

## ACADEMIC ANESTHESIOLOGY DEPARTMENT BLUEPRINT

### **Executive Summary**

W. Andrew Kofke

April 2, 2011

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The mission of the Department of Anesthesiology is to advance the science and practice of anesthesia through the integration of medical and graduate education, patient care, and research in a single academic community.

My vision of an academic anesthesiology department encompasses development and maintenance of excellent programs in clinical care, education, and research. All subspecialties of anesthesiology are practiced with increasing involvement in external remunerative activities. Residency and medical student experience is of the highest quality, including use of simulation. The research program includes clinical and laboratory research with identified areas of excellence with external funding.

### **Blueprint**

*Clinical service* will be based in multisubspecialty practice in perioperative medicine with the core competencies remaining in the OR, ICU, and pain clinic. Anesthesiologists have multiple tasks and challenges relating to operating room anesthesia. These include running an efficient preop evaluation clinic, solving manpower issues with respect to direct provider caregivers and faculty, supporting trauma services, providing anesthesia at multiple remote sites, and developing and implementing ideas for cost containment. The surgical intensive care unit should be staffed by faculty from anesthesiology and surgical services with interdisciplinary coordination at the faculty and housestaff level with a meaningful role for critical care nurse practitioners. The pain service will ensure minimal perioperative pain and provide leadership in the management of chronic pain and palliative care. An information management system should be in place to facilitate cost containment initiatives, increase efficiency of caregivers, and improve quality of care. Such a system can be helpful in documenting the excellence of clinical care provided by the institution. *Decision support systems* are available to manpower decision makers to enable performance of “what-if” analysis of various scenarios and application of evidence based medicine as applicable..

*Research* activities are multiple faceted. Research is primarily driven by clinical problems, involving the complementary expertise of basic scientists and clinicians. One important mechanism to foster and support clinically relevant research is through disease-oriented program development. Such programs, composed of clinicians from diverse specialties and basic scientists, can effectively focus their members' varying perspectives to most expeditiously solve clinical problems. A clinical trials program is set up in the department or the institution to facilitate negotiations with industry to perform research studies. The department's most finite and valuable resources, time and academic funds are fairly allotted through a seed grants mechanism. Department faculty can act as advisors to undergraduates and high school students wishing to gain an exposure to medical research. A bioengineering program can effectively add another dimension to the research and business efforts of the department. The traditional ways of funding research, while still useful are very elusive for clinical faculty who are subjected to increasing clinical and administrative demands. Options for funding research include grants and contracts, institutionally or insurance supported cost effectiveness research, industry-sponsored specific product evaluation, moonlighting (internal or external) to augment funds for an individual faculty for research, and increasing the revenue stream to the department through external business activities. A program in education research is based on the controlled conditions available in the simulator. New faculty start up remains a difficult problem and several options are available for a given situation.

*Education* activities are mostly focused on resident education with important consideration given to medical students, fellows and others. An organized didactic schedule covers material needed to become board certified. High quality residents are presently rather difficult to attract. A variety of strategies are employed to facilitate resident recruitment and retention. A residency academic track is available for residents interested in pursuing an academic career. A T32 or equivalent research education grants are available or are sought.

*Outreach* activities are an essential component of a department's marketing plan. Such activities are done to maintain the excellent reputation of the department in the medical center, in the region, and nationally using described outreach tools, publications, and selective use of visiting professors. Anesthesiology faculty are encouraged to participate in outreach of other health system programs, particularly if they are members of multidisciplinary disease-oriented programs.

*Business* activities should be fostered to support the academic mission of the department. University affiliated business activities, as warranted by available markets, can be developed in areas relevant to faculty expertise such as monitoring, pain management, locum tenens, respiratory therapy, critical care transport, telemedicine, legal consultation, or academic peer review for publishing houses.

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An academic anesthesiology department is a place where high-level anesthesia is practiced in an environment of new ideas. Both of these elements must be present. A department which becomes lopsided in the direction of one area or the other (ideas vs. service) no longer is an academic anesthesiology department. Too much clinical service results in physical exhaustion and loss of intellectual vibrancy. Too much emphasis on research results in loss of clinical skills and decrement in quality of service.

### **I. The Mission**

***The mission of a Department of Anesthesiology is to advance the science and practice of anesthesia through the integration of medical and graduate education, patient care, and research in a single academic community. This is a fairly generic mission statement describing the essence of the mission but typically can have variable forms and specific syntax.***

### **II. Vision Statement**

As a corollary of a mission statement there should be an indication of the vision of the department as developed by faculty under guidance of department leadership. I propose the following as my current vision of a health system Department of Anesthesiology:

**Clinical Programs in all subspecialties of Anesthesiology will provide excellent cost-effective care. Clinical expertise in Anesthesiology and its subspecialties will be identified as an area of excellence of the health system. In addition, the Department will have developed a network of non-OR services and external affiliate clinical sites and other external activities, thus providing a broad portfolio of services. The extensive clinical practice, efficiencies, and search for other relevant revenue streams will provide the additional revenue which will allow the department to support its academic missions.**

**Educational programs will include a high quality residency program attracting the highest caliber physicians eager to receive training in anesthesiology or its subspecialties at the health system. In addition, the cognitive science and simulation center will be established as a leading program with a fellowship program attracting trainees from multiple disciplines and funding sufficient to cover operating costs. The medical student experience in the Department of Anesthesiology will be dynamic,**

**stimulating, and challenging, constituting grounding in acute care which will be of use to these nascent physicians throughout their careers. A high quality teaching program will be in place available to all in the department including a comprehensive didactic program, morning report, informal seminars, journal clubs, research conferences, and bedside teaching.**

**The research program will include clinical and laboratory research with identified areas of excellence and with external funding. The research program will also include cost effectiveness research, outcomes research, clinical trials, and education research. There will be periodic research seminars and collegial peer review of ideas, manuscripts, and grants. Mechanisms will exist to provide internal funding and allocate time based on internal communications outlining and “contracting” with the department for these valuable resources(time and funds). Department research expertise will be available to enhance science training of medical students, undergraduates, and local primary/secondary school students. The department will have an externally funded research training program.**

### **III. Blueprint**

It is my impression that to a variable extent, many of these vision statement goals have already been met in most academic Anesthesiology departments. In light of this the specific vision for a given health system department of anesthesiology is to maintain areas where there is already success and build upon them to improve successful programs and facilitate establishment of successful programs in other areas.

One primary vehicle of implementation will be application of principles from the business sector to the development of a regional and profitable externally affiliated and marketed program in anesthesiology services. As I progressed through business school I came to appreciate many applications of business approaches in academics. For example, there is a portfolio theory of investments which suggests that an investor should have many investments to minimize risk. It seems that this notion can be applied to Anesthesiology by developing income generating programs in OR anesthesia, ICU, pain, monitoring, and so on. Moreover, as a new project is contemplated, techniques from finance literature might be implemented to assess financial risk. Marketing techniques can be used to develop and promote products of the Anesthesia department, including the residency. Management techniques can be used to maintain productivity of personnel.

The details of this vision follow, representing a compilation of ideas, my own and others' I have picked up over the years. These important components form my “**blueprint**” of a successful academic anesthesia department.

*It should be noted here that these ideas need to be prioritized in a given department with an assessment of those that are already accomplished and an ongoing concomitant*

*assessment of feasibility for other goals. These many ideas should not be implemented over a short time period. Rather, these ideas and the change they may represent have to be implemented after a significant period of assessment of current activities and culture, then followed by moves to implement these ideas as opportunity and/or need indicate. Thus, this overview should relay an impression of my overall philosophy and approach to development of an academic anesthesiology department.*

## **A. Clinical Service**

Areas of clinical service include operating room anesthesia, remote anesthesia, pain services, and intensive care units. Within these areas, in addition to the very important traditional role of administering anesthesia in the OR, the anesthesia department has important roles in information management, scheduling, cost containment, and other areas. Important issues in these clinical areas are discussed.

### **1. Anesthesiologist as a perioperative physician:**

Anesthesiologists provide many useful services in the care of patients perioperatively both in and out of the OR area:

- Pre op clearance/evaluation
- Intraoperative management
- Critical Care
- Pain management
- Transesophageal echocardiography
- Intraoperative and perioperative monitoring
- Neurological monitoring
- ECMO support
- Malignant Hyperthermia management
- Status epilepticus management
- Status asthmaticus management
- Airway management out of OR
- Vascular access
- Sedation

### **2. Operating Room (OR)**

- *Pre operative clinic and evaluation.* When outpatients are scheduled for surgery they can visit the anesthesia clinic to:
  - \* Facilitate efficient perioperative evaluation and collection of data; and
  - \* Ascertain medical optimization for surgery. It seems inappropriate for internists, who are not expected to be knowledgeable about perioperative medical and logistical issues, to “clear” a patient for anesthesia and surgery. The most sensible approach is to get medical evaluation to ascertain optimal

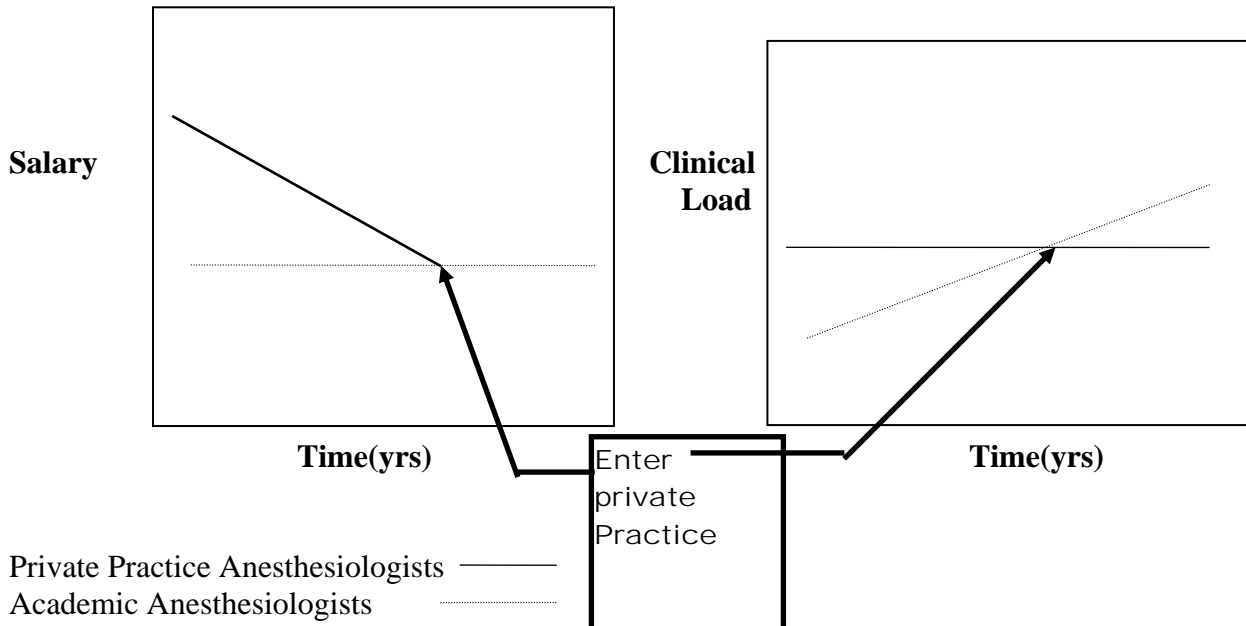
medical management and have the patient's anesthesiologist and surgeon, not in the holding area, "clear" a patient for surgery.

- *Manpower: hands-on care givers.* The limitation of work hours for residents has lessened the availability of residents for clinical services. There are several options available to deal with this problem. Each option has advantages and disadvantages making the right thing to do a qualitative judgment.
  - \* Faculty physician-administered anesthesia. Helpful to maintain faculty skills but decreases time available for administrative and academic activities. Probably not the most cost effective model in a capitated environment.
  - \* CRNAs. Generally very good and efficient practitioners but as a group (AANA) eager to practice medicine without medical training.
  - \* Anesthesiology Assistants. These are essentially physician assistants, practicing under the medical practice act, not the nursing practice act, and thus practice under the license authority of the supervising physician. Generally very good with different background than nurses. Not approved in most states. Thus, advocacy will be need to gain access to them.
  - \* Fellows. Fellows can be used as high level residents but cannot totally replace residents. PSGMS has several high quality subspecialty programs which can be used to attract fellows who can provide some clinical service. The availability of fellows tends to be inversely related to job opportunities. There will not be too many fellowship applicants in the near future.

. I believe the chairman should have available a decision support system which will allow "what if" analysis of differing manpower mixes in the context of the local payer mix.

- *Manpower: faculty.* The late 1990's saw a severe decrease in numbers of American graduates entering anesthesiology programs. . Since this time with the forces of cost containment at work with decreasing reimbursement, there has been an increasing emphasis on efficiency and increased clinical volume with longer clinical days, creating a situation conducive to burnout and early retirement. As a result departmental faculty can get lucrative offers to go elsewhere.

It is thus mandatory that present faculty are not given internal reasons to leave, which combined with external inducements, could severely compromise the ability of the department to carry out its mission.. The more the practice of anesthesiology at ahealth system resembles private practice the more difficult it will be to retain faculty. I conceptualize this as follows:

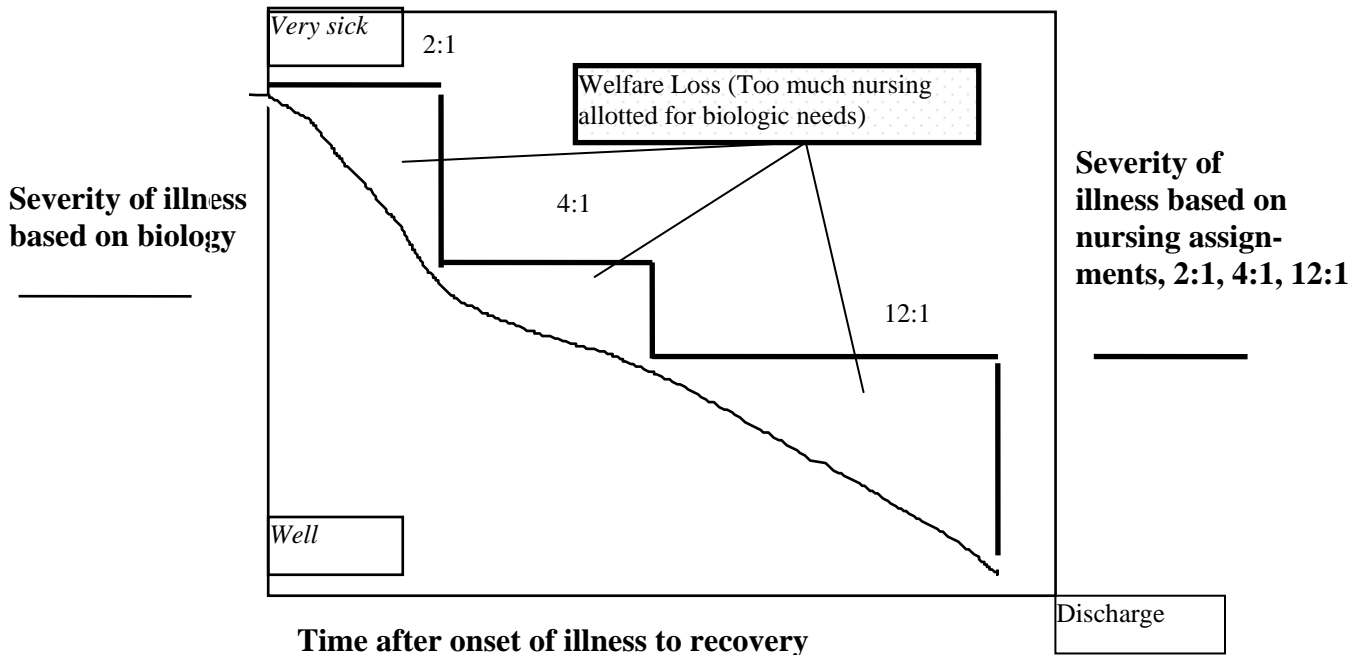


Although it may not seem cost effective in the short term, my analysis of these trends indicates that it is essential that Anesthesiology faculty be competitively compensated and that faculty members are enabled to develop and achieve academic or professional goals. Losing an excessive number to the free market will introduce excessive recruitment costs and likely replacement with lower quality anesthesiologists or anesthesia manpower mix. I have witnessed the consequences of a short-sighted philosophy in the treatment of academic anesthesiologists. These are not theoretical concepts.

- *Trauma services.* The ED can be set up like the OR with respect to equipment and responsibilities. This minimizes confusion and allows MDs to function as they do daily in the OR. Trauma-oriented anesthesiologists are recruited/developed/retained whose careers are invested in traumatology clinical care, teaching, and research.
- *Remote site anesthesia services* are available both in the health system and externally.
- *Cost containment.* Many approaches are possible to decrease medical costs in the acute care area. Some examples:
  - \* Blocks/Lines pre OR by MD/CRNA/CRNP/PA. Every effort is made to use highly expensive ORs for surgery only and not for preparation or recovery

from surgery. Typically lines or blocks are placed in the fully staffed OR. If such procedures could be performed outside the OR, efficiency of OR use should improve.

- \* ICU/IMCU together in a BIG unit. Recovery from an illness progresses along a biologic continuum. Unfortunately we apply resources to this process in a discrete rather than continuous manner. This concept is depicted in the graph below:



Commonly, patients do not graduate to a lessor level of care until the next morning or shift when they are thought to be safe for the lower level of care. A patient may require 2:1 nursing in an ICU and then progress through 1:4 to 1:8 level of biologically required acuity but still be in the ICU until thought safe for 1:12 on the floor. Thus resources are being wasted as the patient progresses through recovery to be sufficiently stable for the floor. Moreover, as nursing acuity decreases it becomes increasingly difficult to place the patient in an efficient unit. That is, a 4-bed IMCU is not efficiently run with anything less than a full census. However, one reason patients require intermediate care is observation for deterioration. Thus, deterioration in a separate IMCU mandates a move to the ICU when most ill. It seems most logical to develop a quite large ICU-IMCU, perhaps 30 beds. All thirty beds are equipped for ICU level care but, depending on the needs of the shift, nursing assignments are optimized dynamically in accord with the biologic needs of each patient.



- \* Maximal OR use. Anytime an OR is not being used represents an inefficiency due to not using fixed cost assets. The more the facility can be used the better off the system will be due to economies of scale. It thus becomes fiscally sensible to run the ORs until 11PM and on weekends with elective cases. There may even be a market segment of patients preferring to undergo outpatient surgery at these non-work times. Such use will mandate implementation of shifts, not simply added late work or overtime, even by surgeons, to avoid burnout, bad morale and attrition with loss of human capital.
- \* Increase AA/CRNA autonomy but still maintain dependence on MDs. There is a significant economic literature on substitution of physicians by less expensive caregivers. This is applicable to a broad range of disciplines. Such substitution has a ceiling, presumably due to physician skills which cannot be adequately performed by any other but a physician. It is possible that some of the vigilance and technical functions of physician anesthesiologists in the operating room might be given over, even more than presently, to CRNAs or Anesthesia Assistants. The anesthesiologists would then be more involved in medical issues, solving problems, and being present for particularly unstable situations. Thus having MDs concurrently supervise more AA/CRNAs (less closely than now) should result in lower system costs. This will necessitate giving CRNAs more autonomy and as such might constitute a decrease in overall quality of care due to less medical oversight. However, with a current anesthesia-related mortality of about one in a million it seems that there is room to try new ideas which might improve efficiency. I do not particularly like this due to efforts by the national CRNA organizations to replace anesthesiologists. Moreover this would represent a radical departure from the current academic model of Anesthesiology. Many issues would have to be resolved before implementation.
- \* Low-flow anesthesia, computer controlled. Hundreds of thousands of dollars annually have been calculated as potential savings in some anesthesia departments through the use of closed circuit anesthesia. High tech computer-controlled closed circuit anesthesia machines exist and can be applied to decrease volatile anesthetic consumption.
- \* BIS to more closely titrate anesthesia. Bispectral index is a processed EEG monitor; a multiparametric index derived from EEG to determine anesthetic depth. It is used to more closely titrate anesthetic depth thus resulting in faster wakeup in the OR and less anesthetic drug use and less use of OR and PACU resources. This has been demonstrated in several publications, although all have been funded by the company marketing the device. However, I observed the phenomena using compuRecord electronic anesthesia record at WVU.
- \* Cost effectiveness research program. Hospital R&D. Most major corporations underwrite research and development programs. This is done to

make and/or save money. To an extent University Hospitals should have similar programs. The hospital supports research to assess safety, cost, and efficacy of ideas for cost containment (not medical efficacy) to determine if they will possibly adversely affect quality of care and actually save money.

- \* Cost containment ideas. If someone in the health system organization thinks of a new idea to save money which is documented to do so safely then that person gets 20% of the first year's documented savings.
- \* Anesthesiologist-intensivist might cover 1 OR and the ICU, if OR and ICU physically proximate. This will result in more efficient use of the intensivist's time. It may make the intensivist unavailable for ICU problems and a backup system would have to be set up. Billing rules might be an obstacle.
- \* Efficient PACU use
  - ◇ Blocks/lines in am
  - ◇ Fast-track anesthetics to decrease or eliminate PACU time
  - ◇ Overflow unit for ICUs

### 3. Critical Care

- *Joint ICU service.* Anesthesiology should be involved in several critical care subspecialty areas: general surgical ICU, trauma ICU, neuroICU, CTICU, and pediatric ICU. Anesthesiology faculty with suitable training can also contribute to the medical and neonatal ICUs.
  - The SICU which sees trauma patients is optimally organized if a system is set up that involves intensivists with base training in surgery/trauma and anesthesiology.
  - Similarly the neuroICU should involve neurointensivists with multidisciplinary base training from anesthesiology, neurology, neurosurgery, emergency medicine, internal medicine and perhaps other fields.
  - The optimal CTICU staffing paradigm appears to entail having critical care trained cardiac anesthesiologists round.
  - The PICU should be managed by pediatric intensivists with base training in pediatrics, anesthesiology, or both.
- *Critical care service line and fellowship.* This broad experience and contribution to critical care suggest the notion that the health system critical care service line should administratively reside in Anesthesiology. Moreover, such a setup is then conducive to the creation of a multidisciplinary critical care program.
- *A critical care nurse practitioner (CCNP) can be used to help housestaff with their routine tasks and decrease need for residents in the ICU.* This is only be cost effective if there are insufficient residents to properly cover the ICU.
- *Intensivists should have a primary role in bed allocation and cost containment initiatives*
- *Telemedicine program.* All ICUs in the health system can be monitored by telemedicine ICU nurses and physicians to thus provide 24 hour attending coverage

of all of the ICUs in the health system. Moreover such a system could be used contractually to cover external ICUs and encourage referrals from those ICUs.

- *Monitoring program.* Monitoring can become quite complex in some patients. The time needed to properly evaluate 24 hr monitoring data and trends can be substantial. Given the time pressure on ICU rounds this is seldom properly done. Thus the notion that a team of ICU-trained physicians with no or less direct patient care responsibility could take on the task of intensive review and interpretation of complex monitoring data.

#### 4. Pain and Regional Anesthesia

- *Perioperative acute pain service.* An acute pain service should be available to manage difficult pain problems after surgery. Optimally the health system might one day advertise the prospect of painless surgery. I believe this is now possible for many procedures and if realized could be an important marketing tool.
- *Chronic pain clinic.* As part of multidisciplinary service anesthesiologists with proper training can provide an important contribution to chronic pain management and research.
- *Palliative care.* Pain physicians are well equipped to oversee a palliative care program and participate in hospice care.
- *Regional anesthesia.* A well run regional anesthesia group can save money and improve the experience of all surgical patients. Moreover, recent data suggests that central neuraxis blockade may have an impact on metastasis of cancer.

#### 5. Information management system for OR/ICU.

. Statistical methods to model OR and ICU patient flow is a research area area within anesthesiology. Paradigms being developed by these researchers should be evaluated and as appropriate trialed and implemented. The data that forms the foundation for such work and its implementation is a good information management system. The following characteristics are suggested.

- *Times logged for patient locations and progress through system.* This provides invaluable information about the efficiency of the facility and where things can be improved. GPS technology may be effectively used for this.
- *Mechanism to log, in a searchable manner, flaws in the system and patient morbidity situations.* That is, as they occur, care givers fill in a comment page about patient problems, especially if they have a system cause.
- *Searchable database of anesthetics used and equipment used.* As an anesthetic, drug, or equipment is consumed the system should be aware so just in time supplying can be done. In addition care-giver practices and their financial costs can be tallied and fed back quickly. . All physiologic signals and drug information is automatically downloaded and archived. This information has been used to assess financial aspects of anesthesia practice at WVU.
- *APACHE system for ICU.* APACHE systems, although expensive, can be used to compare patient outcomes, adjusted for illness severity, with expected outcomes

based on very large national samples. Such data can be used as a QA and marketing tool. For example, when I was at Pitt we discovered subarachnoid hemorrhage patients do better than expected in terms of mortality at UPMC than as predicted by APACHE. This was used as an outreach tool.

- *Medical Archive Retrieval System.* All dictated medical records are in a searchable database available to all faculty.. In addition, all lab data is also automatically entered into the system. This provides an invaluable resource for patient care and QA. Such data can be imported into formatted progress and procedure notes.
- *Decision support systems* are used by manpower decision makers to perform “what-if” analysis of various scenarios.
- *Anesthesia quality institute.* By developing an electronic anesthesia system the health system can contribute to and query the national AQI which is now being developed.

#### 6. OR scheduling.

This is computerized and remotely searchable. It is tied to surgeons’ track records for time to do specific procedures (minus anesthesia times) to appropriately schedule time for a proposed procedure. It can be accessed remotely and permit the clinician to see a summary of his/her scheduled procedures and be able to easily pull up all clinical data on each patient. It provides data that allows for QI evaluation and to develop and support algorithms for optimal constraint based scheduling.

#### 7. Personnel use.

Is there a potential for increased efficiency in knowing where personnel are at all times? Technology is available, developed for inventory control which can allow a central organizing site to know the location of all personnel. (Will they all go on strike with such big brother technology?) Moreover, people doing clinical work should never be pulled from the bedside to answer the phone. There must be increased use of headphones and/or cell phones which permit health care workers to do phone tasks (and possibly dictation) while walking from one place to the next or while doing bedside tasks.

#### 8. Health System -Growth of Anesthesia Services

As outlying hospitals affiliate with the health system or come under the health system control, the affiliated anesthesia, pain, and CCM physicians should become part of the the health system anesthesiology department. Between-hospital cross-fertilization will then be possible. In addition such affiliations should be expected to help underwrite the academic mission. In addition, we will then be in a position to provide physicians who are highly skilled and able to better deal with the occasional patient with complex medical problems and permit patients to safely stay in a lower cost affiliated hospital.

**B. ACADEMIC**

1. Research

*Research dedicated scientists* are an essential component of an academic department's research program. Such people must be an active part of the day to day life of the department and be capable of collaborating with clinicians.

*Clinician-scientists* are also an essential element of an academic department's research program. They are thought to be valuable entities by NIH and should be well positioned to pose clinical relevant questions and develop translational research programs.

*Multidisciplinary problem-oriented programs* Anesthesiologists have expertise which can be helpful to a multidisciplinary team oriented to researching a specific basic science question or disease. For example, I was a member of a University of Pittsburgh subarachnoid hemorrhage research group. This group evolved while I was there into the UPMC Stroke Institute. I was a contributing founding physician and was on the executive committee. This group was composed of neurosurgeons, neurologists, neuroanesthesiologists, neurointensivists, Ph.D. scientists, Ph.D. nurses, critical care nurse practitioners, and technicians. All were focused on stroke both clinically and academically. Indeed I believe this is one very important means to stimulate and develop infrastructure for clinically relevant research in the modern academic medical center and anesthesiologists can be valuable contributors, followers, or leaders..

*Clinical Trials Program.* Program to provide clinical material for pharmaceutical industry. This program is designed to provide patient access, cut the red tape and minimize indirect costs for drug companies desiring to trial new drugs in a clinical setting.

*Seed grants.* The anesthesia department has a program for formal submission and review of seed grants if faculty desire departmental funding and/or time for research. Such activity provides grant-writing training and forces faculty to solidify ideas through the stress of peer review before actually performing the experiments.

*Support for manuscript and grant writing.* Secretaries and business administrators experienced with grants are available to faculty, particularly to deal with the administrative aspects of a grant. The faculty focus on the science and not the administrative minutiae. In addition, optimally, editorial assistance should be available to critique writing and proof for style and grammar issues and resources are available to check for inadvertent (hopefully) duplicate phrases found in already published articles.

*Cost effectiveness research program.* Hospital R&D. As described above.

*Bioengineering.* Anesthesiology is a fairly high-tech field. As such it is appropriate to develop a bioengineering effort which can allow the department to develop and test new

technologies. Such a research group could develop patentable technologies and/or collaborations with the private sector which would might benefit the institution financially. Moreover such a group could develop and oversee an anesthesia technician training program.

*Undergraduate/primary school research program.* On a limited basis some talented high school students can perform straightforward projects in a medical school laboratory. This can be supported by anesthesia faculty, thereby improving the image of anesthesiologists and possibly developing a young person's interest in science, medicine, or anesthesiology. Examples from Pennsylvania:

- Pennsylvania Jr. Academy of Science Collaboration. The Jr. Academy of Science is a Pennsylvania program which encourages involvement of high school students in research. Faculty are encouraged to participate in this as mentors or judges for research presentations. Such activity can only enhance the local image of the medical school.
- Young astronauts (or equivalent). In my prior years at HMC I sponsored the Young Astronauts Program at Derry Elementary School. Myself and colleagues participated in science education activities with elementary age children, including a trip to Goddard Space Center in Maryland.

## 2. Doing more(or the same) academically with less.

*How to maintain research activities with decreasing clinical income.* Dwindling clinical dollars are going to result in a decrease in salaries or a decrease in nonclinical time. If the choice initially is to decrease nonclinical time, then the only way clinicians will be able to participate in research will be through the availability of highly-trained assistants/collaborators. Examples of such options:

- High-level clinical research assistants who do more than just collect data. They become collaborators and are charged with developing an idea: literature search, summarize literature, draft protocols and help with grant/manuscript composition...all under the general supervision of a clinician.
- PhD's in the department. Such PhD's are specifically charged and given time to develop research projects based on clinical problems initiated by clinical faculty, who are providing the source of funds through clinical work. Similar to the clinical assistants, but at a higher cognitive level, they become collaborators and are charged with developing an idea: literature search, summarize literature, draft protocols and help in a collaborative fashion with grant/manuscript composition. Some time must be available for such an individual to develop his/her own ideas. However, in place of the traditional teaching load of a Ph.D., the individual would be responsible to do many of the things the clinician does not have time to do.
- IMG researcher program. The world has many international physicians and scientists eager to work in the US. Indeed I have been impressed with the number who can receive funding from their governments or universities for this or who are willing to

work as volunteers. A program with a curriculum and specific goals for such individuals could be developed, Indeed for busy clinical faculty with research ideas, such individuals could become partners, each deriving substantial benefit from such an arrangement.

It is my belief that this is the primary issue facing academic anesthesiology departments. It is my hunch that the best and perhaps only way to deal with this is through development of other remunerative activities performed by faculty for reimbursement at or greater than that being collected from third party payers for clinical care. This is a logical plan as the cost of submitting bills increases and the percent collection rate decreases. (As the cost of submitting the bill approaches the amount of the bill one will tend to consider doing clinical work an “opportunity cost”). This idea is outlined more fully in the business section.

*Options in funding research*

- PHS. 10-20% payline. The time spent writing and rewriting a proposal, if spent doing clinical work might pay for the research. A very large nonclinical commitment is required to develop a research program and write a competitive proposal. Ph.D. collaborators should have a role
- Industry. See clinical trials program above.
- Incentive plan; If a PI gets a grant he/she gets 10% of the direct costs.
- Hospital and insurers for cost effectiveness research. As described above.
- Moonlighting. Extra internal(or external) remunerative work might be done with the proceeds going to a clinician’s research fund.
- External business activities of the department. This is discussed in more detail below.

*Core lab.* Shared and efficiently used:

- Techs
- Supplies
- Equipment
- Space

*Simulation-based education research.* The simulator provides a unique means to perform controlled studies to assess educational hypotheses relevant to acute care. For example such research was done early in the development of the now widely implemented rapid response team system.

*New faculty start up*

There are a few options here:

- Two-year mentored full time start up
  - \* Years 2 & 3 on faculty 80% nonclinical. During this period a health system mentor, not necessarily in the Department of Anesthesia, works with the research clinician to develop a fundable research program.

- \* Research yrs 2&3 to develop research program and write grants to cover time-supplies for subsequent yrs
- \* First year full time clinical with establishment of a plan for years 2 and 3 and development of initial collaborations
- \* This can be a very expensive and risky option
- Dept.-supported research fellowship at instructor level.
  - \* Trainee has an instructor position working 20-40% in OR as faculty and rest of the time as a research trainee.
- Six year or longer mentored part time research development.
  - \* New faculty works with a mentor in clinical or laboratory research projects with sufficient but not excessive time allotted
- Develop T32 training grant program. This presupposes preexisting NIH funded mentors in the department
- K grants to support early research development
- Support to put in competitive FAER or APSF grants

### 3. Education

*Residency program.* This is the major educational focus of the anesthesia department.

*Surgical and primary care residents.* OR rotations can be offered to prepare these residents for acute care situations. For family practice residents who are likely to find themselves in emergency situations in rural areas without backup, a system of reinforcing these skills over their residency (and career) should be devised. Anesthesia staff can also have a role in the training of non-anesthesia residents in the ICUs.

*Research and other academic activities.* Training teaching research techniques should be available to motivated residents.

*Fellowships.* Fellowship training frequently includes educational and research activities by the fellow. Thus the presence of fellows can augment the academic life of the department. Development of strong fellowship programs can result in the need for a continued educational program. Very busy subspecialty clinical services and very academically oriented subspecialty faculty are prerequisites.

*Teaching activities.*

- Grand rounds
  - Three year cycle to match the duration of the residency
  - Occasionally joint with other services
  - Delay OR one morning a week for educational conferences
- Seminars



- Journal clubs
- Research conferences
- AM conferences or morning report before OR schedule starts

*Resident recruitment/retention.* Residents have provided a very low-cost source of anesthesia care-givers who contribute to the academic mission of the department. All options possible for replacing them cost considerably more. Thus, it makes some sense to invest funds to attract and retain high quality residents. Some ideas:

- Excellent residency program
- House down payment. Repaid without interest when resident leaves the health system upon sale of house.
- Pay expenses for interview visit
- WWW page describing program and the health system
- Generous book/meeting allowance
- Facilitate career development activities. Provide time/funds for research, e.g., day a week during CA3 year, access to clinical research assistant, and guaranteed post residency research fellowship(or MBA training) with salary and reasonable supplies, and mentor. Secretarial support.
  - Develop an academic track with an extra 1-2 years of residency but higher salary during residency and a research training curriculum
- Competitive salary
- Educationally and academically oriented faculty
- Avoid “dumping” on residents. They don’t see CRNA cases preop or provide relief on late cases.
- Acute Care Nurse Practitioner to help them(and other residents) with routine tasks in ICU
- Anesthesia simulator. An expensive piece of equipment which simulates important anesthesia situations, like a flight simulator for pilots.

*Patient education.* An important component of anesthesia practice. Done well it enhances the image of the health system anesthesiology department and of the specialty of anesthesiology:

- WWW
- Preop visit for inpatients
- Preop phone call for same day surgery admissions
- Brochure
- Television

*Medical student education.* In this era of emphasis on primary care the health system anesthesiology department can contribute significantly to education of primary care physicians, starting in medical school. These physicians are likely some day to find themselves alone with a patient in an emergency situation. They should be exposed to issues in airway management, vascular cannulation, life support, and transport. An OR/ICU experience should be offered. However, simply providing a 1-2 week rotation is insufficient. It should periodically be reinforced in subsequent years in OR, ICU,

lectures, and simulator and should be an integral part of a primary care residency, taught primarily by anesthesiologists and intensivists and secondarily by general practitioners.

Experience directed to students interested in a career in surgery or anesthesia should also be available.

*Regional anesthesia conference.* the health system department of anesthesiology should periodically provide CME courses for physicians in the region involved in anesthesia and acute care. Many departments do this and it is unlikely to produce an income stream for the department in excess of cost of time to develop the meeting. Nonetheless it is an important part of the department's educational activities and is a potentially useful marketing strategy. Done well enough to provide national CME meetings remuneration could become significant.

### **C. ADMINISTRATIVE**

#### **1. Merit evaluation of faculty**

Based on academic and clinical contributions to the departmental mission. Consistent with the health system compensation system. Merit evaluation also used to allocate research funds, salary, bonuses, technical support, and secretarial support Nonclinical time allocated and maintained based on documented productive use of the time as a fiscal resource based on quantified merit evaluation.

#### **2. Administrative organization**

- Academic executive committee: Organized along subspecialty/research lines
- Clinical executive committee: Organized according to clinical needs
- Administrative support
- Administrative director: MBA/MHA type
- Manuscript/grant secretaries. Highly skilled typists who understand the nuances of grants and publications
- Correspondence and organizational secretaries. Schedules, correspondence, filing, etc.
- Divisions in the dept.
  - Clinical OR anesthesia with subspecialty blocks(some combined):
    - Cardiac
    - Neuro
    - Vascular
    - Thoracic
    - OB
    - Gyne
    - Ortho
    - Urol
    - ORL
    - General surgery

- orthopedics
  - Education
  - Research
  - CCM
  - Pain
  - Bioengineering
  - External activities
  
- Computer support from bioengineering group or the health system

***D. OUTREACH Activities- Department marketing***

- Earnestly work to maintain the excellent reputation of the department in the medical center, in the region, and nationally using outreach tools described below, publications, and selective use of visiting professors.
  
- Junior Academy of Science Support. Described above
  
- Science Museum Exhibit--Multidisciplinary. Faculty can work with the local science museum to develop a theme or exhibit related to faculty expertise. Done well it can go national.
  
- WWW page with info for lay and professionals. Anytime someone is interested in what is going on at a facility one of the first places to find information is the World Wide Web. Thus the WWW can be a place to inexpensively advertise what is going on at the health system and the department of anesthesiology. It can be used to attract residents, faculty, and patients. Moreover, if a page gets a lot of attention nationally it may become a place where our friends in industry can advertise with reimbursement to the health system. Pages can be set up for:
  - Anesthesiology department
  - Anesthesia dept. divisions
  - Anesthesia faculty
  - Department publications and CV's on line
  - Disease-oriented and anesthesia- and CCM-oriented educational pages for referring docs and lay public
  - Clinical Trials Program to outreach to industry. See above.
  
- Participate in and augment multispecialty outreach, supporting efforts of other health system departments and programs, e.g., trauma, stroke, epilepsy, coronary artery disease. Anesthesiology faculty can add another dimension to outreach efforts of the programs with which they collaborate clinically and in research. I have been involved in the outreach program for the Pitt stroke program.

- Advertise what the health system anesthesia has to offer not available elsewhere. Goal to get some referrals (self and MD initiated) because of unique availability of superior critical care, pain, and anesthesia services.
  - Nationally recognized expertise in anesthesia subspecialties
  - Pain services. Have surgery without pain
  - Multidisciplinary critical care services. APACHE data
- Acute care medicine local newspaper column by health system faculty
- Anesthesia CME conference for the region.
- Faculty/alumni directory and newsletter. I have seen a weekly departmental newsletter be effectively used to maintain morale and spread positive information about department activities

### ***E. BUSINESS Activities to Support the Academic Mission***

There is no easy solution to the financial dilemma facing academic anesthesia departments. Either salaries will decrease or clinical load will increase to an onerous extent. Both situations will encourage loss of faculty at a time that they will be at a premium. I believe that, given institutional blessing and support, the skills of faculty anesthesiologists and scientists can be put to good use providing more remuneration for the department in excess of costs to thus support the academic mission. I envision a number of mechanisms for accomplishing this. This may require hiring more faculty or concocting a way to cover existing clinical load with some faculty attention diverted elsewhere. However, these remain untested ideas which have yet to undergo proper prospective financial scrutiny. They are just ideas, not plans. I know of no other Anesthesiology department which has tried to implement an approach such as this to support its academic mission. Thus, I do not believe there is a benchmark for this approach in academic anesthesia.

#### **1. University affiliated business.**

Services or goods generated by the the health system department of anesthesiology might have market value. An example of this approach is Computerized Diagnostics Inc., a Pitt spin-off company, which offers intraoperative monitoring services to outside hospitals but is affiliated with the University of Pittsburgh. The Department of Anesthesiology/CCM might eventually develop a similar spin-off company and offer services to other hospitals, home-care, nursing homes or other potential markets:

- *Physiological and/or neurological monitoring service.* The program can be networked and developed to provide neuro monitoring services for regional hospitals or others. This will provide people who do this service routinely for hospitals which perhaps don't often use such monitoring. Linked to this is the notion of offering a monitoring interpretation service both internally and externally.

- *Pain management or consultation.* We can provide pain management services in other hospitals or in stand alone clinics, thus increasing market share.
- *Locum tenens MD work;* anesthesia, pain, or CCM. We can make faculty available to help cover clinical needs in private hospitals on a temporary basis.
- *Critical care transport.* If a patient in the the health system HMO becomes a patient in an ICU in another health system, intensivists can transport the patient back home, thus increasing convenience for family with less travel expenses for them while decreasing costs to the health system.
- *Medical direction for respiratory therapy services.* There are home respiratory care services. We could be in this business.
- *WWW advertiser support.* Advertisers are becoming interested in the WWW. If the department could develop a high quality web page which would attract “hits” by other anesthesiologists or lay public then the situation will be appropriate to attract advertiser support.
- *iPhone apps.* Develop anesthesia or critical care apps related to anesthesia or critical care.
- *Consultation for large brokerage houses* on the well-being of health care for profit organizations. This could be provided by faculty with MBA or equivalent training.
- *Legal consultation.* The department (and the health system) might offer a service to lawyers to provide a group opinion(or that of a committee) regarding medical aspects of a case. Alternatively the department legal consult group could provide peer review paid for by the courts to acquire academic peer review of expert witness testimony. Such activities might justify seeking faculty with J.D. M.D. training.
- *Academic peer review organization.* One major problem in the academic advancement of clinicians who like to write but not do research is the lack of peer review. Chapter and book writing garners little credit for promotion. The university could sponsor a peer review organization. Such an organization would act as an editorial board, contacting experts around the world to provide opinions (compensated) on submitted chapters and books. For a fee and a 6 month delay in publishing the publisher gets to put a seal on the cover page indicating that the book has undergone peer review and is approved by the “ health system academic peer review organization.” They sell more books and are able to attract better quality authors, the authors get promoted, and the health system acquires status and another revenue stream..
- *Patents.* Such attributes can not be planned but nonetheless development of a bioengineering group might lead to such potentially remunerative results for the department.