

POCUS— The New Focus in Nephrology Training

By Matthew Wysocki, Natalie McCall,
and Anna Burgner

Popularized by cutting-edge research, on the wards, and even on social media, point-of-care ultrasound, or “POCUS,” has the potential to change the way we practice medicine. Widely implemented in numerous clinical settings, current ultrasound devices are made to be compact and affordable, and an argument could be made that POCUS should be incorporated into the routine physical exam. Although many specialties of medicine have adopted this tool for everyday practice, it remains absent, underused, or undertaught in many nephrology training programs and practices. In addition, per the 2017 ASN workforce fellow data, 44% of respondents felt their programs lacked ultrasound training (1).

Ultrasound has long been an integral instrument in nephrology and is used in many facets of the field including basic evaluation of acute and chronic kidney dysfunction, vascular access issues, hemodialysis catheter placement, and kidney biopsy. However, less is understood about the role of POCUS performed by the nephrologist and under what circumstances it should be applied. Regardless, there has been a push over the years to incorporate it formally into training. In 2019, Koratala and colleagues (2) shared a model curriculum on how POCUS training can be integrated into a nephrology fellowship. This curriculum was based on the American Society of Diagnostic and Interventional Nephrology (ASDIN) rec-

ommendation of 6 weeks of didactic ultrasound interpretation, with the authors suggesting an additional 2 weeks dedicated to teaching POCUS skills, spread out over 2 years. These recommendations reflect the ever-evolving ways of nephrology practice and how ultrasound has shaped it.

The addition of POCUS to nephrology will aid and expedite clinical decision-making, both with the evaluation of acute kidney injury (AKI) and in volume assessment. Assessing for hydronephrosis and nephrolithiasis and even measuring volume status with rapid echocardiography and by scanning for pulmonary B-lines or inferior vena cava (IVC) fullness/collapsibility can all be accomplished with POCUS. A recent study involving the novel venous excess ultrasound model (VExUS), which incorporates the sonographic measurements of IVC and hepatic, portal, and renal vein congestion, showed that AKI risk could be predicted in patients with cardiorenal syndrome (3). The novel renal venous stasis index (RVSI), on the other hand, uses sonographically quantified kidney congestion, which can prognosticate the propensity to develop right heart failure (4). Other studies have shown POCUS being reliable for volume status evaluation among varying kidney functions, especially in predicting intra-dialytic hypotension in dialysis patients (5–7). Furthermore, POCUS skills can be easily taught and are reproducible. POCUS can be effectively implemented in a variety of clinical settings, including the ICU and dialysis unit (7–10). With its application, POCUS has the potential to facilitate AKI evaluation and potentially improve outcomes in patients on dialysis by eliminating some of the guesswork that comes with assessing patients with history and physical exam alone.

Additionally, in an era where 62% of medical schools are integrating courses in ultrasound education, exposing medical students and residents to POCUS in nephrology will give trainees a hands-on, contemporary glimpse into the complex anatomical and physiological principles that make this field so exciting and unique (11). This modern approach to medicine could increase medical student and resident interest in nephrology and be another area of much desired impact.

It is essential to incorporate POCUS in nephrology

training. Our field has the opportunity to reinvent the means we go about in caring for our increasingly complex patients while boosting interest in the nephrology field at the same time. For many fellowship programs, there are currently barriers to implementation including cost, attending physician experience, and available resources. Through collaborative efforts and further research on the impact of POCUS on nephrology, this tool has the potential to be a diagnostic and therapeutic necessity that will become more widely accepted, rendering its exclusion obsolete. ■

Matthew Wysocki, DO, is a PGY4 Nephrology Fellow; Natalie McCall, MD, is an Assistant Professor of Medicine; and Anna Burgner, MD, MEHP, is an Assistant Professor of Medicine with the Division of Nephrology and Hypertension, Department of Medicine, Vanderbilt University Medical Center, Nashville, TN.

The authors have no conflicts of interest.

References

1. Quigley L, et al. Report Highlights. Survey of 2017 nephrology fellows. Prepared for ASN by George Washington University Health Workforce Institute. Accessed May 1, 2021. https://www.asn-online.org/education/training/workforce/Nephrology_Fellow_Survey_Report_2017_Highlights.pdf
2. Koratala A, et al. Integrating point-of-care ultrasonography into nephrology fellowship training: A model curriculum. 2019; 74:1–5. doi: 10.1053/ajkd.2019.02.002
3. Bhardwaj V, et al. Combination of inferior vena cava diameter, hepatic venous flow, and portal vein pulsatility index: Venous excess ultrasound score (VEXUS Score) in predicting acute kidney injury in patients with cardiorenal syndrome: A prospective cohort study. *Indian J Crit Care Med* 2020; 24:783–789. doi: 10.5005/jp-journals-10071-23570
4. Husain-Syed F, et al. Doppler-derived renal venous stasis index in the prognosis of right heart failure. *J Am Heart Assoc* 2019; 8:e013584. doi: 10.1161/JAHA.119.013584
5. Khanin Y, et al. Intradialytic hypotension in critically ill patients on hemodialysis with A-line versus B-line pattern on lung ultrasonography. *Kidney Int Rep* [published online ahead of print April 26, 2021]. <https://doi.org/10.1016/j.ekir.2021.04.010>
6. Covic A, et al. Use of lung ultrasound for the assessment of volume status in CKD. *Am J Kidney Dis* 2018; 71:412–422. doi: 10.1053/j.ajkd.2017.10.009
7. Mallamaci F, et al. Detection of pulmonary congestion by chest ultrasound in dialysis patients. *JACC Cardiovasc Imaging* 2010; 3:586–594. doi: 10.1016/j.jcmg.2010.02.005
8. Zieleskiewicz L, et al. Point-of-care ultrasound in intensive care units: Assessment of 1072 procedures in a multicentric, prospective, observational study. *Intensive Care Med* 2015; 41:1638–1647. doi: 10.1007/s00134-015-3952-5
9. Ben-Baruch Golan Y, et al. Early point-of-care ultrasound assessment for medical patients reduces time to appropriate treatment: A pilot randomized controlled trial. *Ultrasound Med Biol* 2020; 46:1908–1915. doi: 10.1016/j.ultrasmedbio.2020.03.023
10. Gargani L, et al. Efficacy of a remote web-based lung ultrasound training for nephrologists and cardiologists: A LUST trial sub-project. *Nephrol Dial Transplant* 2016; 31:1982–1988. doi: 10.1093/ndt/gfw329
11. Bahner DP, et al. The state of ultrasound education in U.S. medical schools: Results of a national survey. *Acad Med* 2014; 89:1681–1686. doi: 10.1097/ACM.0000000000000414

The addition of POCUS to nephrology will aid and expedite clinical decision-making, both with the evaluation of acute kidney injury and in volume assessment.

POCUS - The New Focus in Nephrology Training **KidneyNews**

44% of surveyed nephrology fellows felt their programs lacked POCUS training

Basic evaluation:

- Acute and chronic kidney dysfunction
- Vascular access issues
- Dialysis catheter placement
- Kidney biopsy

Improve ascertainment of volume status assessment

Uses of POCUS in nephrology include:

Clinical decision making, both with the evaluation of acute kidney injury and in volume assessment

Boosting medical student and resident interest in nephrology

Conclusion: POCUS should be incorporated into nephrology training. It has the potential to add to patient care and increase trainee interest in nephrology.

Reference: Wysocki M, McCall N, Burgner A. POCUS - The New Focus in Nephrology Training. ASN Kidney News, July 2021.
Visual Abstract by Denisse Arellano, MD & Yoshi Shimamura, MD, MPH.
@denisse_am & @SQWONsLKxEUwhHe