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EDITORIAL

Training Future Hospitalists with Simulators: A Needed Step Toward Accessible, Expertly Performed Bedside Procedures

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Internal medicine residency programs, the major pipeline for incoming hospitalists, often provide little hands-on experience in bedside procedures. Some residents may only insert 1 central venous catheter every 4 months on the general medicine wards,[1] and others may gain little more experience during intensive care unit rotations. As seen in the survey presented by Grover et al.[2] in this issue of the *Journal*, after 3 years of training in all types of patient care units, residents often count their accumulated experience on their fingers and toes. Such sparse experience hardly leads to expertise. Recognizing this pervasive lack of training the American Board of Internal Medicine narrowed its certification requirements for bedside procedures in 2006.[3] Residents are no longer expected to *perform* bedside procedures but instead to *know* them. This important revision acknowledges that manual skills training should neither be assumed nor expendable—continuing to do so is too risky.[4] Yet as internal medicine residency programs focus their bedside procedure training on cognitive competence, the ongoing exodus of bedside procedures to the up-market hands of subspecialists, surgeons, anesthesiologists, and interventional radiologists[5] will likely accelerate.

But why should hospitalists disrupt this trend? Bedside procedures are common and not always conveniently needed during daytime hours. Roughly one-tenth of general medicine inpatients receive a central venous catheter (CVC) insertion, a lumbar puncture, an abdominal paracentesis, or a thoracentesis.[6] Among these patients, about one-half will urgently need procedures during off-hours. Outside of the emergency department, hospitalists will likely remain the only group of physicians available at the bedsides of general medicine inpatients 7 days a week, 24 hours per day. Thus, in developing "our particular practice system to best serve our patients,"[7] we believe that hospitalists ought to remain principals in ensuring that inpatients have ready access to expertly performed bedside procedures.

Yet unfortunately, given the limited training in manual skills that today's internal medicine residents receive, hospitalists are increasingly less prepared to provide this access themselves.[8] State-of-the-art training methods developed by medical specialties that depend largely on manual skills provide promising potential solutions for both future and practicing hospitalists.[9] In particular, patient simulators can provide trainees with the essential hands-on experience they often lack. In contrast to the ad hoc "see-one, do-one, teach-one" method in current widespread use, training with simulators has distinct advantages. First, simulators obviate the increasingly awkward consent as patients grow savvier about safety concerns and (understandably) less tolerant of a novice's need to acquire experience.[10] Second, training with simulators is controlled so that anatomic variations, comorbidities, patient discomfort, and time pressures—though important real-world factors—can be artificially removed in the earlier cognitive and integrative stages of training.[11] Third, immediate feedback, which at the bedside of real patients is often empathetically avoided or delivered in cryptic hand signals, can be unmistakably unmuted and honest in the simulator setting. Fourth, and most important to the development of expertise, simulators can be used repeatedly, allowing trainees first to become facile in the mechanics of their performance (eg, holding an ultrasound probe for real-time guidance or knowing how it "feels" to enter a vein) before attempting a procedure on a patient.

Three examples of patient simulators used to train internal medicine residents in CVC insertion are presented in this issue of the *Journal*.[12–14] Using observers who adhered to objective, a priori assessment criteria, both Rosen et al.[13] and Millington et al.[14] carefully demonstrate that internal medicine residents' manual skills can improve with patient simulators. Given the understood importance of hands-on experience in manual skills training,[15] these anticipated findings are important validations of simulator theory. The work by Barsuk et al.[12] goes further to begin to examine whether or not simulator training actually leads to improved patient outcomes—the holy grail of such research. In this observational study, compared to residents who did not undergo simulator training, those who did undergo such training had 1 fewer needle passes during successful CVC insertions. Given the relative infrequency of periprocedural complications, this study was understandably underpowered to measure true complications, relying instead on the often-used surrogate of needle passes. Nonetheless, this work will serve as an important initial example of why simulator training may be worth the effort.

To direct participation in simulator training, we endorse selecting trainees who will perform bedside procedures in their future practice.[16] Given the trend in manual skills training among internal medicine residency training programs, hospitalist programs may need to shoulder this effort themselves. Thankfully, simulator training need not be

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expensive. Based on transfer-of-learning research,[17] the "fidelity" of the simulator is less important than the accumulated experience it can afford. Even low-fidelity simulators, such as the store-bought whole chicken used by Rosen et al.,[13] may preserve trainees' manual skills just as effectively as the expensive, bionic, high-fidelity simulators used by Barsuk et al.[12] and Millington et al.[14]

Beyond the costs of training, however, hospital administrators and hospitalist group leaders have more complex externalities and opportunity costs to weigh when evaluating which physician groups should perform bedside procedures. The intuitively lower-cost strategy for hospitals, we believe, would be to ask hospitalists to perform *bedside* procedures at patients' *bedsides* instead of asking, say, highly-paid interventional radiologists to perform the same procedures in fully-staffed fluoroscopy suites. There is, however, very little research to help inform these decisions. As hospitalists, we know firsthand that modern healthcare remuneration is based more on doing than on knowing. Yet, whether or not bedside procedures afford financial incentives for hospitalists is unclear—much will depend on local factors. Regardless of the finances, we believe that hospitalists skilled in performing common bedside procedures can improve the quality and efficiency of care delivery at patients' bedsides. So, instead of a call to arms for yet another turf battle, let's continue development of state-of-the-art training methods like simulators to ensure that future hospitalists can expertly perform bedside procedures. After all, fighting for improvements in patient safety is a battle that we hospitalists know how to win.

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