you are in disaster mode).

Counsel and educate patients and their families.

At this point, you’d need to jump into a time machine and go back to the preoperative area to discuss what will be done if things go wrong intraop. Here is a patient who was healthy up to this point, but there is a genuine worry that things may end up very badly (keep in mind that the surgeon himself was extremely concerned, and even getting at the aneurysm required quite an effort).

Does the patient have a living will? Is organ donation (see the later discussion) something the patient and family are willing to discuss and consider?

Use information technology to support patient care decisions and patient education.

Again, this is the sort of thing that is best handled in the preoperative phase of the operation. You look up any studies the patient has had (a chest X-ray or the computed tomograph or magnetic resonance image of the aneurysm) so that you will have knowledge of what the surgeon will be doing.
Perform competently all medical and invasive procedures considered essential for the area of practice.

At induction, a competent anesthesiologist would skillfully place adequate venous access and a preinduction arterial line (to monitor blood pressure on a beat-to-beat basis during induction and intubation) and would secure the airway appropriately. Later, when the surgeon has placed the tracheostomy (done because the face would be so disrupted by the approach), the anesthesiologist would make sure the switch from oral endotracheal tube to tracheostomy was done well.

Provide health care services aimed at preventing health problems or maintaining health.

The number-one preventive measure we take during such a case is timing the delivery of prophylactic antibiotics. Current standards dictate that antibiotics be delivered within 1 hour of incision.

Obviously, this aspect of the Core Clinical Competencies seems a bit Pollyannaish at this point – worrying about maintaining health when the patient has just had a massive and potentially life-threatening bleed into the very center of his brain. This is included for the sake of completeness (each case considers all the Core Clinical Competencies, but different competencies receive different emphasis).

Work with health care professionals, including those from other disciplines, to provide patient-focused care.

Right now, you are married to that neurosurgeon – you are joined at the hip, one and the same, because death stalks the land right now. Are you going to work closely with the neurosurgeon and all the other members of the operating room (OR) team to get out of this jam? As Sarah Palin would say, “You betcha!”

Medical knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g., epidemiological and social-behavioral) sciences and the application of this knowledge to patient care.

Demonstrate an investigatory and analytic thinking approach to clinical situations.

On goes your thinking cap – that blood pressure went through the roof for a reason. And that heart rate went down for a linked reason (vagal response to the massive increase in blood pressure). Of course, you do a quick check to make sure nothing else could have caused this insta–pole vault of the blood pressure (syringe swap, patient instantly getting “very light”). You jump to Cushing’s triad by putting it all together – complexity of the case; physiology of increased pressure in the brain; your look into the field, confirming a disaster.

Know and apply the basic and clinically supportive sciences that are appropriate to their discipline.

Before you cross the threshold into the neurosurgery room, you make sure you understand all the physiology that applies to these complex cases: cerebrospinal fluid formation; cerebral autoregulation; function of the blood-brain barrier; intracranial pressure; and cerebral blood flow responses to hypoxemia, hypoxia/hypercarbia, and potent inhaled agents. The supportive science for neuroanesthesia fills hernia-inducing textbooks.

The quick and dirty physiology that you draw on right now follows:

- the aneurysm popped
- blood is pouring into the “meat” of the brain
- as the brain expands, it attempts to maintain perfusion by increasing the blood pressure
- the heart (which has no way of knowing what’s up in the head) “sees” high blood pressure and reacts by slowing down

Practice-based learning and improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices.

Analyze practice experience and perform practice-based improvement activities using a systematic methodology.

Something about the surgeon being spooked about this case and saying “oh, shit!” tells you that you are in deep trouble right now. Call it the world’s fastest “analysis of practice experience”:

- This surgeon has been working for years.
- He knew this was bad going in.