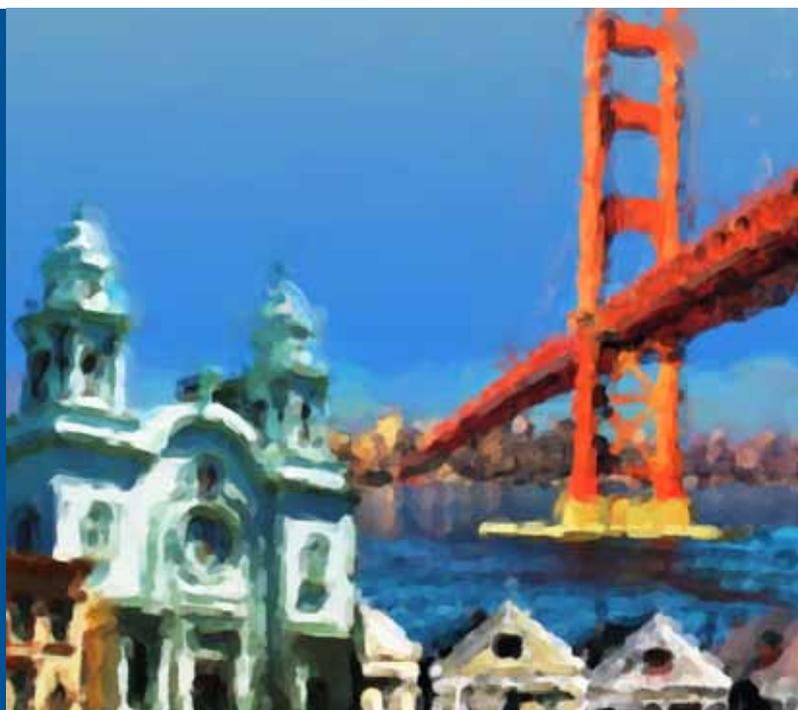


2012 American Thoracic Society

BEST PRACTICE GUIDE

Pulmonary, Critical Care, Allergy and Sleep
Fellowship Training Programs



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The ATS Training Committee is honored to recognize 15 US fellowship training programs that over the past year have gone above and beyond to demonstrate exceptional achievement in their pulmonary, critical care, allergy or sleep practices. The goal of the **Best Practice for Pulmonary, Critical Care, Allergy and Sleep Fellowship Training Program** was to 1.) honor fellowship programs that exemplified an environment of educational excellence over the past year and 2.) share their best practice methods among fellowship programs so that others could learn from one another.

For this new program, the Training Committee asked that each program submit a Best Practice application and essay summarizing their practices, which were reviewed by a working group of the ATS Training Committee. The 15 programs that the ATS would like to recognize this year includes:

Children’s Hospital of Boston ★

Children’s Hospital of Michigan

Lahey Clinic

Mayo Clinic

New York University School of Medicine ★

New York Presbyterian

The Ohio State University ★

**University of California,
Los Angeles Medical Center**

**University of California, San
Francisco**

University of Cincinnati ★

University of Colorado

University of Mississippi ★

University of Pittsburg ★

Wake Forest

Yale University

★ Indicates program was selected as one of the best training programs of the year. Selections made by working group

Congratulations
to all 15 programs for an
outstanding year!

A SPECIAL THANKS TO THE ATS BEST PRACTICE WORKING GROUP MEMBERS:

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We encourage you and your training program to submit a BEST PRACTICE to be highlighted at the ATS 2013 International Conference – Philadelphia. Submissions will be solicited beginning in Fall 2012. For more details, visit the ATS Resources for Training Directors web site at <http://thoracic.org/education/resources-for-training-program-directors.php> or contact Lauren Lynch, staff to the ATS Training committee, at llynch@thoracic.org.



Children's Hospital Boston
The first place for children

Children's Hospital of Boston ★
300 Longwood Avenue Boston, Massachusetts 02115
Pediatric Pulmonary Fellowship Program
Training Program Director: Debra Boyer, MD

The pediatric pulmonary fellowship program at Children's Hospital, Boston has been training fellows for over thirty years. However, limitations in direct patient contact due to duty hour restrictions and increasing societal expectations for attending level involvement, has led to wide and unpredictable variation in the educational experiences of pediatric pulmonary fellows with regard to clinical exposure, teaching, procedural training, as well as formative/summative feedback. We sought to develop a unique simulation-based training "boot camp" for pulmonary fellows to improve consistency and quality of education across expertise gradients.

In April of 2010 a needs assessment was performed throughout the Children's Hospital Boston (CHB) pediatric pulmonary fellowship and included data from current CHB fellows, attendings, recent program graduates as well as national pediatric pulmonary fellowship directors. The e-administered survey identified gaps in subspecialty training and responses were categorized by theme. Training gaps included inconsistencies in clinical exposure, teaching experience and procedural training. We then derived the Boot Camp course content from these and divided these items among three general teaching modalities (i.e. didactics, simulation, task training.)

The pediatric pulmonary boot camp curriculum was devised as three 4 hour sessions including mixed-modalities tailored to specific learning objectives (e.g. skills training such as chest tube placement, flexible bronchoscopy complication management, respiratory failure in the cystic fibrosis patient, and team responses to acute medical crises). Each course includes introductions, icebreakers, didactics, partial task training and full-scale high fidelity simulation. Importantly, grant funding was obtained so that scenarios could include professional actors to provide patient and family interactions. This provides much needed practice and feedback around difficult conversations with patients and families.

We performed a pilot session last year and have now implemented our first full year running all of our fellows through the program. The feedback has been uniformly positive with fellows appreciating the opportunity to work through simulated medical complications and difficult conversations in safe environments. Our goals are to further enhance and develop this Boot Camp by developing further sessions for more senior fellows over the next few years. Learning objectives of these more advanced sessions might include experience with teaching/supervision, providing feedback and crisis resource management. In addition, we hope to be able to make this Boot Camp available for pediatric pulmonary fellows around the country.

Our approach is concordant with the American Board of Pediatrics efforts to ensure competent training in critical elements known as "entrustable professional activities" (EPAs). (O ten Cate 2007) We are quite proud of our Pediatric Pulmonary Fellows Boot Camp as it offers on demand opportunities for practice/preparation in numerous EPAs and therefore may offer a new paradigm to standardizing effective fellowship training curricula across programs.



Children's Hospital of Michigan
3901 Beaubien St Detroit, MI 48201
Critical Care Fellowship Program
Training Program Director: Mary W. Lieh-Lai, MD

Children's Hospital of Michigan is a 260-bed tertiary care center located in the heart of Detroit. It is the pediatric facility for the Detroit Medical Center complex and serves as the center for pediatric training for the Wayne State University School of Medicine. There are more than 1600 admissions per year to our 30 bed unit. Our seven pediatric critical care fellows are responsible for the care of patients from a diverse, urban and suburban population with a vast array of pathology including but are not limited to acute respiratory failure; fulminant infectious disease and sepsis; traumatic head injury; status epilepticus; oncologic complications including care of children following bone marrow or stem cell transplant; inborn errors of metabolism; and poisonings. The fellows provide post-operative care following high-risk surgical procedures including neurosurgery, orthopedic spinal surgery, airway reconstruction, and surgery for complex congenital and acquired heart disease including transplantation. They are proficient in all traditional ICU procedures as well as the implementation and management of patients on high frequency oscillatory/jet ventilation, continuous veno-venous hemodiafiltration, extracorporeal membrane oxygenation, and ventricular assist devices.

While this clinical experience is similar to other academic tertiary care referral centers, there are other aspects of our training program that are unique and represent best-teaching practices. First, in contrast to most pediatric intensive care fellowships, all of our fellows become proficient in bedside flexible bronchoscopy. They spend one month learning the skill at a local adult hospital under the guidance of adult pulmonologists, then hone their abilities at the bedside in the pediatric ICU under the direction of CCM division faculty members who are all certified to perform the procedure. Our division also owns a state-of-the-art bronchoscopy simulator with modules that allow the fellows further practice during their non-clinical months.

Secondly, our fellows have 2-3 two hour formal board examination review sessions each month. Two faculty members have served on the NBME USMLE committee and the American Board of Pediatrics sub-board of CCM. They share their question-writing expertise with the divisional faculty members by way of lectures and critique on how to write good questions. Using the content specifications for the PCCM Sub-Board examination, an ICU attending then prepares 3-5 certification-type questions for each session. A fellow then uses these questions to prepare a formal PowerPoint presentation on the topic. Once the presentation is prepared, it is converted into a Turning PointR presentation, which integrates an audience response system to allow the other fellows and attendings to actively participate in the presentation. The answers are recorded electronically. On a quarterly basis, the results are downloaded, tallied, and added to each fellow's quarterly evaluation, providing an objective measure of fund of knowledge. The fellows additionally receive two additional hours of formal didactic lectures each week, a 1-hour cardiovascular lecture and a 1-hour respiratory or pharmacology lecture, both of which also integrate the audience response system for optimal participation. We believe that our board review series is an example of fellowship training "best-practice" because it is a well-developed exercise that provides faculty development in writing certification examination questions; and allows our fellows to learn about, and answer

questions to almost all the content specifications for pediatric critical care medicine. This educational activity has led to an increase in subspecialty in-training examination scores for our fellows and is a significant factor in our successful board pass rate (99.9%) for first time takers over the past 27 years.

Lastly, for the past 2 ½ years, the fellows have received via e-mail, one at least two Mondays per month, an additional mock board question created by the associate fellowship director with instructions to provide an answer and brief explanation by the end of the week. Answers and full explanations are then sent out on Friday. We believe our unique formal didactic experience is an excellent complement to our fellows' tremendous clinical experience, which is substantiated by our exceptional board passage rate.



Lahey Clinic
41 Mall Rd, Burlington, MA 01805
Department of Pulmonary and Critical Care
Training Program Director: Anthony Campagna, MD

The three year Pulmonary and Critical Care fellowship at Lahey Clinic is arguably one of the top programs in the nation and it should be recognized for its world class training. The program accepts two fellows per year as well as an Interventional Pulmonary fellow and Sleep fellow. This high faculty to trainee ratio allows the fellows to build strong relationships with all faculty members, enhancing training. Twenty four hour in-house Intensivist coverage allows for continuous teaching and attending presence. This intense support fosters unparalleled growth and leadership. Fellows interact daily with Tuft's University medical students and residents from Lahey allowing them to develop their own style of teaching and leadership.

Located in downtown Boston for over 50 years until it needed more space for its growing needs, Lahey Clinic continues to be recognized for its high quality healthcare in the Boston metro area. Its relationships built decades ago, offer excellent opportunities for fellows to rotate in the city at Boston Children's for Cystic Fibrosis and Brigham and Women's for Pulmonary Transplant. Home at Lahey, the fellows rotate through numerous specialty critical care units including cardiothoracic, cardiac, surgical/trauma, neurology/neurosurgery as well as two medical intensive care units.

Procedural training is unrivaled. The fellows have access to a state of the art simulation center offering training in virtual bronchoscopy and endobronchial ultrasound as well as training in difficult airways and code situations. Skills are sharpened on a daily basis by performing a large amount of the hospital's endotracheal intubations, chest tubes, and percutaneous tracheostomies which are becoming a rare find in fellowship. Having a dedicated Interventional Pulmonary fellowship enhances fellows' education by exposing them to advanced procedures including endobronchial ultrasound, brachytherapy, pleuroscopy, stenting, laser therapy, rigid bronchoscopy, and thermoplasty. As one of the first hospitals to ever offer interventional pulmonology, it hosts an annual International conference for which the fellows eagerly participate.

Fellows also enjoy the opportunity to work at a community hospital ICU. Not only does this opportunity give them one-on-one time with a pulmonary/critical care attending, but they experience a true community feel while being exposed to different resources and a new patient population.

In the outpatient setting, fellows are exposed to a wide array of pulmonary disease and disorders from all over New England. Specialty clinics in alpha one antitrypsin deficiency, pulmonary hypertension, thoracic oncology, tuberculosis, and sleep give fellows a focused patient population and enhance learning with an attending who specializes in each area. Our tuberculosis clinic was also recently recognized by both the House of Representatives and the Senate for its achievements in outstanding patient care and prevention of tuberculosis.

Dedicated biweekly pulmonary and critical care conferences are supplemented with inter-departmental conferences on a regular basis including anesthesia, allergy, radiology, cardiology, and oncology nurturing a multidisciplinary application and understanding of medicine. This strong rapport with other departments creates a fertile environment for growth will spills over in to other fellowship programs.

Lahey Clinic is a national leader among Pulmonary and Critical Care fellowships, providing a comprehensive training program that offers a balance of support and independence. Its strong relationships with other departments and Boston area hospitals enhance an already well established program. Progressive independence and solid relationships with faculty create an environment of growth and allow for self discovery. Lahey Clinic graduates post doctoral fellows who transition seamlessly in to attending role with confidence and a drive to continue to deliver compassionate high quality healthcare.



Mayo Clinic
Gonda 18h South, 200 1st Street SW
Rochester MA 55905
Pulmonary / Critical Care Fellowship Program
Training Program Director: Craig Daniels, MD

In 1904 William Osler wrote, “No teaching should be done without a patient for a text”.

Affectionately referred to as “Wednesday morning conference”, our Pulmonary and Critical Care Division’s Case Conference is a superb example of a “best educational practice”. The basic structure of presentation of a brief “unknown” clinical case to a single physician who must demonstrate diagnostic reasoning while under the eye, and occasionally the ire, of the whole division has endured – unchanged – through the tests of time, technologic innovation, new medical knowledge, and educational theory. It is a point of pride for our division that our Case Conference is the longest running clinical conference in Mayo’s history.

Applying knowledge through a problem solving strategy to reach a diagnosis is the most valuable skill a physician must learn. This skill, termed clinical reasoning, endures the changes in medical knowledge throughout one’s career. But how is it taught? Historically, students present a single patient’s case to a medical educator who guides them through the process of relating isolated facts (symptoms, signs, and test results) into a coherent understanding their patient’s diagnostic possibilities. The opportunity to observe and assess the clinical reasoning by physicians at various levels of training up to master clinicians is the basis of our Division’s Case Conference.

While many institutions have conferences in which they present cases, the culture of our case conference is unique, memorable, and entertaining. A staff physician presents

a case and questions a tremulous trainee with the knowledge that a trainee has an equal opportunity to challenge a staff member with a difficult case. The modest anxiety which accompanies this interchange means one may be assured those involved in the interchange will recall the details of missed cases years later. In addition, the opportunity to repetitively rethink one's own diagnostic skills from a comfortable chair in the audience provides the format from which one quickly recognizes holes in reasoning and fund of knowledge with painful clarity. How many times has each of us stated, "I'm glad I wasn't called to discuss that case, I would have missed it." Typically, presenters select cases for presentation because they have learned and been challenged. In preparing and sharing a difficult case over 15 minutes, one is forced to distill essential elements and therein analyze the success and failure in their own diagnostic reasoning. The spectrum of diseases and presentations never ceases to amaze.

We asked our fellows for feedback of our Case Conference:

"This spirit of sharing our best and most interesting patients with one another solidifies the Division and allows fellows to feel on par with the experienced and learned."

"Interdisciplinary participation by our colleagues from pathology and radiology make it exceptionally comprehensive and educationally robust. It is undoubtedly the best educational conference I have ever attended."

"All faculty from the department participate which allows for the fellows to learn from the strengths of each staff."

When new fellows ask why they should attend our Case Conference, I tell them that every time I have ever attended the conference I learn something which impacts patient care. There is nothing else like it.



New York University School of Medicine ★
50 W 4th St New York, NY 10012
Pulmonary / Critical Care Fellowship Program
Training Program Director: Doreen Addrizzo-Harris, MD

How has our Pulmonary and Critical Care Training program exemplified an environment of educational excellence?

Our program at New York University/ Bellevue Hospital exemplifies educational excellence in many ways. These include having outstanding clinical rotations in both pulmonary and critical care amongst four hospitals, having outstanding faculty supervision and involvement and having a robust system of clinical exercises to monitor levels of fellow development and competency.

For this award, I would like to highlight our excellence in curriculum development and assessment.

We are very fortunate to have a large program of 22 fellows and more than 40 full time faculty at four major hospitals. We have developed, as many other fellowship programs a robust pulmonary and critical care curriculum on paper, which is used as a roadmap for teachings on rotations and for development of core conferences. What we have done that is different is two-fold. We have a unique, active curriculum committee of faculty and fellows that meets regularly as a workgroup and we have a very structured

curriculum roadmap for our fellowship training program that includes hands on assessments.

Our curriculum committee is made up of a core group of faculty who are dedicated to curriculum development. This group is a subgroup of all of the faculty who take part in the required annual curriculum committee meeting mandated by the ACGME. This curriculum committee is made up of the program director, associate program director and three assistant program directors (each with a specific curriculum focus), bronchoscopy director, a faculty representative from each of our additional teaching hospitals (Tisch and the VA) and a fellow representative from each fellowship year. The three assistant program directors each have an area of focus in curriculum development. The three areas are simulation, ultrasound and patient safety and program improvement. The committee meets monthly to revise curriculum and to develop new and better assessment tools.

Our curriculum is laid out in a very structured format for fellows. At the beginning of fellowship, first year fellow have 7 days of dedicated core curriculum lectures, workshops and simulation exercises that are free from patient responsibilities. The remainder of the summer has a daily core conference or workshop for all fellows so that by September fellows have all had an intensive core curriculum. We decided to teach our critical care curriculum in 9 critical care blocks which include for example; shock, respiratory failure, airway, toxicology, cardiology, ethics. During these blocks fellows receive several mandatory lectures, perform a journal club on a associated topic with reading material, have at least one 2 hour simulation session on the topic and end the block with a jeopardy style conference designed by the senior fellows. Goals and objectives have been developed for these blocks as well as common case scenarios that the fellows are presented with during the simulation sessions. This block style multi-modality teaching of the curriculum has been well received by fellows and faculty. We plan to structure our pulmonary curriculum similarly as well in the next year; our first block which has been developed is on asthma. We plan to have 10-12 blocks.

As part of this critical care curriculum we have developed assessments for simulation (based on the above curriculum) , ultrasound and bronchoscopy which all fellows will have to complete by the end of each clinical year.

Our curriculum committee and curriculum structure allow us to educate our fellows using multiple modalities and to integrate changes rapidly into our program curriculum with both faculty and fellow feedback. It has also allowed us to have better tools for assessment of our fellows and better tools for educational feedback.



COLUMBIA UNIVERSITY
*College of Physicians
and Surgeons*

**New York Presbyterian Hospital
PH8E-101 Columbia University College of
Physicians and Surgeons
New York NY 10032
Allergy Fellowship Program
Training Program Director: Rachel Miller, MD**

We propose that our training program be considered for the ATS “Best Practice Recognition Program” due to its outstanding academic growth and achievement, and provision of educational experiences that go beyond clinical training required to practice

Allergy/Immunology. We would like to showcase our outstanding trend of commendation by the ACGME, as well as our record of scholarship that is uncharacteristic for a program of our size. We also would like to highlight our program's strengths in training fellows as critical thinkers with respect to training program systems improvement, and as educators in their own right.

In the last decade this program has completely transformed itself from one on probation issued by the ACGME in 1999. Extensive programmatic improvements led to full accreditation in March

2003. Sustained efforts by dedicated faculty and fellows led to full 5 year accreditation with ZERO citations in the last review in February 2009. Among the achievements in programmatic improvement realized during this period was the funding of a second fellowship trainee position. The new structure, with one senior and one junior fellow, introduced the critical opportunity for each trainee to be a teacher/mentor of his/her peer. As cited by the Residency Review Committee, "The program director is commended for the marked improvement in the program and the PIF preparation. In addition, securing funds for an additional resident is noteworthy at this time."

The physician faculty to fellow ratio is 7:1. Forty percent of the last 10 graduates have academic appointments at major university medical schools. We argue that benchmarks of scholarly success for small programs like ours that grew from 1 fellow every two years to one fellow annually in 2008 should be assessed on a "per fellow" basis over time. This program (last 10 fellows) averaged 3.7 publications, and 1.2 manuscripts (excluding abstracts), per fellow during fellowship. One fellowship manuscript by Dr. Kathleen Donohue (Donohue et al., *Anti-cockroach, mouse IgE is associated with early wheeze and atopy in an inner-city birth cohort, J of Allergy and Clin Immunol*, 2008) has been cited by 24 articles to date, including the following year's *J of Allergy and Clin Immunol* "Latest Advances" editions (Szeffler, et al. *Advances in pediatric asthma in 2008; Bush and Peden. Advances in environmental and occupational disorders in 2008*). The last 10 fellows have been the principal recipients of one Educational Research Trust (i.e. ART) Faculty Development Award, Flight Attendants Medical Research Institute Award, Clinical Innovator Award, 4 research fellowship awards, AAAAI Clinical Fellowship Award, and one NIH K08 award during or within one year of completing fellowship.

The program has introduced recently a formalized curriculum in Program Improvement in which the trainee is asked to examine the systems operations of one aspect of the program that they believe could be improved. They gather data to document the baseline level of function, propose and, with approval, implement a systems-based change in operation, and finally, gather data to assess the impact of this systems change. As an example, one fellow conducted an attending supervised project directed at improving patient waiting time in the adult allergy clinic. In the established system, all patients had been instructed to arrive at the same time and patients complained they would wait 1-3 hours to see a physician. Additional problems were that patients were not scheduled for a visit with a specific fellow, impeding continuity of care. The fellow hypothesized that she could reduce patient wait time and improve continuity of patient care and physician-patient relationship by 1) monitoring, and if needed, modifying the clinic schedule prior to the clinic date to avoid overbooking, and 2) writing the appropriate physician's name on the patient's chart to decrease door to room time and permit each physician to anticipate better the needs of a given patient. She

developed methods that included reviewing the schedule one week in advance, verifying and enforcing appropriate scheduling with guidelines on the number of new patients per fellow per clinic, and writing the physician's name on the chart. The mean waiting time decreased by approximately 50%, yet time spent with the physician remained an average of 30 minutes. New templates for scheduling patients were developed and implemented.

In addition, each fellow is directly involved in teaching the medical and dental student 'Introduction to Immunology' course every year. The Allergy/Immunology fellows serve as preceptors in small group sessions, each paired with an experienced member of the teaching faculty. The curriculum introduces the students to case-based discussions, and the fellows teach fundamental principles of immunology. The reviews from fellows and students uniformly have been positive. This different take on "back to the classroom" motivates fellows to review important concepts in basic immunology, make sense of these concepts in order to teach them, and offers them a great sense of accomplishment. As a result of these practices, Columbia fellows graduate from the Allergy and Immunology program with a better understanding of the importance of integrating self-assessment and education into their careers no matter what venue they ultimately choose



The Ohio State University ★
201 DHLRI 473 West 12th Ave, Columbus OH, 43210
Pulmonary / Critical Care Fellowship Program
Training Program Director: John Mastronarde, MD

Our training program employs novel and cutting edge educational methods to assess the competency of our fellows from the day they begin their fellowship until graduation. Traditionally fellows have begun clinical training and learned via a "see one: do one" educational method which has limitations. We created a novel month-long introduction to fellowship coined "Pulmonary Medical School" designed to establish minimal cognitive and procedural skills prior to beginning clinical rotations. A multimodality approach provides instruction in core clinical topics and procedures with assessment of basic competency in a low-stakes environment. Lectures and e-learning modules are used to review relevant basic physiology, core clinical topics in pulmonary and critical care medicine, and essential procedures. Technical skills and baseline procedural competencies are established through the use of simulators and cadaver laboratories (both with direct faculty supervision), and wet labs with static models. Finally, first-year fellows (F1) work in an "apprentice role" on each of the core clinical services where they shadow a senior fellow, performing all procedures and providing patient care with direct supervision and individual instruction from the faculty.

Assessment of competency is achieved through the administration of written pre- and post-tests, direct observation of procedures in the simulator, cadaver and skills laboratories, and by designated faculty members who use structured competency assessment tools to evaluate fellows' performance following the completion of a predetermined number of procedures. Upon successful completion of all competency assessments, first-year fellows are then graduated to assume full patient care responsibilities on the clinical services. As fellows progress in their training and achieve

specific numbers of key procedures they undergo a formal assessment of competency to practice these procedures independently upon graduation.

Our “Introduction to Research” month in January of the F1 year provides a similar opportunity to build key skills at a critical transition point in fellowship education. This curriculum is designed to build a firm foundation in skills necessary to pursue successful careers in academic medicine, to facilitate the selection of a primary research project and mentor, and to enhance the practice of self-directed learning. Didactic lectures and e-learning modules in research design and analysis, grantsmanship, Internal Review Board submissions, and scientific writing are coupled with a series of round table discussions with faculty of varying academic backgrounds who offer advice on successful mentoring. Finally, F1s participate in a mentor/fellow matching process which ensures that each fellow has identified a faculty mentor and research project for the next academic year. Each fellow is subsequently assigned to a research mentor panel with meetings at least quarterly to review their progress.

We have also developed a mentoring program for residents that begins with intern orientation. A “Pulmonary/Critical Care Interest Group” offers quarterly gatherings and one-on-one meetings with the Program Director and Associate Program Director to guide residents toward a successful career in Pulmonary/Critical Care medicine including facilitating research experiences with our faculty. This year, 6 residents will be attending the International Conference with our Division to present abstracts and oral presentations, and to see first-hand the numerous benefits of membership in a professional society (6 residents attended in 2011).

Our Pulmonary/Critical Care fellowship training program has worked to develop formal curricula at key transitional points in fellowship education while also establishing clear milestones for achieving competencies prior to graduation. These best-teaching practices highlight the strength of the educational programming available at our institution, and illustrate some of the many reasons why we believe this training program is exceptional.



**Harbor - University of California,
Los Angeles Medical Center**

**1000 West Carson Street,
Box 491 Torrance CA 90509**

Pediatric Critical Care Fellowship Program

Training Program Director: Richard Mink, MD, MACM

To provide an exceptional clinical experience, the Harbor-UCLA Pediatric Critical Care Medicine fellowship utilizes clinical rotations at two uniquely different sites, Harbor-UCLA Medical Center, a Los Angeles County facility and CHOC Children’s, a free-standing children’s hospital. These two institutions are highly complementary, both in patient population and administrative structure, and this confers a significant benefit in terms of experience. By rotating through these pediatric intensive care units (PICUs), fellows interact with numerous pediatric intensivists as well as multiple pediatric subspecialists. By the end of their training, fellows are well prepared to practice pediatric critical care medicine in a variety of settings.

Although we feel we provide an excellent clinical training environment, it is the innovative curricula of which we are most proud. These were developed to teach all six competencies which we believe one must excel in order to be an outstanding physician. Our curricula are highly interactive, usually case-based and are often supplemented by short (10-15 minutes) didactics to provide background information or data.

In the professionalism, cultural competency and bioethics curriculum, the first session begins with a clip of “House” to foster discussion about “what is professionalism.” In pairs, fellows apply the concepts to different scenarios related to disclosure of medical errors, impairment of peers and societal obligations. To teach conflict of interest, an audience response system (ARS) is used to poll fellows as to what pharmaceutical gifts they believe are appropriate. Then, data showing the influence of these gifts are presented and discussed, ending with a review of the institutional policy for conflict of interest. Prior to the session on conflict management, fellows complete the Thomas-Kilmann Conflict Mode Instrument. A PICU scenario is subsequently analyzed in which the fellows determine whether their preferred mode for conflict resolution was appropriate for that particular situation. The importance of maintenance of certification is explored using facilitated discussion so that there is a full understanding of the physician’s obligation to society. Sessions on bias and stereotyping and healthcare disparities focus on how these influence patient care in the PICU, particularly related to end-of-life decisions and language barriers. These utilize illustrative cases and viewing and discussion of the PBS trailer of “Unnatural Causes...is Inequality Making Us Sick?” The three sessions on bioethics use pre-session reading, ARS and small group discussion to learn how to apply the principles of bioethics and to understand the legal aspects of common ethical issues in the PICU.

To improve communication, fellows view videos demonstrating inappropriate and appropriate approaches to provide bad news to parents followed by discussion about what they observed. Based on a specific case, each fellow is then videotaped giving bad news to an actor playing the role of a parent. This is shown to the faculty and other fellows so that constructive comments can be provided to improve the fellow’s skills. In another effort to improve communication, each fellow is required to read “Difficult Conversations” and then write a self-reflection explaining how he/she can incorporate the main points of the book into practice.

Each fellow conducts morbidity and mortality reviews and completes a quality improvement project. M and M’s are structured and focus not only on patient care but also review whether communication among services and with the family was satisfactory and whether chart documentation was sufficient. The quality improvement project is accompanied by required readings and web-based modules followed by a written test to assure compliance.

A leadership curriculum was created to provide the fellows with the necessary skills to develop into leaders. Each fellow first completes a Myers-Briggs Type Indicator to begin to understand their own personality traits. Fellows then read “classic” books about self-assessment, emotional intelligence, instituting change and team building. After each reading, fellows write a self-reflection describing the main points of the book and how they plan to utilize them. This is followed by conferences in which each book is discussed.

Throughout the program, there is instruction in teaching the fellows “how to teach.” Sessions are held about how to provide bedside teaching, specific classroom teaching techniques, curriculum development and assessment of outcomes. There are workshops to educate about writing goals and objectives, making PowerPoint slides and creating polling questions for ARS. Interaction with the audience and innovation are highly encouraged and direct feedback to the fellow is provided after every session.

These curricula were developed to maximize learning by fully engaging the trainee. Our goal is to train pediatric intensivists who are excellent clinicians, fully understand what it takes to be an outstanding doctor and have the tools necessary to become leaders in the field of pediatric critical care medicine.



University of California, San Francisco
505 Parnassus Ave, San Francisco, CA 94143-0111
Pulmonary / Critical Care Fellowship Program
Training Program Director: Stephen C. Lazarus, MD

The Fellowship Training Program in Pulmonary and Critical Care Medicine at the University of California San Francisco began in the 1950s as a research training program directed by Julius Comroe. In 1966 John Murray and Jay Nadel added a rigorous clinical training program. Since the Program began nearly 50 years ago, approximately 80% of our graduates have chosen careers in full-time academic medicine and research. In addition to academic appointments in Pulmonary and Critical Care Medicine, many of our graduates have been Division Chiefs, Department Chairs, and Deans.

Key components of our training program include a clinical program shared equally by 3 different hospitals (UCSF Moffitt-Long, San Francisco General Hospital, SFVA Hospital) with 3 very different patient populations, a weekly Tri-Hospital Clinical Case Conference, and a weekly Fellows' Research Conference. We believe, however, that the success of our Program and of our Graduates is due in large part to our efforts to tailor each individual's training program to their specific interests and needs. The key components of the clinical training program are dictated by the ACGME, but we attempt to allow each fellow to design the rest of their training in accordance with their individual specific goals. All fellows complete 18 months of clinical training. The remaining 18 months of ACGME training and any additional training focus on scientific investigation. Research time is protected, and except for Clinics and Conferences, fellows are guaranteed time for research and career development. Specific research tracks are available for Clinical, Translational, and Laboratory-based research. We require all fellows to write an individual NIH NRSA grant within 6 months of beginning their research training. This process helps them focus their research objectives, and provides critical training in grant writing. Whatever the outcome of these grant applications, we commit to supporting fellows for as long as it takes for them to establish independence and obtain their own career development funding.

Before the first day of fellowship training, each Fellow is assigned an Advisor who serves as a guide both professionally and personally during the course of the Fellow's training. This is especially important during the first year when fellows are adapting to a new role, often in a new city, and are trying to identify a career focus. In addition to

helping the Fellow navigate the transition from Resident to Fellow, the Advisor helps the Fellow explore research pathways and select a research mentor. Thereafter, every fellow is required to form a Research Advisory Committee (RAC), comprised of the lead mentor and 3-4 additional UCSF faculty members. Faculty are chosen (by the fellow) who can complement the lead mentor's research mentorship by providing scientific expertise in fields related to, but distinct from, the primary mentor's research program. RAC members can also be chosen because they can provide career mentorship and key guidance about publication and presentation of findings, extramural funding, participation in the American Thoracic Society activities, and plans to transition to a faculty position.

Beginning in the 2nd year, the RAC along with the Fellow and mentor meet at least 1-2x/year to ensure that academic goals, research objectives, and/or clinical work is progressing appropriately with the future success of the Fellow in mind. After each meeting the fellow provides a written report and Career Development Plan to the appropriate Research Training oversight committee and to the Program Director, who interact with the Fellow and her/his research mentor to facilitate and ensure progress.

Much like "personalized medicine", we believe that a training program that is personalized to include the specific clinical, research, and career interests of each trainee stacks the odds in favor of success



University of Cincinnati ★
231 Albert Sabin Way, ML O564, Cincinnati, OH 45267
Pulmonary / Critical Care Fellowship Program
Training Program Director: Mitchell Rashkin, MD
and Peter Lenz, MD

A Multifaceted Board Review Program Optimizes Fellow Learning & Improves In-Training Exam Scores.

Rationale: Multiple barriers exist for fellows to receive optimal and comprehensive preparation for board exams. Asynchronous clinical experiences create a wide variability in the learning experience for fellows and large didactic conferences are not conducive to high level retention of complex material. We aimed to improve the pulmonary and critical care fellowship conference learning experience, board exam preparation, and performance on the pulmonary and critical care in-training exam (ITE) by developing a more robust board review program and curriculum that incorporated state of the art adult learning principles. Over the past year, we implemented a 4-phase, multifaceted board review program to address the multiple learning issues listed above.

Description of Program: Phase 1: We created an interactive hour long session each month for the presentation of 15-20 carefully targeted, board-style questions using an audience response system (ARS). Realtime deficits in knowledge could be identified and addressed. The question error rate provided an index of the effort needed to remediate any deficiencies. During this phase the questions were created by our faculty. The ARS allowed for an engaging, non-threatening adult learning environment to be realized. Phase 2: We accumulated data from the initial board review sessions to determine the content areas we needed to work on in the upcoming conferences. Phase 3: We began requiring that all presenters from all disciplines submit at least 2 board style questions on the content they presented to our fellows at lunchtime conferences. Evaluating fellow performance on these questions during

subsequent board review conferences allowed us to formally evaluate our curriculum and to improve subsequent conference quality. Phase 4: Formal instruction was given to the fellows on how to write board-style questions and the questions the fellows create are now presented and validated by faculty and fellows present during the discussion portion of our sessions. Fellows now get an idea of the literature review and research effort that goes into creating high caliber board style questions.

Summary: The implementation of our board review program has improved our fellows' ITE scores. In fact, our current 3rd year fellows improved from their 1st year under-national average mean score of 70.2% (87.7/125) to an above-national average score during their 2nd year of 76.5% (95.6/125) after our intervention had been in place for one year. Implementing a board review program and holding the fellows and faculty mutually responsible for its content can improve ITE scores and improve the fellow learning experience multifold. Making the faculty accountable for board style content from their lectures allows our program to more meaningfully evaluate the effectiveness of our didactic conferences and to objectively refine the content of teaching sessions. Requiring the fellows to vigorously research board style topics they encounter in clinical practice provides a new dimension to their education and allows for asynchronous learning experiences to now be shared. The validation process that occurs when fellows' questions are challenged has provided healthy discussions on various pulmonary and critical care topics amongst our faculty and fellows. Our board review program was awarded the 2012 Darlene Buczak Award for Innovations in Medical Education earlier this year by the Association of Pulmonary and Critical Care Program Directors (APCCMPD).



University of Colorado
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Pulmonary/ Critical Care Fellowship Program
Training Program Director: Mark W. Geraci, MD

The University of Colorado School of Medicine Pulmonary and Critical Care Fellowship Training Program encompass a broad array of affiliate institutions, including: University of Colorado Hospital, National Jewish Health, Denver Health, Denver Veterans Affairs Medical Center, Rose Hospital and Saint Anthony's Hospital. The Fellowship has a long and productive history of training leaders in academic Pulmonary and Critical Care Medicine. In many regards, the training program has been extraordinarily successful in promoting the careers of the next generations of leaders. Indeed, in the more recent era of training since the time of Dr. Thomas L. Petty as the Director in 1970, the division has trained nineteen individuals who have gone on to become Division Heads, and six individuals who have become Chairs of Departments. Moreover, the division has a long history of supporting the efforts of the American Thoracic Society. The division has twelve individuals who have been Trudeau Medal awardees: including Henry Sewall, Gerald B. Webb, Florence R. Sabin, James J. Waring, Roger S. Mitchell, Robert F. Grover, Reuben M. Cherniak, Michael D. Iseman, Talmadge E. King, Jr., Marvin I. Schwarz, Leonard D. Hudson, and Steven A. Sahn. Moreover, many trainees and faculty have gone on to prominent positions within the American Thoracic Society, including service as President of the American Thoracic Society: Roger S. Mitchell, James D. Crapo, Leonard D. Hudson, Talmadge E. King, Jr., Sharon I.S. Rounds, John E. Heffner, and Monica Kraft.

Undoubtedly, one of single most important “best practice” efforts of the University of Colorado has been its central focus on the Fellows and their career development. The cornerstone of fellow career development has permeated the culture of the Pulmonary Division for nearly fifty years. Importantly, during the past twenty years the Pulmonary Division has elected to create an endowment, the Lung Research Endowment Fund, specifically designed to support the early career development and career transitions of academic pulmonary and critical care trainees. This endowment is currently valued at nearly \$12 million. In addition to the usual “best practices”, the division has invested heavily in its young investigators at crucial career developmental periods to assure their successful transition into leaders in the field. While investigative infrastructure and mentoring teams remain of utmost importance, the culture of financial support for promising trainees through this unique endowment mechanism remains a hallmark of success for our program.



University of Mississippi ★
2500 North State Street, Jackson MS 39216
Pulmonary / Critical Care Fellowship Program
Training Program Director: Demondes Haynes, MD

Since my training as a fellow in pulmonary and critical medicine, I have been well aware of the potential conflict between the enthusiasm of the fellows to make ventilator adjustments and the responsibilities of the respiratory therapists taking care of the patients in the intensive care unit. After discussions with the fellows and respiratory therapy department, we instituted a plan so that all of our faculty and fellows are certified to change mechanical ventilator settings and document on the respiratory care sheet. The plan includes:

- Lectures on mechanical ventilation given by faculty:
- First week of July, a lecture on the basics of mechanical ventilation - This lecture is dedicated to modes of ventilation, including the history of mechanical ventilation. This gives first year fellows an opportunity to ask basic mechanical ventilation questions while preparing for the MICU. This serves as a refresher course for the 2nd and 3rd year fellows.
- Second or third week of July, a lecture on mechanical ventilation and salvage therapies - This lecture focuses on more advanced mechanical ventilation and salvage therapies.
- 3-4 months later, a lecture focused on high frequency oscillatory ventilation.
- In-service training: An in-service with hands on experience, with the different mechanical ventilators available in our hospital, is provided to the fellows by our MICU RT supervisor. This is an intense course which must be completed by all fellows. There is a didactic and hands on practical session approximately 4 hours in duration. During this session, basic mechanical ventilation is reviewed including waveform analysis, ventilator setup and adjustment, troubleshooting, etc. The fellows are free from other duties during this time. The fellows are educated on the various ventilators which we use in this institution and at the VA (SERVO-i® and occasionally Servo 300). The fellows receive instruction and hands on experience with making adjustments on each ventilator. They are also instructed on documentation on the respiratory care flow sheet that is usually completed by the RT.

- **Written Exam:**The fellows must take and pass a written exam after the in-training session. A score of 80% is required for passing. If fellows do not pass the exam on the 1st attempt, they are allowed a 2nd attempt. If they do not pass on the 2nd attempt, they are required to participate in the in-service session again.
- **Practical Exam:**After completing the written test, the fellows schedule individual appointments with the MICU RT supervisor for a hands-on practical exam. After successful completion of the practical exam, the fellows are deemed competent to make ventilator manipulations. Their certification for ventilator adjustments is approved by the medical director of respiratory therapy. Only fellows (and faculty) who receive this certification are allowed to manually manipulate mechanical ventilators in our institution.

This has improved the communication and relations between the fellows and respiratory therapists. We believe this is a best practice as it teaches the fellows about manipulating the mechanical ventilators, working as a part of the healthcare team and promotes life-long learning.



University of Pittsburgh ★
628 NWUPMC-Montefiore 3459 Fifth Ave,
Pittsburgh OA 15213
Pulmonary / Critical Care Fellowship Program
Training Program Director: John W. Kreit, MD

The goal of the fellowship program in Pulmonary and Critical Care Medicine at the University of Pittsburgh is to train the next generation of physician-scientists, while ensuring that our graduates are also master clinicians. To do this, we've implemented a number of innovative programs to provide outstanding training in both clinical medicine and biomedical research.

Our fellowship consists of 18 months of clinical training followed by 18 months of protected time for research. During the first 2 months of the 1st year, fellows receive an intensive introduction to pulmonary and critical care medicine. Daily lectures supplemented by mannequin-based medical simulations allow our fellows to learn the essentials of critical care ultrasound, bronchoscopy, endotracheal intubation and airway management, ventilator management, hemodynamic monitoring, thoracentesis, and central venous and right heart catheterization.

Beginning in 2012, we will enhance this introductory training with a one-week PCCM boot camp prior to the start of clinical rotations. This program will focus on critical care ultrasound, bronchoscopy, endotracheal intubation, and central venous catheterization and allow our fellows to learn without being distracted by clinical duties. We will solidify and supplement this training with our usual daily lectures and hands-on instruction throughout the first two months of fellowship.

Throughout the remaining 18 months of clinical training, our fellows are encouraged to become increasingly independent, and they are given progressive responsibility based on objective assessments of their clinical knowledge and skills. We also provide our fellows with individualized training by giving them two months of clinical elective

time in the 1st half of their 2nd year. This allows them to focus on areas of particular interest or fill in perceived gaps in their clinical knowledge or skills. Popular rotations include general thoracic surgery, chest imaging, pulmonary pathology, echocardiogram interpretation, and right heart catheterization. This individualization also extends to outpatient training. Each fellow selects a series of 6-month continuity experiences, which can include general pulmonary medicine, sleep medicine, asthma and allergy, interstitial lung disease, pulmonary vascular disease, lung cancer, lung transplantation, cystic fibrosis, and emphysema.

We introduce our fellows to research long before the end of their clinical training. In January of their 1st year, fellows are removed from the clinical services to participate in an off-site, 3-day research retreat. There, senior fellows and junior and senior faculty members discuss a variety of important topics, including how to choose a research mentor, how to be successful in academics, how to apply for grant funding, and how to transition from a mentored to an independent investigator. Every RO-1-funded investigator then gives a description of their research and discusses potential fellow projects. During the next few months, each fellow meets with potential mentors and regularly reviews their progress with a research committee composed of the division chief, the fellowship director, and the fellowship research director. By the end of their 1st year, every fellow has a research mentor and a well-defined project that has been evaluated and approved by the research committee.

In July of their 2nd year, fellows are excused from the clinical services for a 2-week Introduction to Research course. Lectures by our faculty cover topics ranging from cell biology and immunology to mouse physiology to IRB protocols. Fellows are also provided with 30 hours of hands-on experience performing important laboratory techniques, such as cell culture, Western blot analysis, RNA extraction, laser capture micro-dissection, proteomics, and microarray. Between July and December of their 2nd year, fellows use their “spare time” to meet with their mentor, practice laboratory techniques, and even collect preliminary data. Although they have not yet finished their clinical training, almost all of our fellows submit an ATS abstract in November of their 2nd year.

Clinical training ends in January of the 2nd year and except for a weekly, half-day outpatient clinic, the next 18 months are devoted solely to training in biomedical research. Fellows are closely monitored as they read all relevant literature, learn research techniques, and collect data. At least twice a year, the research committee meets with each fellow and mentor to ensure that the fellow is on track to meet pre-specified milestones, including applying for grant funding and submitting abstracts and publications. Second and third-year fellows also make regular presentations at our weekly research in progress conferences.

All fellows apply for NRSA funding. These grants are written, critiqued, and rewritten during a series of regularly-scheduled grant writing workshops. These sessions, which are led by our director of fellow research, not only teach our fellows how to write a grant application, they have also led to a very high success rate. Similar workshops are provided for 3rd and 4th-year fellows who are preparing for a K-08 or K-23 submission.

From the beginning of their training, we make it clear to our fellows that an academic career requires at least 2 years of protected time to collect data, publish,

and secure K-level grant funding. Staying for one or more years of additional research training has now become the norm, and many of our fellows have become successful, independent physician-scientists. We believe that our innovative programs to enhance both clinical and research training and to provide ongoing and effective research and career mentoring have significantly contributed to this success.



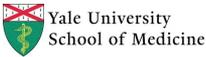
**Wake Forest University School of Medicine
Medical Center Blvd, Winston Salem NC 27157
Pulmonary / Critical Care Fellowship Program
Training Program Director: Edward Haponik, MD**

During the past two years the use of multimodality simulation has become a major component of the renewal of Pulmonary/Critical Care Fellow education at Wake Forest University School of Medicine, and has complemented the experiences focused on traditional hospital service-based clinical rotations. This curricular initiative represents a partnership of Fellow and Faculty delineation and prioritization of learning needs and application of dynamic, novel resources in our Medical Center's Center for Applied Learning (CAL; see attachment). Components of the latter have included cadavers prepared especially to represent specific respiratory problems; high-fidelity anatomic models and other devices developed to promote motor skills, procedural competencies, and real-time clinical decision making; and a computer-based curriculum incorporating video-based instruction. Our individualized learning goals were defined, focused upon knowledge, skills, attitudes and behaviors in areas that required improvements in the Fellow experience. We prioritized areas for these activities based upon internal and external (RRC) review of our program, together with computer-based needs assessment by Faculty and Fellows.

One example of an especially productive experience evolved from the need for augmented Fellow instruction in the placement of chest tubes. Although this procedure has always been available to Fellows during their rotations on CT Surgery, Trauma, and Oncology services, it represented an opportunity for improved instruction. Surveys of Faculty and Fellows confirmed that this was a valued area for our curriculum, and a focused experience in our CAL simulation laboratory was designed. Pretest surveys confirmed suboptimum appreciation of specific details of the procedure, and prospective assessments documented a low frequency of chest tube placement by Fellows. To assure participation in this training experience, Fellows were relieved of their clinical responsibilities and covered by Faculty so that they could attend two blocks of instruction in our cadaver laboratory. In an experience coordinated with our program's expanded use of ultrasound, each Fellow had hands-on direct instruction by faculty who also observed their performance in the placement of chest tubes, rigid bronchoscopy, pleuroscopy and percutaneous tracheostomy. Fellows received immediate feedback from Faculty following this direct instruction. Fellows' self-assessments and knowledge were retested with a written examination, and had improved.

This initial positive experience has been followed by the expanded use of the Center for Applied Learning in other major areas, including Fellow instruction in placement of central venous catheters, critical care ultrasound, and interventional bronchoscopy procedures. This approach has also promoted new multidisciplinary

interactions including sessions on management of difficult airways (coordinated with our Department of Anesthesia); tracheostomy care (Department of Otolaryngology); and, in a team experience partnered with our Department of Obstetrics/Gynecology, emergency management of a simulated critically ill patient during pregnancy. Reinforcement of instruction has been achieved through repeated training experiences, with the latter modified and refined by feedback from participating Fellows, and Faculty. We believe that this novel, memorable instruction and objective evaluation applying CAL resources to Pulmonary/Critical Care has complemented and enriched our Fellows' clinical experiences, and has made a major, durable impact upon Fellow education.



Yale University School of Medicine
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Pulmonary / Critical Care Fellowship Program
Training Program Director: Margaret Pisani, MD,MPH

While our PCCM fellowship training program has several educational initiatives which have been developed over the past few years including both weekly outpatient and inpatient focused didactic curriculums, a unique board review session and one-one assessments of clinical competency in procedures including bronchoscopy, the best-teaching practice I would like to showcase relates to our research planning and mentoring for our fellows.

Our training program places a large emphasis on scholarly work and the fellows spend at least 18 months of their training performing research. In any given year we often have 4th and 5th year fellows continuing on in research tracks. Before they even arrive for fellowship training all matched fellows are contacted and encouraged to submit an abstract to the American College of Chest Physicians Annual Meeting in the fall. All first years fellows are then sent to the ACCP meeting. All of our upper year fellows attend the American Thoracic Society Meeting where they are expected to present their research findings. We also have fellows present at other subspecialty meetings including sleep meetings, FASEB and disease specific meetings. We have had several fellows present their research at the Young Investigators Forum .

We begin the process of research planning as soon as fellowship begins. Starting in their first year of training the fellows are assigned an advisor. When fellows have an idea about their research goals the advisor is chosen based on interest, otherwise faculty volunteer to serve as advisors for fellows who are uncertain as to their future career path. The advisors meet with the fellows at least quarterly to assess how their clinical year is going, to get to know them as a person and to help guide them in choosing a research mentor and project. The fellows also receive a "survival guide" at orientation and in this survival guide a research section which provides instructions to the fellows about how to set up and facilitate the research portion of their training. The guide includes an introduction to academic medicine with links to important web pages, it explains how their Research Advisory Committee (explained below) will work and it details expectations regarding presenting their research findings.

In the early fall we have a Research Retreat for first and second year fellows. There are talks by senior research faculty to introduce the fellows to the various opportunities

available to them. There is also a meet and greet with the faculty so the fellows can ask specific questions about different career paths. At the end of the day there is a social time where the fellows can speak with each other to share experiences regarding mentors, labs and projects they have worked on.

At the end of their first clinical year the fellow will have an assigned Research Advisory Committee (RAC). The goals of this committee are to ensure appropriate mentoring, to provide feedback related to the research project, assistance with career planning and assessment and documentation of the fellows progress. The specific tasks of the RAC are to assist fellows with identifying feasible projects, refining hypotheses, and troubleshooting research problems. The RAC also provides timely reviews of research protocols with a written summary of suggestions/critiques to the fellows. They help review and interpret research findings and are expected to attend the Research in Progress Conferences.

Each fellow has their own committee which consists of a primary mentor, a secondary mentor, an expert clinician related to their topic matter and often a statistician or other faculty depending on the project. These committees meet at least twice a year. Overseeing the individual committees is a large committee run by the section chief which includes the program director and both clinical and bench research faculty. This group meets quarterly to receive updates from the individual RACs and ensures that the fellows are truly getting the mentoring and support they need to be successful.

We have weekly Research in Progress Conferences where the 2nd and 3rd year fellows present their research projects and results to the faculty and their co-fellows to receive feedback. In June we have a Fellowship Research Day where the graduating fellows present a summation of their research experience and all the posters which have been presented throughout the year are displayed for feedback from the School of Medicine community at large.

Our research mentoring system has been extremely successful. Every year we have fellows who present their research at ATS as talks, poster discussions and poster presentation sessions. We have had several fellows receive travel awards. We also have had several residents who have now matched in pulmonary present their Research in Residency projects and receive travel awards from ATS. Our fellows are also publishing their projects in peer reviewed journals and receiving grant funding from both the NIH and foundations.

| YALE PCCM Fellowship ATS Presentations | 2009 | 2010 | 2011 | 2012 |
|--|------|------|------|------|
| Poster Presentations | 9 | 14 | 7 | 9 |
| Poster Discussions | 1 | 3 | 1 | 0 |
| Talks | 2 | 2 | 1 | 0 |

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