A Return to the Bedside:

Teaching Point-of-care Ultrasound at Abbott Northwestern Hospital

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Did you learn to distinguish mitral regurgitation from aortic stenosis by the quality and location of the murmur? Maybe you used percussion to detect pleural effusion and ascites and used your hands to palpate an enlarged liver or spleen? If you mastered these traditional exam maneuvers, then you spent many hours at the bedside practicing.

The traditional bedside physical exam has been in decline within Internal Medicine (IM) for many years with various contributory causes.[1–5] Once the erosion in skills began, a shortage of teachers and mentors developed ensuring weak skills and interest by successive classes of medical students and residents. Despite strong efforts by the Abbott Northwestern IM Residency Program leadership over many years to continue strong teaching of the traditional exam, we agree that the traditional exam is held in predominantly weak regard and is usually cursorily performed.

Yet, two factors support the necessity of a competent bedside exam. First, as Verghese, et al. have argued, there is a ritual aspect of the exam that should be preserved. Second, because of radiation exposure and resource use, it is difficult to imagine a future in which all patients simply undergo serial complete body imaging and laboratory panels without focus.[4] Thus, an IM bedside exam must be found that maintains physician/patient contact but that also contributes importantly to the diagnostic ability of the physician, allowing appropriate selection of subsequent diagnostic and therapeutic interventions. We believe that such an exam is created through the strategic addition of point-of-care ultrasound (POCUS).[5–7]

There is strong evidence that POCUS is superior to most traditional exam maneuvers and to many forms of plain radiography.[7–11] Specialties such as emergency medicine, critical care, rheumatology, sports medicine and orthopedic surgery have already made POCUS commonplace in practice and training. In some countries general internists are also routinely trained to use POCUS, and a rapidly growing number of United States medical schools have added ultrasound education to their curricula (101 of 134 schools participating in the AAMC 2015-16 Curriculum Inventory).[12,13] The Society of Hospitalist Medicine and the American College of Physicians have incorporated POCUS certificate programs and training courses at the local and national levels over the last 5-10 years to keep up with this reality.

In 2011, we began one of the first, and most robust, residency-based IM ultrasound training programs in the country known as IMBUS (Internal Medicine Bedside UltraSound). We started by training 12 of our core faculty and program leaders in a breadth of POCUS applications targeted at weak areas of the traditional physical exam. After a year of faculty training, the first group of IM residents entered a longitudinal, three-year curriculum. To date, over 175 providers, including residents, faculty, and advanced practice providers have gone through training at Abbott Northwestern in both in- and outpatient POCUS.

One month into residency, our 1st year residents enter a five-day IMBUS "boot camp." The goal of this intensive course is to familiarize residents with the core areas of IMBUS and give them enough hands-on time to reach an efficiency and comfort with image acquisition. Following this week of intense training, residents have a "learner's permit" and enter "behind-the-wheel" training. Residents then continue POCUS learning at the bedside of patients they are caring for with one of our faculty mentors at their side until they reach certification with each skill. Though some POCUS knowledge can be taught away from the bedside, the critical skill of clinical integration necessitates physician-mentored bedside practice. It takes much experience to understand the strengths and pitfalls of POCUS, the appropriate clinical weight of a finding within the context of other available data, the spectrum of "normal" such that abnormal begins to

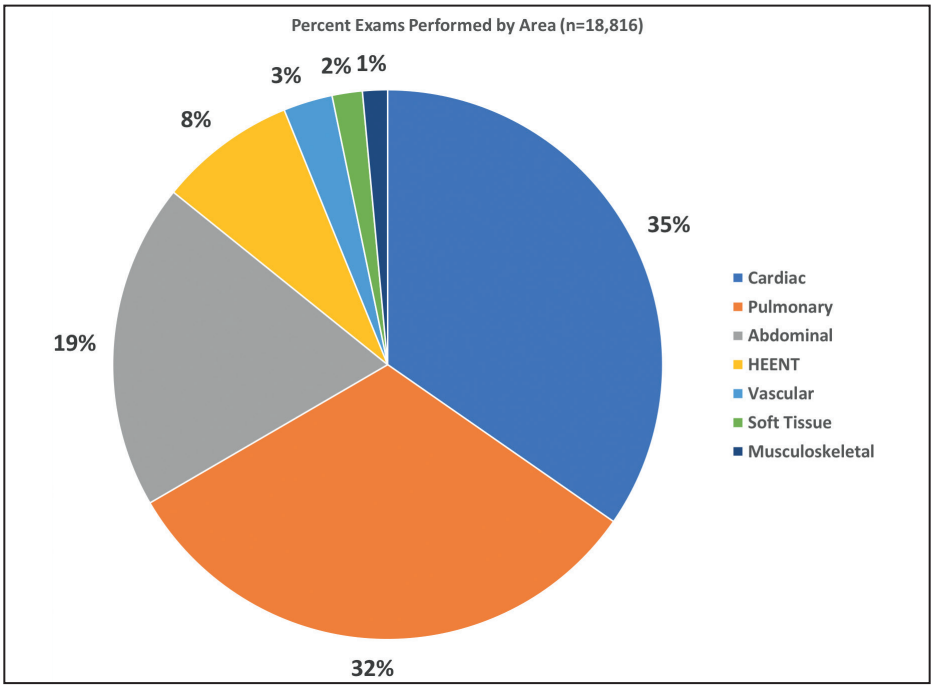
stand out, and the art of this exam and how it is also integral to the physician-patient relationship.

Though frequently thought of as an inpatient tool, POCUS for internists is equally impactful in the outpatient setting where the spectrum of disease is different, and a variety of POCUS needs exist that rarely surface in the hospital. In 2013 we established a dedicated outpatient POCUS rotation for our 2nd year residents that has extensive formal and experiential learning and takes residents beyond the core level of IMBUS skill using an advanced POCUS machine.

There are many program investments beyond training a necessary fleet of inpatient and outpatient IMBUS faculty mentors. Laptop/cart-based ultrasound machines are housed on all hospital stations and in both resident and faculty clinics. In 2017, we added tablet-sized ultrasounds right next to stethoscopes in the pockets of our ward team residents. Each exam performed on these devices, and the findings observed, are recorded on an internally-developed, smartphone-based, mobile tracking application. The study images from the exam can be wirelessly archived for follow-up or to facilitate inter-provider communication, and these archived images can be immediately viewed from any computer or smartphone when the need arises. An online educational portal and textbook (http://imbus.anwresidency.com), regular IMBUS case conference and image review sessions, as well as a POCUS curriculum specific for our rotating medical students, are key components of ongoing education. Finally, a faculty reimbursement model that compensates our core IMBUS faculty for time spent teaching at the bedside is a requirement for optimization of the educational efficiency, quality, and safety of the program.

In addition to the obvious challenge of POCUS training and program logistics, the current major barrier to wide-spread POCUS implementation in IM is the reimbursement model. POCUS takes additional time and current RVU based compensation models bring little if any additional revenue for physicians performing it. Thus, while the patient and the entire health system can benefit from IM POCUS, the individual physician (and usually the hospitalist group or clinic) can actually lose. Reimbursement systems need to better recognize clinical outcomes and the total cost of care for POCUS to reach its potential in IM.

The POCUS mountain is difficult for a residency and its faculty to climb, but the future of IM will revolve around residents entering practice that have been trained in a longitudinal, residency-based pathway like IMBUS. Short courses offered at local and National meetings are helpful as introductions, but development of true competency in POCUS takes mentored practice at the bedside that these courses cannot provide.



So, what are the benefits of such a climb? Here are a few we know to be true after almost seven years and over 18,000 exams performed (chart below) within the IMBUS program: 1) a reduction in radiation-based imaging; 2) better diagnostic accuracy than traditional exam often resulting in more timely diagnosis, decreased cost, and a reduction in antibiotic use; 3) safer invasive procedures; 4) an enthusiasm among students, residents, and faculty of all ages to see physiology, anatomy and pathology at the bedside; 5) a satisfaction among patients tied to visual rather than verbal explanations; and 6) preparing for the future of medical students and residents who are leaving training with this skillset. Last but not least, the IMBUS experience has been about a return to the bedside for us as internists, now with an ability to diagnose, efficiently treat, and engage patients in the relationships that drew many of us to internal medicine in the first place. ✦

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