VA Palo Alto

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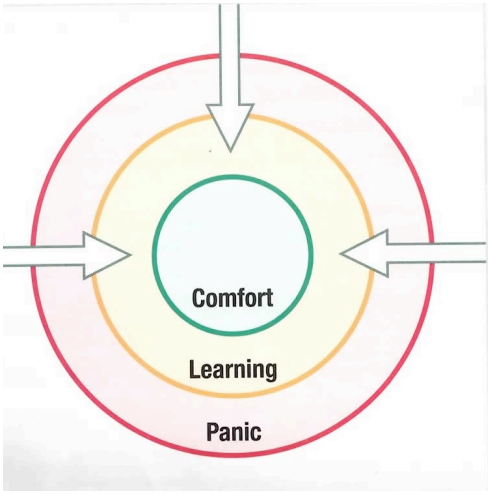
Thinking about education

This issue contains a collection of articles describing what physicians and nurses in the ICU are doing about improving patient care through education. Former fellow and Stanford Attending, Ana Crawford describes the range of activities that comprise fellow education, while Melissa La Pierre details new practice models for nurses as this profession adapts to changes in health care. CCM Fellow, Dan Sedehi provides some additional perspective on how to assure that self-education remains part of our daily routines. Appropriate to this discussion, SCCM President Pamela Lipset recently described a continuum of operations ranging from "comfort" to "panic," as indicated in the diagram, imploring critical care providers to push themselves beyond their comfort zone and take on new educational challenges. As we do hopefully incorporate some of these ideas into practice, let us not forget that Critical Care is inherently a "team sport," and that our learning will magnify further is we engage with another, and across professional lines as we discover new ideas. *Geoff Lighthall, editor*



Some thoughts on Critical Care Fellow Education

Ana Crawford, MD
Head of Fellow Education
Stanford Critical Care Programs

One of the strongest aspects of the VA Palo Alto and Stanford Intensive Care Units is the multidisciplinary approach to patient care. Having care teams comprised of people from different specialties contributes greatly to

the well-rounded care provided to our patients. We all have much to learn from each other if we examine another perspective and attitude toward patient care issues. Open communication between all medical and surgical services, nursing, respiratory therapy and pharmacy is a constant learning experience from which all benefit. Similarly, this approach is likely the strength of the Education program for the Critical Care Medicine (CCM) Fellowship. In our fellowship, Internal Medicine, Pulmonary Medicine, Neurology, Neurosurgery, Anesthesiology, Emergency Medicine, Infectious Diseases, Palliative Care, and Surgery comprise a growing network of patient care and physician education. This broad exposure is crucial for fellows to utilize when they move on to jobs in the community and other academic centers.

However, the educational approach for the CCM fellows involves more than rounding on multidisciplinary teams. For a start, *Medical knowledge, Professionalism, System-Based Practice, Practice-Based Learning, and Patient Care* are the core competencies set forth by the ACGME. In our fellowship program *Medical Knowledge* is covered by the core curriculum outline, the fellow core lecture series, and interesting case conferences, in addition to the active discussions in daily rounds. *Medical Knowledge* is likely more important to fellows during their training as it prepares them for the certifying exams administered by the American Board of Internal Medicine, the American Board of Anesthesiology, and the American Board of Surgery. Several of our fellows will sit for boards in other countries as well. A key aspect of fellow education then becomes expansion of *Medical Knowledge* for not only daily *Patient Care*, but also board exam preparation.

Most would argue that although board certification is important for measuring advancement in a field, the true goal is effective, compassionate and appropriate *Patient Care*. To determine the effectiveness of patient care, continual monitoring and reassessment of patient outcomes, as performed by our many Continuous Quality Improvement committees, is necessary. Further, compassionate care requires looking at the patient and their family outside of their current disease state. Medical illness is uniformly accompanied by stress in many forms. Financial stress, stress placed on family relationships, the stress of realizing ones mortality and the stress of losing control over ones circumstances; this is a small list of difficulties faced by our patients and their families. Again, we must train CCM providers in a multidisciplinary approach of *Systems-Based Practice* that utilizes spiritual and financial counseling, social services, as well as methods of educating patients and their families regarding their disease states.

In our aging population, determining whether P*atient Care* is appropriate is often a matter of much debate. We must provide our CCM fellows with the tools to adequately assess the services they provide in order to determine whether they are health promoting. Maintenance of ethical decision making within the patient's best interest and effectively conveying this to patients and their families is a key component in this determination. Conveniently, this also comprises the core of the *Professionalism* and *Interpersonal and Communication Skills* competencies set forth. Again, optimal care for patients requires a *Systems-Based Practice* method and

recognition that discussions regarding end-of-life care and Palliative care services may be included in that approach.

Practice-Based Learning implies a constant reassessment of the quality of *Patient Care* and a review of relevant evidence-based data to improve the *Patient Care* given. In this regard, Physicians best serve their patients by recognizing strong evidence that could change patient outcomes and treatment options. Increasingly, the amount of journals and medical resources are abundant and can easily become an overwhelming amount of information to dissect. Journal Clubs can be an effective way for faculty and fellows alike to discuss recent relevant articles and the strength of the data presented. However, it is imperative in order to maintain *Professionalism* that physicians have a basic understanding of how to interpret the medical literature and determine the impacts on *Patient Care* regardless of whether Journal clubs are available. This should be a key feature of any residency or fellowship training program.

Just as healthcare technologies and treatment options are changing, so too should our approach change to educating CCM providers. Our CCM fellows graduate into several practice settings from academia to private practice, and their fellowship years should prepare them for all. Additionally, exposure to CCM should further strengthen their capacity in their core specialty. We should not limit ourselves to covering the core competencies set forth by governing institutions, but instead be forward thinking in our methodology. Expansion of research opportunities for fellows at the bench and in the clinical setting allows for generation of evidence based medicine rather than its review. Allowing fellows to be involved in the many CQI committees facilitates education in developing protocols for safe and effective patient care. Mentorship from current faculty allows fellows to expand supervised teaching and lecturing activities, gives guidance on future career choices and settings, allows review of their evaluations placing emphasis on improvements in Patient Care, and assists fellows with organization of portfolios of academic accomplishments. Investigation of Bioinformatics and its impact on patient care, expansion of technical skills for diagnostics and treatments including bedside ultrasound and exploration of CCM in the global health setting are all key areas in the immediate future of our field.

Reevaluating the education process itself is important to maximizing its impact. The days of teachers lecturing to students and students reading their textbooks are largely gone. Today's education process must adjust to technology based resources, increased complexity and accountability of our health care system, and the increased availability of information for physicians, as well as patients and their families. The ideal CCM provider must not only have a wealth of medical knowledge, but also be compassionate, knowledgeable and sensitive to diversity, able to utilize healthcare system resources, treat patients based on ethical principles, evaluate care as effective and appropriate to be health promoting, constantly reassess ones approach to patient care, review relevant recent evidence based medicine, be a teacher, be a student, be technically proficient, think globally, and anticipate the needs of patients in the larger context of their health needs immediately and in the future.

The Clinical Nurse Leader

Melissa LaPierre, RN

The Clinical Nurse Leader (CNL) role is being introduced and implemented in healthcare settings across the United States. The role contrasts with other RNs as indicated in the table below and in the following ways. The Staff Nurse is the primary point of contact between patient and the health care system. Provides nursing care to the assigned patients, works with patients and families at the bedside and outpatient settings. Patient care quality is being maintained and improved by continuing education classes. Nurse managers are ultimately responsible for the nurses performance on their unit. Duties include setting up schedules, assign duties, responsibility for adequate staff training to provide quality care, budget, equipment, and interdisciplinary involvement. Case Managers are RNs that screen, asses, plan, facilitate and advocate for services to meet individual's health care needs through communication and process coordination. Case management approach assumes that clients will access services from a range of providers with a goal to achieve seamless service delivery. Interdisciplinary involvement is a must. The Clinical Nurse Specialist is an advanced practice RN with focus on specific patient population and certain types of diseases. Involved in clinical practice, management, teaching, research, and consulting. Usually CNS is an interdisciplinary team member. The clinical Nurse Leader is and advanced generalist accountable for the health care outcomes for a specific group of patients within a specific unit or setting. Manages outcomes in a specific setting/unit, introduces evidence based practice in order to improve quality of care. Assumes leadership role; interdisciplinary Involvement is a major component of a role in order to prevent communication gaps and fragmentation of care.

The CNL role was born out of necessities of our modern and ever changing world with new demands on outcomes rather than processes. It has been a difficult decade for a healthcare in the US. The Institute of Medicine (2000) report, "To Err is Human", cited evidence of 44000 to 98000 annual deaths in hospitals as a result of medical errors and called for increased efforts to reduce errors and improve patient safety (IOM 2000). The Institute of Medicine recommended five core competencies for all health care providers: patient-centered care, interdisciplinary teams, quality improvement, evidence-based practice, and informatics (IOM 2004). Nursing is the discipline that interacts with the patient from beginning to end should be at the core of the health care required. The delivery of health care serviced has gone through changes with patient care becoming increasingly complex, lengths of stay compressed, services offered in a shorter amounts

of time, and an accelerated need for continual education of health care professionals. The CNL role was described in the Working White Paper of the Clinical Nurse Leader in May of 2003. The vision was of a nurse generalist who would be prepared to address the complexities of today health care delivery with focus on improvement of quality and safety of patient care. CNL assumes accountability for the health care outcomes of a specific group of patient care unit or setting. Competencies achieved in the academic preparation of the CNL are categorized within the following role components: patient and staff advocate, member of a nursing profession, team manager, information manager, systems analyst/risk anticipator, clinician, outcomes manager, and educator. Among the core competencies of the CNL are communication and collaboration with other members of the health care team and interdependency of all involved disciplines.

	Staff Nurse	**Nurse Manager**	**Case Manager**	**Clinical Nurse Specialist**	**Clinical Nurse Leader**
Educational Preparation	ADN BSN	AND BSN	Baccalaureate degree	MSN	MSN
Licensure	RN	RN	RN Social worker (LCSW)	RN	RN
National Certification Requirements	None Specialty certification, for example CCRN	None	Accredited Case Manager Certification available	Yes (CNS)	Yes (CNL)

How to learn when there is just no time.

Dan Sedehi, MD
Former Medicine Resident and Medicine Chief Resident
Current Critical Care Fellow
Future Cardiology Fellow, Cleveland Clinic

As physicians, we love to learn. It is inherent to our beings. Why else would someone endure 4 years of university, 4 years of medical school, and at least 3 years of post graduate training (sometimes 9 or 10) before they can have their "real job". And even once out of training, medical education for the individual cannot stop. There is a thought process that goes through the minds of every resident. It goes along the lines of "Oh, things will be

easier when I am a BLANK (insert higher level of training, meaning resident, fellow, attending, etc)". The fact is that statement is utterly false. As you progress in training, time is even more limited and time for reading and learning seems to be usurped by time spent documenting fevers, disclosing to patients that they are MRSA positive from a nares specimen (which is now a law for the physician to do), and billing. Not to mention a life outside of the hospital.

So how do we do it?

Let us start with how we fail to accomplish this goal. And let us start at the beginning, with residents. Last year I was lucky enough to be one of the Medicine Chief Residents, and was in charge of the brunt of the educational system for the Internal Medicine Housestaff. I also was able to attend as a General Medicine Attending on the wards for about 4 months during that year. At the end of each of my months with the residents, during a feed back session, there was one statement that came out of every mouth of every resident when asked what they could be doing better. "Well, I need to read more." This reading of which they speak is with regards to medical journals. So yes, this first step in realization that they are responsible for their own education came through: their failure to be up to date on recent medical literature. They admit their weakness. But the next step, the solution to their deficiencies, came through with the same answer with an amazingly high fidelity: "I just need to read more." Right. Like me having this conversation is going to lead to a life changing moment when you suddenly take 20 to 30 minutes out of your day, outside of the hospital, to get yourself up to speed on medical knowledge. Fat chance. So just by saying we are going to do something, we fail to do just that. Without a plan, with backups and incentives or improvements in ease of learning, it will not happen. Trust me, I was there and said the same things. And also did not read except for those first few days after I had had those conversations with my attendings. So how do we do it? It is not so simple, but with a few steps, it can be achieved. Learning and reading that is.

1. Set monthly goals. At the beginning of each month, when I first met my new team of interns and a resident, I would lay out my expectations for them. One of these expectations was to set two educational goals that first night. They could be simple things, like improving their cardiac exam and hearing murmurs, to more complicated ones such as understanding anemia. I wanted to be simple enough to where they could be learned over the course of one month, because that makes them achievable. (Goal setting is a very important part of self-improvement. And achieving those goals is a crucial step.) I would then ask them to write their goals down as well as tell them to me. This way, they were held accountable to themselves and their supervisor, me. But by telling me, they would also enlist the help of someone who could be a resource for them, helping them over come roadblocks or testing their knowledge or mentoring them. I would them meet with them half way through the month, ask how they had progressed on their two goals, and what they had learned. If they achieved their goals, I asked them to put them to use for me. If they had not, I devised a plan with them to see

how they could achieve their goals. If they had met their learning goals, I asked them to pick two more. This process allowed them to set short-term, achievable goals, and celebrate the learner in each of them. It also gave them a pat on their own shoulders, letting them know that education was within reach, and was actually quite easy to do. Enabling oneself to drive one's education is quite enthusiastically adopted, once demonstrated that it can be done easily and efficiently.

2. Learning aids. Setting monthly goals sounds great, but it does take motivation, on the part of the individual, and even more importantly, on the part of the educator. Enter learning aids. No, they don't go in your ear and read to you while you sleep. These are services, usually online ones, which provide you with highlights of recent journal articles. They are not meant to replace reading the article itself, but at more meant to spark interest. One of the most cumbersome, and therefore limiting, steps of reading journals is trying to sift through all of the non-interesting material. These services do a great favor by introducing you to the topic briefly, and should you desire more information, allowing you to link directly to the article. Here are two of the readily accessible aids (I am particularly fond of these two).

- Journal Watch.(http://www.jwatch.org/). This is a great service with multiple different subheadings, cardiology, GI, Hepatology, pulmonary, nutrition, that allow you to customize the area of medicine in which you wish to receive weekly updates on recent scientific papers. Sent to your email account, this is a great service. The emails are less than one page, they have a title of the article, the authors, and a short one to two line summary of it. There are usually three to four articles highlighted each week.

- Critical Care Smart Brief. (http://www.sccm.org/Pages/default.aspx). This is another service that provides the recipient with information about the critical care community and recent changes, notable achievements, etc. It is not as useful or simple to navigate as Journal Watch, but is worth a look. It has many more discussions regarding systematic changes leading to improved patient care and safety, as well as highlights of nursing communications and resources.

There are other learning aids that are different and for that reason, let me highlight them in the next section.

3. Audio learning aids. In the age of the iPod/iPhone/iPad, learning has surely become truly multimedia. Looking through the iTunes podcast store, there are any number of wonderful resources that tout medical education and knowledge as a benefit. Some of these are much better than others. My recommendation is to try as many as you can (they are free after all!) and see which fits you and your lifestyle. The benefit of these is that they can be listened to while on your bike, going for a run, cooking dinner, whenever you

are close to something that can play back sound. I find these particularly useful for those times when I am doing something lazy, like cleaning on a Sunday morning or riding the bus or my bike to work, and want to learn about a new innovation. Here are a few of my favorites.

- POEM of the Week (POEM stands for Patient Oriented Evidence that Matters). Quick discussion about a recent article and how it is relevant to patients. 5-10 minutes each
- SCCM weekly podcast. Goes into depth about a particular article, usually in a discussion with one of the authors of the study. 10-20 minutes each.
- New England Journal of Medicine weekly podcast. Goes through the table of contents and a usually reads the abstract for each original article. 8-15 minutes.
- Annals of Internal Medicine weekly podcast. Same as the NEJM podcast. 8-15 minutes.

There are many of these around, so check out what works best for you. But do remember, these are often discussions and opinion pieces, so if you are curious and quite rigouours about your education, it may behoove you to see the article yourself if you are curious about a certain discussion piece.

4. Online discussion forums. This is the last tool I will discuss. To be honest, I am familiar mainly with a very successful site started and run by the New England Journal of Medicine called CardioExchange. (http://www.cardioexchange.org/). This is a website where news in the cardiovascular world is published as a discussion topic and recognized world experts hold a discussion forum on their interpretation, along with other members and discussants views, on recent articles. It is a GREAT resource, because as residents, it is one thing to be able to read and interpret an article, but we all are still learners and use more experienced mentors to help guide us, and this service provides essentially online mentors in thoughtful, sometimes heated, discussions.

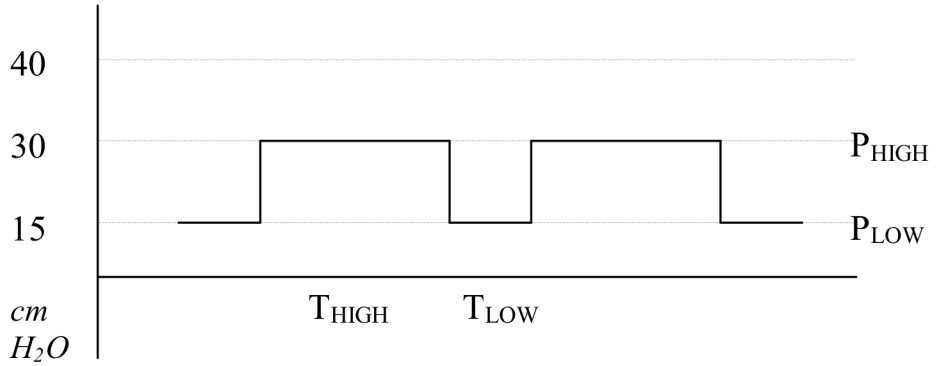
Continuing your education throughout training is incredibly difficult. Much of the time, many people to not develop the resources and skills necessary to continue their life long learning adventure until they have finished their residency. With these resources, there is hope and one can start early. Start learning today!

What is APRV??
Brad Wee Tom

APRV stands for Airway Pressure Release Ventilation. This mode is essentially a raised CPAP mode with a short release phase. Because it is a

pressure mode and not frequently used except after all other modes have failed, the mechanics and use of APRV are not well understood by most critical care practitioners.

How does APRV works?
With APRV, the traditional components of inspiration and expiration are replaced by plateau and release phases as shown in the figure below.



As one can tell from the figure, a sustained mean airway pressure is generated, which provides for alveolar recruitment and oxygenation. The effective tidal volume (and hence CO_2 elimination) is accomplished during the release phase (T_{Low})by adjustment of the pressure minimum (P_{LOW}, described below). As such, APRV is a form of inverse ratio ventilation.

Goals and Applications
The Goal of APRV is to maintain recruitment of poorly compliant lung, and protecting the lung by minimizing shear stresses. Indications for APRV include poor oxygenation (with FiO2 ≥ 60%, PIP≥ 35cm H2O and or PEEP ≥ 10cmH2O), failure of traditional lung protective strategy, pulmonary contusion, and pulmonary edema.

Benefits of APRV include more effective maintenance of alveolar patency, alveolar recruitment, potential for less sedation or paralytics compared to traditional mechanical ventilation, better oxygenation at lower peak and mean airway pressures, and maintenance of spontaneous respiratory drive.

Setting up APRV
The main settings for APRV are as follows:

- **T_{HIGH}** Inspiratory time. The time spent in the high pressure recruitment phase, which is typically set 4-6 seconds in adults resulting in inverse ratio ventilation.
- **T_{LOW}** Expiratory time. The time spent at the lower pressure de-recruitment phase which is typically set 0.5-0.8 seconds
- **P_{HIGH}** Inspiratory or plateau pressure delivered during $T_{HIGH.}$
- **P_{LOW}** -Positive end-expiratory pressure corresponding to T_{LOW} which is typically set at 0 cm H_20
- **ATC**- (automatic tube compensation) used to improve CO_2 elimination

How to wean from APRV?
As with all vent weaning, separation for APRV involves coordination with all parties to minimize sedation. ATC is used to decrease the work of breathing. Generally, the FiO2 is first decreased, then the P_{HIGH} in small steps. As the compliance improves the T_{HIGH} and T_{LOW} are adjusted in small steps to restore a normal i:e ratio. Once the P_{HIGH} is at a CPAP level between 10-12 cmH_2O, consider changing to CPAP with or without pressure support.

Something about Epidural Anesthesia

Geoff Lighthall

Epidural anesthesia describes the administration of bioactive medicines above or outside the dural covering of nerve roots and the spinal cord. The rationale for epidural use is to get the medicine to the nerves that carry pain signals to the spinal cord, and hence address the neural substrates of pain in the most direct and specific manner with the least amount of medicine. Epidurals are named by the vertebral interspace where the catheter enters. For example a T7 epidural rests in the middle of the thoracic spine.

Classes of drugs you will see given in an epidural include local anesthetics, which actually block nocioceptive (pain) pathways by blockade of neural sodium channels, and opiates which activate specific receptors in dorsal nerve roots as well as centrally following diffusion to the spinal cord and brain. You will see these drugs used either in isolation or in combination. Typically, opiates are good at taking care of pain in resting patients, but are not very effective for dynamic pain, meaning during motions such as walking or coughing. Much larger doses of IV narcotics are needed to achieve the same degree of pain control, so the epidural route is ideal for elderly patients or those preferring to be more alert. Itching and nausea are the most common side effects as well as respiratory depression from synergy with IV opiates. Pulse ox monitoring is indicated for the first night following a combination of epidural and IV opiates.

Since local anesthetics work on all classes of nerve fibers, loss of strength and sympathetic tone are always concerns with their use. It is rare to have a thoracic epidural prevent ambulation, but one must observe the patient for any unintended weakness. The sympathectomy from local anesthetics turns out to be on e of the most controversial topics in hypotensive patients. Often large intraabdominal operations give rise to large "third space" fluid losses, which can cause hypovolemia and hypotension. With an epidural in place, it is often turned off with the idea that it is a major source of hypotension. While it is true that some vasodilation results from epidural local anesthetics, one must ask whether this is really the *cause* of the hypotension or a bystander? In the first night of an open AAA repair or exploratory laparotomy, the epidural will probably require that an extra 300-500 ml of fluid be given. One must question the logic of sacrificing good pain control for a 10% savings in infused fluids

(given to take care of a much larger underlying process). While you can always start the local anesthetics later, this practice is often associated with giving larger amounts of local to establish an effective block level, and this is likely to result in a greater hypotensive stress than letting things run at a low level overnight.

Starting epidural infusions in the ICU

There is tons of work and many decisions anesthesiologists need to make at the end of a large cases, so it is more the norm to give boluses through an epidural and "load it" than to take the time to start continuous infusions. *Nonetheless, the kinetics of the drugs given is dependent on infusions starting within 30 minutes of arrival at the ICU.* If the bolus drugs are allowed to wear off to lower levels or until the patient is uncomfortable, the infusions will not work and the patient will experience greater hemodynamic stress in re-establishing analgesia.

Mechanical complications

The greatest fears associated with epidurals are not directly related to the medications used, but to direct damage to the nerves or compression by hematomas created during placement and removal. Accordingly, the timing of catheter movements requires careful attention to the use of anticoagulants. The anesthesia team needs to know exact timing of lovenox, unfractionated heparin, plavix and IIb/IIIa inhibitors such as integrelin, so please offer this information if not asked directly.

General ICU News

Post arrest hypothermia

In some types of cardiac arrest, notably survivors of VF/ VT arrests out of hospital that remain comatose on arrival, cooling of the patient to 33C for 24-36 hours has improved neurologic status on discharge. While we do not have many of these patients, there may be others with in hospital arrests that may benefit for cooling. With this in mind Dr. Leland Lim of Neurology has worked with the ICU and medical management committee to receive approval for a comprehensive post-arrest cooling protocol. Key elements include use of sedatives and paralytics, and a cutaneous warming/ cooling device called the artic sun. Except for the latter device, the drugs and monitoring used to cool patients should be quite familiar to the nurses, pharmacists, and respiratory therapists caring for post arrest patients. In-services and additional details regarding all of these elements will be provided in the near future, and before the protocol goes live.

ICU Protocols and Procedures Manual

What does sepsis management consist of? How do you transfer a patient to Stanford at night?? There is now a black binder with laminated cards describing various algorithms and procedures for high risk events, and other useful information. It is kept at the "doctors desk" in the ICU, but is for all to use. Please keep contents intact and return it when finished.