

# Dialysis Vascular Access Training: A Peruvian Experience



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Chronic kidney disease in Perú is a growing public health problem, similar to the rest of the world. In 2016, Peruvian Social Security reported that 10,710 patients were treated with dialysis, and 7778 received coverage from public health insurance.<sup>1,2</sup> Furthermore, according to the Health Situation Analysis report by the Ministry of Health in Perú,<sup>3</sup> kidney disease is the sixth leading cause of death and the 11th leading cause of preventable death in people over 60 years of age.

Perú has a population of 32.5 million (in 2019) with a prevalence of dialysis-dependent chronic kidney disease of 974 per million population. The highest prevalence is in the 45 years to 64 years age group (43.3%), with hemodialysis (85.9%) as the predominant renal replacement modality. The renal transplant rate is 4 per million population, which is significantly less than other countries in Latin America (e.g., Brazil 28 per million population, Uruguay 43 per million population).<sup>1,3,4</sup>

Central venous catheter is the most frequently used vascular access in the prevalent hemodialysis population (76%), despite its known complications. Native arteriovenous fistula (AVF) use in the prevalent population remains low (24%) as shown in Table 1.

Catheter related blood stream infection and central venous occlusion that require endovascular intervention are the most frequent causes of hospitalization at the Hospital Guillermo Almenara in Lima, Perú. Dialysis vascular access care remains fragmented, similar to other developing countries across the world. Besides late referral to nephrology, other reasons frequently encountered include limited skilled workforce, poor team coordination, and lack of vascular access focused training for all stakeholders involved with dialysis care. Moreover, the vascular surgeons are constantly challenged with competing demands and a relatively low priority vascular access procedure.

## Recognizing the Vascular Access Knowledge Gap

The existing vascular access care in Perú remains suboptimal. The fragmented care provided by

individual specialties has been largely due to lack of training at all levels of care. The current curriculum for nephrology, vascular surgery and interventional radiology fellowships fail to emphasize the importance of vascular access. The nephrology fellows are unaware of the basic concepts around AVF planning and site selection, early referral to surgical colleagues, evaluation of an access for dysfunction, incorporating point of care ultrasonography, and fundamentals of endovascular procedures. The knowledge gap translates into inconsistent care as evident from 75% of patients having hemodialysis initiated with a central venous catheter despite being followed by a nephrologist for >6 months,<sup>5</sup> and remaining dependent on central venous catheter 60 days after initiation.<sup>6</sup>

Vascular surgery trainees are inadequately informed about primary and secondary patency rates of AVF, challenges with cannulation and long-term complications such as aneurysms and thrombosis, and impact on cardiovascular function. Interventional radiology trainees are ill-informed about avoiding subclavian catheters, implanting a catheter regardless of the AVF location, the risk of central vein stenosis, and the importance of prioritizing an endovascular salvage procedure for a dysfunctional AVF. The net outcome is difficulty in implementing a multidisciplinary team approach to a complex medical problem.

## A Step in the Right Direction

The initiative from the Interventional Nephrology Working Group of the ISN has helped to promote the importance of a well-functioning dialysis vascular access and encouraged nephrologists to become team leaders and change

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**Table 1.** Epidemiology of vascular access in prevalent dialysis patients in Latin American

Country	nAVF, %	pAVF, %	Tunneled catheter, %	Nontunneled catheter, %
Argentina <sup>a</sup>	67.9	12.3	8.7	11.1
Uruguay <sup>b</sup>	47.6	23.2	20.7	8.4
Perú <sup>c</sup>	24	— <sup>d</sup>	53	23

nAVF, native arteriovenous fistula; pAVF, prosthetic arteriovenous fistula.

<sup>a</sup>Registro Argentino de Diálisis Crónica 2020. Instituto Nacional Central Único Coordinador de Ablación e Implante (INCUCAI) y Sociedad Argentina de Nefrología (<https://www.cadradialisis.org.ar/registro.php>).

<sup>b</sup>Registro Uruguayo de Diálisis 2018. Sociedad Uruguaya de Nefrología (<http://nefrouuguayo.org.uy/registro-de-dialisis/>).

<sup>c</sup>Registro Nacional de Diálisis (Rendes) 2016. Hospital Guillermo Almenara.

<sup>d</sup>Not reported.

the paradigm from fragmented to coordinated care.<sup>7</sup> The primary focus is to implement initiatives to utilize multidisciplinary team approach while emphasizing patient-centered care toward vascular access.<sup>S1,S2</sup> As a result, countries such as Nicaragua have implemented the standardized AVF surgery training curriculum.<sup>8</sup> Similar experience of a modular vascular access training program for surgical trainees was reported from the United Kingdom.<sup>9</sup>

In 2017, the Peruvian Vascular Access Association (APDAV) was formed with a mission to promote vascular access focused education and training for all stakeholders involved with providing dialysis care. The APDAV is a multidisciplinary platform that brings nephrologists, vascular surgeons, radiologists, and dialysis nurses together, to learn and share from each other's experience. The primary goal is to begin a dialogue among all care providers, recognize the limitations to providing optimal care, create educational forums, and act as an advocacy group to improve resources.

In 2019, the ISN Educational Ambassador Program assigned nephrologists with experience in interventional nephrology to participate in the APDAV congress. Practical ultrasound workshop that was focused on AVF examination and cannulation techniques for dialysis nursing were developed, and clinical cases were discussed from a multidisciplinary approach perspective. The

meeting was attended by 100 professionals (69 medical doctors, 25 nurses, and 6 trainee fellows) from Perú and Guatemala. The participation of the Chair of the ISN Education Working Group and international speakers specialized in vascular surgery and interventional nephrology, allowed a real-time dialogue focused on clinical cases. The speakers included 11 nephrologists, 5 vascular surgeons, 1 interventional radiologist, 1 interventional nephrologist, and 3 nurses. Nurses were introduced to and trained in ultrasound-guided vascular cannulation during the workshop.

### Impact of Training

As a consequence of this intervention, since January 2021, the vascular surgeons at the nephrology service of Hospital Guillermo Almenara have implemented regular ultrasound vein mapping (409 ultrasounds in 2021) to study the vasculature of all incident hemodialysis patients and, progressively, to the prevalent tunneled catheter dependent dialysis population. Furthermore, nephrologists have started performing these ultrasound examinations. In addition, the creation of AVF by vascular surgery has been optimized in outpatient care (110 fistulas in 2021 with a median delay time of 34 days), as well as in hospitalized patients for transposition of the basilic vein. A delay of >4 weeks for the creation of the AVF was avoided. Currently, 12% of patients are

awaiting central vein venography before AVF surgery.

A multidisciplinary team approach is implemented during preoperative evaluation and planning of AVF surgery. The key members of this multidisciplinary team include a vascular access nurse coordinator, a nephrologist, a radiologist, and a vascular surgeon. Our prior practice involved obtaining a central venogram for every patient being dialyzed with a tunneled central vein catheter, which clearly was unnecessary and also overwhelmed our radiology colleagues. We have changed our practice to performing ultrasonography and selectively requesting central venography based on a protocol ([Supplementary Data](#)).

The nephrology fellow participates in the preoperative vein mapping with ultrasound and collaborates with interventional radiology and vascular surgery colleagues. Besides improving ideal site selection for AVF surgery, our multidisciplinary approach has helped facilitate communications between team members.

Finally, ongoing discussions and interactions via clinical case webinars have allowed us to share and learn from global experts. In December 2021, APDAV organized a virtual multidisciplinary meeting, to share the experience of AVF creation by nephrologists and challenges and barriers encountered in Brazil and Japan.

### Future of Vascular Access

The ISN has recognized APDAV as a regional training center for interventional nephrology in Latin America.<sup>S3</sup> Moving forward, our objective is to promote multidisciplinary team approach and educate all stakeholders involved in providing dialysis care. Another objective is to learn from the experiences of our colleagues to utilize ultrasound for vessel mapping and

assessing dysfunctional vascular access,<sup>S4</sup> and build simulation training centers to improve surgical skills<sup>S5,S6</sup> of dialysis providers irrespective of their primary training (urology, general surgery, or nephrology).<sup>S7</sup> The successes reported from other Latin American countries such as Brazil<sup>S8</sup> and Nicaragua can be replicated in Perú.

## SUPPLEMENTARY MATERIAL

[Supplementary File \(PDF\)](#)

[Supplementary Data.](#)

[Supplementary References.](#)

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