Dr. Ara A. Chrissian: the key components to a successful Pulmonary and Critical Care Medicine training program

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Expert introduction

Dr. Ara A. Chrissian (*Figure 1*) is visiting us from the United States as part of a training collaboration between Henry Ford Hospital in Detroit, USA and two hospitals in China: Changhai Hospital at the Second Military Medical University in Shanghai, and the Guangzhou Medical University here in Guangzhou.

After graduating from UCLA with dual Bachelor of Science and Arts degrees, Dr. Chrissian obtained his Doctor of Medicine from the University of California in San Diego. He then specialized in internal medicine at UT-Southwestern Medical Center in Dallas, and subsequently completed fellowship in pulmonary and critical care medicine (PCCM) at Washington University in St. Louis. He recently also completed a subspecialty fellowship in interventional pulmonology at Henry Ford Hospital in Detroit. Dr. Chrissian is a faculty member at Loma Linda University Medical Center in southern California since 2011, where he is the Medical Director of Adult Bronchoscopy and Interventional Pulmonology and Associate Director of the Pulmonary and Critical Care fellowship. He is heavily involved in educational activities, including curriculum development and lecturing. Dr. Chrissian has particular expertise and research interest in endobronchial ultrasound, sedation for bronchoscopy, critical care ultrasound, and medical education, and has published in these areas. He has an active clinical practice in interventional pulmonology, which includes advanced diagnostic bronchoscopy for a variety of thoracic disorders, as well as therapeutic interventions for complex airway disease. He also regularly attends in the intensive care unit.

Figure 1 Dr. Ara A. Chrissian.

Interview questions

JTD: What are the key components to a successful PCCM training program?

Dr. Chrissian: Thank you for inviting me to speak about PCCM training. First, please allow me to provide a brief history of PCCM in the United States. The practice of and training in pulmonology has been established for quite some time in the USA. A field that mostly focused on tuberculosis in the 19th century evolved into a broader specialty in the mid-20th century through an increased understanding of respiratory physiology and the subsequent integration of research and clinical practice. Conversely, critical care medicine is a fairly new subspecialty, dating back only a few decades. Its main contribution has been to bring into the intensive care unit a dedicated physician specifically trained in managing critically ill patients. This shift in paradigm effectively created what we call a 'closed ICU.' in which this physician's team assumes primary responsibility for the patient's care throughout the duration of their acute critical illness. This new model has resulted in better and more cost-effective medical care, so critical care physicians are now in high demand. This, in turn, has led to an expansion in the number of training programs, and enhanced scrutiny on the quality of training provided.

In the United States, a physician can obtain training in adult critical care medicine after specializing in fields such as surgery, emergency medicine, and anesthesiology. However,

it is most commonly pursued after specialization in internal medicine, and in combination with training in pulmonology. Collectively, this joint fellowship is called PCCM. These PCCM training programs are 3 years in duration in the United States, and must provide a comprehensive learning experience to ensure adequate preparation in both of these advanced subspecialties.

And so that brings us to your very important question, "*What are the key components to a successful PCCM training program?*" Of course, opinions will vary, but I would say many of the basic principles that constitute any successful educational program apply. These in my view include four essentials: (I) an effective didactic curriculum; (II) opportunity for scholarly activity; (III) procedural and/or situational simulation; and (IV) clinical experience.

An organized didactic curriculum forms the informational cornerstone of any educational program. Therein, trainees learn the theory that will supplement their practical experience. The educational sessions can come in many forms and be taught with varying styles. Many PCCM fellowship programs, including ours at Loma Linda University, utilize a comprehensive daily conference schedule. We incorporate lectures that teach relevant physiologic and cellular mechanisms of disease, the approach to diagnosis and therapy, as well as quality control and improvement. Both faculty and fellows participate in leading the lectures and associated discussion, and this intimate learning environment allows teachers and learners to form a collegial relationship.

Another important component of a successful PCCM program is the opportunity for scholarly activity. This way, the trainee can explore their subspecialty in more detail and develop particular expertise. The sole goal isn't necessarily to publish research, but to learn the process of scientific investigation. This includes hypothesis creation, study design and implementation, statistical analysis, and critical appraisal and dissemination of the final product. After all, in the age of evidence-based medicine the ability to properly evaluate, interpret, and apply medical research is essential. An infrastructure that supports robust scholarly activity is ideal, and the presence of faculty engaged in scientific investigation substantially aids the mentorship process.

PCCM of course is a procedure-based specialty, and one that often places the physician in clinical situations when quick-thinking and action can be the difference between life and death. There is ample evidence, in many settings, that simulation training helps the learner more effectively develop and perform a particular skill, while decreasing patient harm. It also allows instruction and preparation for rare scenarios and diseases. Therefore, training with procedural and situational simulation is crucial for the PCCM fellow. This can be in the form of virtual simulators (computer or video-based) or animal, cadaveric, and synthetic models. In certain circumstances, human volunteers are also utilized.

Finally, a good PCCM program exposes the trainee to a broad variety of respiratory disease and critical illness. Dr. William Osler, who many consider the father of medical education in the United States said, "*He who studies medicine without books sails an uncharted sea, but he who studies without patients does not go to sea at all.*" Namely, true expertise as a physician can only be achieved by applying theoretical background and simulation to real-life clinical practice. Learning solely from books and journals (or now our computers and smartphones) is not enough.

JTD: Why should developing countries like China formalize a medical training program, such as in PCCM?

Dr. Chrissian: As I've learned during my visit, China is moving toward a more formal training process in PCCM, and I think this is very exciting. And from what I have already seen, there is abundant respiratory disease here, allowing for the potential for very successful training programs. While providing health care to all citizens remains a challenge in many countries (including the United States), a minimum quality standard should be an expectation. And this of course begins with properly standardizing medical training.

But different hospitals may treat different diseases, prioritize either research or clinical care, and have variable amount and type of resources allocated for education. This leads to the potential for uneven and unreliable training on a national level. For example, in the United States there are now over 100 PCCM training programs. It is impossible for all to provide an identical educational experience to their trainees. So to help ensure that some of the key components we discussed in the previous question are incorporated across training institutions, the United States established the Accreditation Council for Graduate Medical Education (ACGME) in 1981. Through various regulations, this body provides quality oversight on a national level to help ensure that a basic educational standard is met and maintained. This, we hope, leads to more uniform medical practice across the country, and in turn, patients can trust in the care they receive. I would imagine that as PCCM programs

further expand in China, a similar national committee will be employed as well.

JTD: What is the most challenging issue with performing bedside ultrasound in the critical care setting, and how to overcome?

Dr. Chrissian: Point-of-care critical care ultrasound has emerged as a very powerful bedside tool for evaluating critically ill patients with various disorders. Substantial medical information that may have an immediate impact on therapy can be rapidly acquired by the treating physician, without the need to transport the patient. For example, in a patient with cardiorespiratory failure, one can quickly and accurately evaluate for the presence of numerous causes such as pneumothorax, pneumonia, pulmonary embolism, hypovolemia, myocardial infarction, cardiac tamponade, aortic dissection, and so on. The critical care community has rapidly adopted this high-yield, yet simple and relatively cheap technology. We frequently joke that the ultrasound machine is our 21st century stethoscope. Several international societies within the field advocate for its use and there are ample educational courses offered all over the world.

But I would say that the main challenge in performing critical care ultrasound is first establishing its regular use in your institution's ICUs. Critical care ultrasound, at least for its most common applications, is actually fairly easy to learn and perform. Past studies have shown that trainees can accurately utilize and interpret basic ultrasound techniques after a straightforward educational process. But the main hurdle is obtaining a few physicians at your hospital that will champion initial education and application. For this I recommend a multidisciplinary approach. At Loma Linda University, we elicited and incorporated the ultrasound expertise of physicians from various specialties including emergency medicine, pulmonology, anesthesiology, cardiology, and radiology. The result of this collaboration was a comprehensive critical care ultrasound curriculum for our faculty, fellows, residents, and medical students, and ultimately the widespread implementation of the technique in our ICUs. So once you have taught the teachers, they can further disseminate training to the rest of the institution.

JTD: What should we pay special attention to during EBUS sampling?

Dr. Chrissian: We all know endobronchial ultrasound-guided bronchoscopic sampling has become a central tool in evaluating a wide range of thoracic disease. But to maximize the benefit of EBUS bronchoscopy, one must understand and perform it correctly. First, of course, is to learn and utilize proper technique. While EBUS is now taught in a large majority of PCCM training programs in the United States, acquisition of skill varies considerably and there is no consensus yet on when someone has reached an adequate proficiency level. Most would agree, however, that additional training in Interventional Pulmonology well prepares a bronchoscopist to expertly perform EBUS. This is not only because they perform a high volume of these procedures, but they also gain expertise in managing the associated clinical conditions. As you see, we come back to the importance of good education and training!

And that, I believe, is the most important aspect of performing EBUS accurately: understanding the possible underlying disease processes for which EBUS is indicated. The suspected diagnoses will dictate the extent and type of sampling during EBUS. The bronchoscopist must also decide if another procedure (or no procedure at all) is a more appropriate diagnostic approach for the patient. For example, concern for an infectious or inflammatory process may not always require EBUS technology. But if it does, the bronchoscopist decides which sampling tools, tissue processing methods, and supplementary tests are needed. If cancer is suspected, the bronchoscopist may be more particular and comprehensive with lymph node sampling to ensure adequate staging and tissue collection for genetic analysis. The breadth and order of tissue acquisition may depend on the type and clinical stage of cancer suspected, or the availability of ancillary resources, such as rapid on-site cytologic evaluation.

JTD: It is amazing to know that you have a background both in molecular biology and history, and then you achieved the doctor of medicine. Would this background be helpful in your practice?

Dr. Chrissian: I am flattered by your comment and appreciate you looking over my history so carefully! This is an excellent question. Specifically, what impact does one's area of study in college have on success in medical school and later as a physician?

So again, some brief background. Prior to attending medical school in the United States, we must first attend university (or 'college'), which on average is about 4 years in duration. During this time, we choose a field of interest

to focus our studies—this is called a 'major'. There are many majors, but are broadly grouped into science and non-science categories. The latter includes subjects such as politics, history, philosophy, anthropology, sociology, art, literature, and so on. Collectively, these academic disciplines are often referred to as "the humanities" or "social sciences". Traditionally it was thought that if one wanted to be accepted and succeed in medicine, they had to choose a 'pre-med' major, which usually meant one of the biological or physical sciences. In fact, until quite recently a certain stereotype persisted against those applying for medical school who did not have science backgrounds.

This has changed significantly in the last 25 years. Now about a quarter or more of medical students do not major in a science during university. Research has shown that these students perform just as well in medical school as their 'pre-med' counterparts. Interestingly, they may even score higher on the medical college admission test (MCAT) and have a better chance of being accepted into medical school. It is debatable why this may be so, but fun to speculate. Perhaps the application process selects for those with non-traditional backgrounds. This could be because some of these individuals are inherently more talented or well-rounded, leading to distinction in not only curricular studies, but also in humanitarian pursuits and other life experiences. So maybe they are just more interesting!

But does having a non-science background make a better doctor? We sometimes forget that medicine is not just a science, but an art—more specifically, a human art. The desire and ability to relate to the human condition is a key component of effective doctoring. Those with such inclinations often gravitate toward the humanitarian or social studies in college, during which there is further fostering of these attributes. And so I do indeed think that such a background contributes to the success of a physician by adding perspective and insight into human nature, or is a marker of one who already possesses these characteristics. After all, we want our own physician to be both an expert clinician and humanitarian—to be able to marry the science with compassion, empathy, and effective communication. I believe accomplishing this makes for a more complete physician.

JTD: Thank you so much for your nice talk

I have only been in China for 2 weeks, but have had a wonderful educational experience, both in Shanghai and here in Guangzhou. In addition to gaining insight into your training process and medical practice, I have seen a lot of respiratory disorders we don't commonly encounter in the United States, such as tuberculous airway disease. And everyone has been so very hospitable in hosting us. I can't wait to come back!

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Footnote

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