

## Renal Ultrasound, Dialysis Catheter Placement, and Kidney Biopsy Experience of US Nephrology Fellows

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Procedures are a key component to the practice of nephrology. The Accreditation Council for Graduate Medical Education (ACGME) requires nephrology fellows to acquire skills and demonstrate competency in the performance of several procedures during fellowship training, including temporary hemodialysis catheter placement, biopsy of native and transplanted kidneys, and various dialytic therapies. It is also required that fellows acquire competency in the interpretation of renal imaging, including renal ultrasound, during their training. To gain a more recent perspective of nephrology fellows' experiences regarding renal ultrasonography, dialysis catheter placement, and kidney biopsies, we carried out a national survey of nephrology fellows in May 2014. A majority of the programs did not offer formal clinical training in renal ultrasonography. In addition, a significant percentage of fellows in adult nephrology may not be acquiring the required procedural skills and competency during fellowship training. In this perspective, we explore some of the reasons for this occurrence and propose some measures that the nephrology training community can take to enhance procedural skills and competency of fellows.

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Procedures are integral to the practice of nephrology. Due to time constraints or proficiency, nephrologists may perform a limited number of procedures. In comparison to several other internal medicine subspecialties, nephrology fellowship programs are not required by either the Accreditation Council for Graduate Medical Education (ACGME) or the American Board of Internal Medicine (ABIM) to train fellows to perform many procedures. However, during fellowship training in adult nephrology, fellows are required to demonstrate competency in the performance of several procedures, including urinalysis, temporary vascular access placement for hemodialysis (HD), percutaneous biopsy of both native and transplanted kidneys, and various urgent and long-term dialytic therapies.<sup>1</sup> Despite these requirements, the minimum number of procedures needed to acquire competency is not specified and is left open for each nephrology fellowship program to decide. Furthermore, there are no requirements for the performance of either renal or bladder ultrasonography, although the ACGME requires that fellows receive formal instruction regarding indications for and interpretation of renal imaging during nephrology fellowship training.<sup>1</sup>

Renal ultrasonography is a quick and noninvasive procedure that allows nephrologists to obtain vital information in a timely manner in both the inpatient and outpatient settings. For example, ultrasonography can rapidly rule out hydronephrosis as a cause of acute kidney injury or help support a diagnosis of chronic kidney disease when one sees small echogenic kidneys

with cortical thinning. In addition, performance of bladder ultrasonography can quickly aid in the diagnosis of acute urinary retention. Likewise, lung ultrasonography can be helpful in managing intravascular volume status in patients with advanced chronic kidney disease.

Invasive procedures such as percutaneous kidney biopsies and temporary HD or peritoneal dialysis catheter placement are also crucial to the practice of nephrology. Kidney biopsies, whether of a native kidney or a transplanted kidney, can be performed with ultrasonography guidance, with computed tomography guidance, or by the more old-fashioned "blind technique" using anatomical landmarks. The sonography used for the guidance of kidney biopsy is performed by a technician, a radiologist, or even a

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nephrologist. Temporary HD catheters can be placed in either the internal jugular or femoral vein.

In 2007, Berns and O'Neill<sup>2</sup> surveyed adult nephrology training program directors in the United States to assess fellows' procedural training. They found that although many core procedures such as percutaneous kidney biopsies, insertion of temporary HD catheters, and continuous renal replacement therapies were done at nearly all programs, training was limited. There were some programs in the United States that did not offer training in certain procedures. The authors concluded that there was a great opportunity to advance the procedural training skills of adult nephrology fellows. Furthermore, the results of their survey showed that many fellowship training programs intended to make diagnostic renal ultrasonography and other procedures a part of their curriculum in the future.<sup>2</sup>

To gain greater insight into fellows' experience regarding renal ultrasonography and other procedures, we performed a national online survey. The survey was considered exempt by our health system's institutional review board. The survey was anonymous and consisted of several procedural questions; it was distributed to US-based fellows in adult nephrology through US nephrology training program directors and coordinators in May 2014. Graduating nephrology fellows (defined as those scheduled to graduate June 30, 2014) and nongraduating nephrology fellows (defined as those not scheduled to graduate until the next academic year at the earliest) were surveyed. The survey was closed on June 30, 2014. A total of 200 trainees (21% of the fellows in adult nephrology training in 2013-2014) responded to the survey, with 38% being graduating fellows.

### Renal Ultrasonography Experience of US Nephrology Fellows

In 2009, Berns<sup>3</sup> conducted a survey of practicing nephrologists to assess the adequacy of their fellowship training. In that survey, a small number of respondents felt competent and well trained to perform diagnostic renal ultrasonography (5.3%) and interpret diagnostic renal ultrasounds (12%).<sup>3</sup> The other respondents reported having either little or no training in these procedures during their fellowship and not enough to feel competent.<sup>3</sup>

Although it is not an ACGME or ABIM requirement to train fellows in the performance of renal ultrasonography during fellowship, we wanted to know whether nephrology fellows were receiving any such formal training in their respective programs. We found that a majority (83%) of the respondents' fellowship programs did not offer formal clinical training in performing renal ultrasonography. The remaining programs offered formal training in renal

ultrasonography that ranged from 1 to 4 weeks in duration. Although there may be no formal training offered to fellows in performing renal ultrasonography during fellowship in most programs, we wanted to know whether renal ultrasonography was used by fellows in the outpatient or inpatient setting. Based on our survey findings, we found that performance of renal ultrasonography was underused during fellowship training. A majority (63%) of respondents had not performed renal ultrasonography in the outpatient setting. Sixty-one percent reported not or rarely having performed renal ultrasonography in the inpatient setting. Only 10% reported having performed renal ultrasonography routinely in the inpatient setting.

Several factors could play a role in the underuse of this procedure. Although the availability and cost of the ultrasound machine could be a factor, more importantly, nephrology faculty experience or interest in renal ultrasonography itself may also limit the use of this procedure during fellowship training. Seventy-two percent of respondents in our survey did not have a faculty member in their program who was able to perform renal ultrasonography. Hence, it is likely that lack of faculty experience or interest in the performance of renal ultrasonography may also play an important role in the underuse of this procedure during fellowship. Aside from this, faculty may not have the time to incorporate the performance of this procedure into their busy daily schedules. Finally, we also believe that until it is required by either the ACGME or the ABIM to formally train fellows in the performance of renal ultrasonography, this experience will not be uniformly offered to all fellows during their fellowship training.

Although a majority of the nephrology fellows in our survey did not undergo formal training in performing renal ultrasonography during fellowship, most fellows agreed that renal ultrasonography will become more important to the practice of nephrology. An overwhelming majority (96%) of responding fellows thought that nephrology fellowship programs should offer a formal rotation in performing renal ultrasonography of 1, 2, or 4 weeks during fellowship training. Moreover, there were 21% of fellows who plan to pursue additional training in renal ultrasonography outside their fellowship.

Currently, the ACGME requires programs to provide fellows with formal instruction regarding indications for and interpretation of the results of renal imaging.<sup>1</sup> The majority of fellows in our survey described their ability to identify normal anatomy or pathologic findings on renal ultrasound as poor to fair. Nearly two-thirds (67%) also reported that they did not receive formal didactic renal ultrasound experience during their fellowship. To enhance the interpretation

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