"Enhancing Care in the Dialysis Setting: Motivation, Communication, and Simulation"

Module 3: Dialysis Access Simulation in ESRD

Introduction

In the area of dialysis access, training appears to be well-suited for the use of simulation. Aspects of training such as root cause analysis of adverse outcomes, case-based learning, and team training have the potential to improve the standard of care for peritoneal dialysis and hemodialysis, and for access in all types of oncology patients. In recent years, growing technology has improved our understanding of dialysis access and has mandated more focused attention on safety and patient outcomes, for which simulation programs have the opportunity to play a significant role. In patients with end-stage renal disease (ESRD), implementation of simulation tools can be effective for all aspects of access for hemodialysis and peritoneal dialysis.

However, simulation methods are often overlooked in this particular area. In this CME activity, we turn to Dr. Ingemar Davidson, professor of surgery at the University of Texas Southwestern Medical Center and medical director at Parkland's Vascular Access Clinic, for insight on simulation in the field of dialysis access. Dr. Davidson's current interest hasq focused on the potential benefits of simulation, and the following is a brief question and answer interview designed to help improve understanding in the area.

Question 1:

Dr. Davidson, what exactly is simulation as it pertains to the field of dialysis access?

Simulation is an important aspect of dialysis access in that it allows the user to practice, make mistakes and learn from them, and revise their practice habits with zero risk to a patient. This is in comparison to traditional patient-based training, in which inexperience, medical errors, improper technique, adverse events, etc., can all be detrimental to patients due to its real-life setting.

One of the most important aspects of simulation is that it allows for standardized procedures and environmental control. Training includes root cause analysis of adverse outcomes, simulated case-based learning, continuous refinement of concepts, and procedural advances. In real-life patient-based training, the concept of "see one, do one, teach one," means that you view an example of a procedure or concept on a single patient, then implement what you learned on a patient. Finally, you evaluate what you've done and learn from any mistakes that may have occurred. However, this particular system is extremely inefficient and sometimes dangerous due to a lack of experience or practice. In simulation, you can "see one, practice 100 in the simulation lab, then do one." This process is much more feasible since you can practice over and over before ever touching a patient. Then, when it comes time to implement the concept or procedure into practice, you are significantly more prepared.

Question 2:

How is training in the current real-world setting unrealistic?

As alluded to above, in the traditional medical approach, learning, training, and testing in the real-world setting usually takes place in an unrealistic classroom setting. This tends to emphasize knowledge-based learning rather than focusing on the exact situation in which concepts will be applied. In other words, these methods involve teaching that is separate from the actual system in which the clinician will eventually find himself or herself. As a result, competence and performance suffer.

As I have written in the past, I believe that we need to institute a cultural change that involves three essential elements. First, there is a need to implement user-friendly, technology-based simulation systems to enhance clinical performance. Second, when implemented, there is a critical necessity that members train and work together as a team to optimize patient outcomes. Finally, the team using the system must test, practice, and refine their habits before safely applying the concepts to patients.

Question 3:

What are some of the goals of simulation in medical practice?

I think that in using simulation for dialysis access, we are setting out to achieve several things. First, we want to improve deficits in communication and leadership. Through simulation, clinicians can actually put into place steps that will improve their communication with others on the dialysis team. Next, I think it's important to use checklists to prevent errors, and simulation is a way to teach this. Simulation is also a means toward promoting changes in attitudes towards vascular access. This can be achieved through practice, repetition, and making mistakes and learning from them immediately in a risk-free environment. Of course, we also want to improve the performance of the trainee. And a more long-term goal is to increase staff retention through making the workplace more efficient, safer, and more user-friendly.

Question 4:

Please comment on how simulation in the field of aviation is a good example of how simulation plays an important role in learning?

Aviation and medicine share several similarities in how they operate. In aviation, "Crew Resource Management" (CRM) has been around for several decades. It involves several aspects of knowledge, skills, and attitude training. CRM also emphasizes communication, situational awareness, problem solving, and teamwork, which have together resulted in a safe and streamlined way of travel.

In aviation, simulation is a large part of success in everything from flight simulators for pilots to simulation of various passenger situations for flight attendants to team-based management for the entire crew. In CRM, there is equal emphasis placed on team training and individual training in order to improve interactions within the system while encouraging individual success. At this time, the aviation industry is far ahead of health care in terms of communication and collaboration, in part due to a high degree of performance-based learning through simulation.

Question 5:

What are some kinds of simulators that may be used in clinical practice?

Specific examples of simulation, specifically for vascular access, include various suture devices, tunneled conduits for needle cannulation, and technology-based interventional simulators. These examples include a wide spectrum of simulation-based devices/concepts, from simple suture learning devices and inexpensive simulation methods for venous puncture, such as a turkey breast or leg; to sophisticated computer programs designed to teach procedures such as vascular access angiography, stent placing, and balloon angioplasty. Whenever a new device or technology is released, it is never fully tested until a patient is actually involved. Thus, it is essential that simulation devices/programs are available so the clinicians can be well-prepared when the time comes to use a new product in the patient setting.

Question 6:

Why might simulation exercises be more effective than current methods of learning in the medical field?

In the medical field today, our malpractice culture takes it for granted that the offending party did something wrong or incorrect and as a result must be held responsible. Thus, many clinicians operate under the assumption that the primary goal of learning is to avoid mistakes rather than work toward improved efficiency and safety. I believe that a better model is to incorporate simulation, in which a clinician can make mistakes and overcome obstacles in a risk-free environment, then use the information learned to improve safety and satisfaction within the overall system. Both clinicians and patients win.

Question 7:

How are simulation courses designed, particularly with regard to dialysis access?

Simulation training courses for dialysis access are specifically built to mimic reproducible situations that clinicians will see in practice. This includes the actual dialysis and vascular access environment – operating room, team members present in their real-world roles, etc.

Ideally, simulation in vascular access involves three specific elements to ensure the best results. First, a solid knowledge base on the part of the clinician is needed, which includes understanding of chronic kidney disease, algorithms for patient selection, indications for renal replacement therapy, prescribing concerns, and several other elements of care. Next, training will typically involve short, concentrated lectures with video-based presentations and clips. The third and perhaps most crucial step involves simulation exercises, which incorporate hands-on learning under direct supervision.

There's one more step before completion, and that's testing and debriefing. Establishing levels of achieved competency and discussing results offers participants a keen look into how they're doing and how they can do moving forward.

Question 8:

Simulation isn't a widespread modality used in learning, particularly in the medical field. What would you consider to be the most fundamental change needed in order to more widely implement simulation?

I believe that in order to make strides to enhance outcomes in dialysis access and ESRD, we need to make a fundamental culture change in the way we train, educate, and test our clinicians. I think that the most fundamental change we need to address is moving from a focus on individual achievement (higher salary, awards, promotions, etc.) to a more team-based approach in which the individual's interaction with the entire team and system is enhanced. In the aviation example, simulation is an important and practical means for achieving this. This elemental change is not designed to decrease an individual team member's responsibility or relevance. It's not designed to make the individual a cog in a larger system. It IS designed to encourage each person to consider each other's experience and expertise, while maintaining autonomy and a sense of accomplishment. Thus, we can more effectively take aim at our end result: improving patient outcomes.

References

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