Training the Next Generation of AV Access Specialists:

Necessary Skills, Expertise, and Settings

Dr. Davidson provides his perspective on the dialysis access education landscape.

WITH INGEMAR DAVIDSON, MD, PHD, FACS

How do you train the patient-specific decision making needed for optimal dialysis access selection, which is largely based on career experience and skills acquired?

Although technical skills may dominate at a younger age, judgment and safety performance gained from knowledge and experience is only obtained from years of practice. The question then becomes: How do you balance skills, knowledge, and judgment during one's career? I have no definitive answer, but my suggestion is to strive to embrace a mentoring role in your practice as your career progresses. For example, our team is developing an online dialysis access training program consisting of 10 modules that include continuing medical education (CME) credits (Table 1). This activity is supported by unrestricted grants and free for anyone to use.

We plan to have all modules finished in English by the Simulation of Dialysis Access–Controversies in Dialysis Access (SoDA–CiDA) meeting in San Diego in November. Currently, there is one module available on dialysis access steal syndrome, and there are three more in draft form. These courses deliver basic knowledge, and they are available to an unlimited number of attendees with translation into Italian, French, German, and Spanish. There will also be a Chinese version of the dialysis access steal syndrome module this fall. More information on these and other courses is available at www.kidneyacademy.com.

What tools are available to guide this decision making, and what environment is best suited to facilitate this type of professional growth?

We also offer other CME hands-on training with John Ross, MD, at the Dialysis Access Institute in Orangeburg, South Carolina. Surgeons, radiologists, and nephrologists can obtain temporary state licenses and operate under supervision or just observe. On average, 100 cases (both open and endovascular) are performed in 1 week. This program gives attendees 49 CME credit hours. This intense and unprecedented short-term learning experience is limited to five attendees per week and offered five to six times per year on a first-come basis. The TACIDA training program outline was previously published in the *Journal of Vascular Access* (2014;15:3–7). More information about this hands-on training can be found at www.tacidagroup.com.

Obtaining a detailed patient history and physical examination are two important aspects of patient-centered, optimal decision making. How much is the personal interaction with the patient part of the overall training compared with the more removed virtual skills training?

Detailed patient history and examination are the mainstay of dialysis access modality selection, including site and type of access. Conducting a proper patient history and physical exam will yield suitable patient selection for the

TABLE 1. ONLINE DIALYSIS ACCESS COURSES IN DEVELOPMENT	
Module 1: Introduction to Dialysis Access	Overview of prevalence and incidence of end-stage renal disease from a global perspective
Module 2: Physical Exam	Introduction to the end-stage renal disease patient, including presentation and examination of vascular
Module 3: Native Vein Arteriovenous Fistula	Discussion of patient selection and surgical technique for native vein arteriovenous fistula placement
Module 4: Grafts	Discussion of various artificial grafts as hemodialysis access conduits
Module 5: Peritoneal Dialysis	Review of the underused but preferable set of surgical techniques, delivering optimum outcomes for first-time dialysis patients
Module 6: Algorithms for Dialysis Access	Selecting the best access for individual patients
Module 7: Central Vein Pathology and Catheters	Discussion of tools, techniques, and strategies for managing catheter-induced central vein obstruction
Module 8: Dialysis Access Steal Syndrome	Presentation of etiologies and treatments for hemodialysis-induced hand ischemia
Module 9: Radiation Safety	Description of radiation physics and equipment utilized in endovascular access procedures with an emphasis on safety protocols
Module 10: Case Reports	Presentation of a series of cases and treatment options, designed to illustrate the complexity of dialysis

most optimal dialysis modality and site of access placement. Selecting the appropriate access for each patient every time is key to the overall outcome of the access.

No dialysis modality or access type is better or mandatory. For example, peritoneal dialysis (PD) and hemodialysis must not be seen as competitive therapies, but rather as complementary, where over a patient's lifetime, all dialysis access options, including transplantation, may be used as integral parts of a thoughtful long-term plan with the patient's best interest in mind. As a lifelong access utilization strategy, PD should be considered as the first dialysis modality in suitable cases, followed by appropriately planned hemodialysis.

After the history and physical examination, duplex and/or Doppler ultrasound examination is the next logical step in determining the optimal hemodialysis access type and site for preoperative vascular mapping. Duplex ultrasound testing will show most vascular access complications and direct the proper surgical or interventional radiology management.

Because the team approach philosophy and communication between staff members are essential components of dialysis access training, have you employed any types of team-building exercises? If so, what types have you found to be useful?

The word *team* is often used loosely and has positive connotations, suggesting that this is a good thing to embrace. In fact, many institutions do not apply a real team concept and have limited experts available in the operating room (OR) during dialysis access cases. A strict definition of an effective team consists of a small group of expert individuals performing specific expert tasks for which they are trained. In terms of dialysis, there should be expert cannulators, expert PD nephrologists and nurses, and expert surgeons performing open and endovascular access surgery with involvement of interventional nephrologists and radiologists as appropriate. In the OR, there must be a scrub nurse, circulator, a radiology technologist, and an anesthetist placing regional blocks, all expert in their respective fields. Only then will dialysis access be placed safely and most cost-efficiently. The often-held opinion by hospital OR managers that everyone should be able to do everything is unsafe if not plainly wrong.

OR crises are often the result of unforeseen problems and can be attributed to human cognitive error in the safety cultures of complex systems. There is almost never a single cause leading up to an accident. The error chain is a concept used to describe human error accidents as the result of a sequence of events that, uninterrupted, can culminate in injury and death. The links of these error chains are identifiable by means of up to 10 identifiers

of the error chain: ambiguity, fixation/preoccupation, empty feeling, violating upper and lower limits, undocumented procedures, loss of clear control/no one is in charge of the patient, no one is looking at the patient, failure to meet targets, unresolved discrepancies, and not adhering to standard procedures. Recognizing and breaking one link in the error chain will likely prevent the potential adverse event.

Do you still use checklists in your daily routine? Are there sample checklists that institutions can work from, or should each center create lists that apply to their specific situation?

Most hospitals require checklists for invasive procedures. In fact, in a now-classic international, multicenter study published in *New England Journal of Medicine* in 2009, use of a simple checklist cut postoperative mortality and complications nearly in half.

Applying leadership to the OR is another way to use a checklist in practice. An example is initiating the concept of *time out* before the start of a dialysis access procedure, whereby pertinent issues and questions are addressed or discussed (eg, the team is introduced, stating the procedure, confirming the correct extremity side is marked, asking questions about patient allergies or medications given).

How prevalent is the human factor teaching approach, and is there still skepticism that this approach is effective for dialysis access training?

The main barrier to training in human factor is resistance of the medical leadership to accept the basic principles. Human factor teaches how to manage conflict, evaluate performance, and provide feedback and support to meet the commitment of the team and the organization. Team performance is best evaluated with a model of excellence against which to measure performance. Team building will occur more easily when all team members train and practice jointly in tasks of mutual importance. This allows each member to provide their technical expert knowledge and skills to help complete the tasks. Each team member must understand all aspects of the task at hand, even if they will not be performing those steps directly.

This is not to take away from the team member who normally performs this task, but it is a safety check to ensure that the correct steps are being followed in every procedure, every time. In the OR, the surgeon, anesthesiologist, circulator nurse, and scrub technician must all understand the steps in a procedure. For example, the surgeon should be able to start the electrocautery devices and know the instrumentation, including the details of suture material and where to find them. More overlap in knowledge without intrusion increases safety and effectiveness.

Are there any data that demonstrate that quality education makes a quantifiable difference in dialysis access outcomes? Should this be further pursued in terms of future research or cost-effectiveness?

This can be difficult to address because outcome and cost-effectiveness mean different things to different people. To summarize the complexity, consider the following statements regarding finances:

- Patient: Mainly means out-of-pocket expense for insurance and copayments.
- Physician: Income, professional prestige, and reputation. In academics, it is slightly different, with emphasis on recognition and career advancements and publications.
- Insurance companies: Policies and premiums and what is covered, in which case, less is more.
- Most medical institutions, including hospitals: The focus is on fewer readmissions and reimbursement from insurance, which therefore means it is mostly motivated by financial performance. Fewer complications may not be on the list, as complications bring income.
- States and government: Allocating funds to programs, such as end-stage renal disease (ESRD). As an example, PD versus hemodialysis, where PD is less expensive to fund and therefore recently emphasized by the Centers for Medicare & Medicaid Services as a reasonable alternative to hemodialysis.

What is the most important resource for guidance and the latest information on dialysis access that new operators should be aware of or consult on a regular basis?

For basic information on dialysis access, I will be egocentric and direct readers to www.kidneyacademy.com. It is a free resource, as we are a not-for-profit entity, and our mission is to train and teach with a global view. As mentioned previously, you may consider the www.tacidagroup.com hands-on training program, which can only admit a few people at a time, on a first-come, first-served basis. Third, you may attend one or more of the many global meetings on dialysis access. In addition to learning, the dialysis access meetings provide a source of connectedness with colleagues around

the world. There are major geographic differences as to how dialysis access is viewed and practiced. Finally, don't forget the self-study opportunity through the various books to read on dialysis access.

What are the capabilities of virtual training, and how have they expanded based on current technology? What skills must still be trained/proctored in person, and where and how is this best done?

Professional outcomes are basic knowledge that we get from reading books, online training, and via meetings. Second, skill training can be safely taught in simulation before exposing the trainee to live patients. There is no substitute for knowledge and skills. Surprisingly, human factors such as verbal communications, body language interactions, willingness to go the extra mile, and attitude with an interdependent mind-set make up 80% of overall professional effectiveness. Interview techniques can be taught in simulation, where nurses and doctors can be trained. This is especially challenging in medicine when bad news is central to the conversation, such as organ donor requests.

What is on the horizon for further technologic innovation in simulation training?

Just about everything related to dialysis access and ESRD can be simulated, including behavior training or use of the correct terminology, especially in the OR. Surgeons must know the names of specific instruments and tools. Examples of areas in dialysis access that may be useful topics for development of simulation training include:

- Dual lumen, cuffed catheter placement
- Ultrasound vascular mapping in live patients
- Ultrasound-guided access cannulation in an arm simulator
- Peritoneal dialysis catheter placement in an abdominal simulator
- OR safety videos from the flight deck
- Suture station videos and bench simulation (beginner)
- Dialysis access arm suture simulators (advanced)
- The computerized interventional radiology arm
- The dialysis access tool demonstration station
- Communication skills station of simulated patient interactions
- Assessment and evaluation of training of live volunteers or patients

As a course director for the SoDA program at CiDA, can you tell us how this course came about and how it has evolved since its inception?

The OR safety concept goes back to my interest and connection with high-liability industries, most notably aviation. The safety record of commercial airplanes is mind-blowing. For example, among more than 37.6 million commercial flights in 2015, there were no commercial airplane crashes because of mechanical failure, pilot errors, or weather-related factors.

Dialysis access outcomes vary greatly between centers. The *center effect* concept is well recognized in organ transplantation, and the causes and implications of this phenomenon for patient safety are less understood but are believed to reflect policy, team skills, and coordination and training, where simulation plays a major role. As I just eluded to, aviation using rigorous training and procedure protocols has made jetliners the safest transportation mode available. We will have an airline captain at CiDA speaking about the global "center effect" in aviation. In keeping with the aviation concept of small team experts training, SoDA stations will include new tools and techniques shown and taught by expert faculty, reflecting the rapidly developing new technology, particularly in endovascular procedures. One such example is the endovascular creation of native vein arteriovenous fistulas.

SUGGESTED READING

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What is the mix of specialties and experience levels you've seen among the attendees of SoDA, as well as the instructors?

There is a wide spectrum of interests from dialysis access technologists to nurses to basic researchers in the ESRD and renal arena to industry engineers looking for new innovations. A deeply rooted concept of the course directors is the expert team concept. CiDA embraces all members of the access team. No specialty is favored or emphasized. Anyone with a genuine interest in dialysis and ESRD should attend.

Is there anything you would like to mention about what's coming up for the 2017 SoDA–CiDA course?

The three most prominent features of the SoDA–CiDA 2017 meeting are an increased international presence, the emphasis on simulation training, and the cultivation of the human factor aspects and communication, which have been at the core of the CiDA meetings since its inception. ■

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Disclosures: None.