PODS Scholarship Recipient Barbara K. Smith, PT, MPT, PhD, Studies Interventions to Help Wean Intensive Care Unit Patients From Ventilators

Barbara K. Smith, PT, MPT, PhD might have attended medical school if it weren’t for a conversation she had while still a Biology major at Grove City College in Pennsylvania. Her aunt, a manager of an orthopaedic surgery practice, suggested that Smith consider a career in physical therapy. Soon after, she began working summers as a rehabilitation aide at a community hospital. Smith was “bitten by the therapy bug” and became determined to become a physical therapist.

Even after more than 16 years of clinical practice, Smith is still passionate about her role as a physical therapist, specializing in cardiovascular and pulmonary, acute, and intensive care physical therapy.

“There are so many hats you wear as a physical therapist. The ones I consider to be most important are coach and patient advocate. As a coach, it’s been my job to provide patients with the safety zone of what they’re physically capable of, but also encourage them and take them where they need to go. As a patient advocate, it can be very difficult to navigate our ever-complex healthcare system. It is confusing for a family member who is not familiar with the technology and processes involved, making it difficult to get the services or equipment needed for the patient,” Smith explained.

Smith eventually made the transition from clinician to researcher when she realized there was a lack of evidence-based interventions for the treatment of her patients within research publications.

“It was always hard for me to shut off my mind when I left work. There is always a face behind the charts we are reading. My patients would literally keep me up at night as I would try to figure out why certain interventions worked for ‘patient A’ but not ‘patient B,’ and what it was about how the treatments were implemented that made a difference,” said Smith.

She found very little research examining the safety and benefit of early mobilization and strengthening in the intensive care unit (ICU). Smith became motivated and challenged to pursue this research herself.

Smith began her post-professional doctoral studies at the University of Florida (UF) and learned about the Foundation and its scholarship programs.
She went on to receive a 2008 Promotion of Doctoral Studies (PODS) I Scholarship and a 2009 PODS II Scholarship from the Foundation.

“Winning these scholarships has been both an incredible honor and an amazing learning experience. I met some wonderful people during this time, from other scholars to benefactors and advisors at the Foundation. I’ve learned so much,” said Smith.

Smith also had the honor of receiving the Scot C. Irwin Award, presented to a PODS I recipient for post-professional studies in cardiovascular and pulmonary studies. This award is in memory of accomplished physical therapist and APTA Cardiovascular and Pulmonary Section member Scot C. Irwin.

“Dr. Irwin was a pioneer of the Section, a great educator, and a tireless advocate for his patients. I’m deeply indebted to the Section’s commitment. I’m walking in the footsteps of giants, so having great mentors around me has been a huge boost to my training,” said Smith.

Smith’s research project, “Inspiratory Muscle Remodeling Following Tracheal Occlusions,” was the first study to investigate whether strength training induces specific ventilatory muscle remodeling and hypertrophy. She began this project as part of her PhD program at UF with support from the Foundation.

“The diaphragm muscle atrophies very quickly and becomes very weak at a rapid rate once patients are placed on ventilators. This can create a vicious cycle—the ventilator can cause the diaphragm to become weak and atrophy, but muscle weakness and atrophy make it more difficult to come off the ventilator. From the clinical perspective, ventilators are also very costly and consume the majority of time spent in the ICU,” said Smith.

Her research focused on understanding the physiology of that cycle and the diaphragm, and trying to examine rehabilitation strategies to either prevent the dysfunction or reverse it. Earlier studies using animal models did not use the same exercise loads that would be used with patients, as implemented in Smith’s study.

Preliminary data showed that the diaphragm muscle fibers grew after just 2 weeks of training, closely replicating the inspiratory training physical therapists provide to help wean patients from the ventilators. Removing ventilator support could lessen the likelihood of patients developing respiratory and limb muscle weakness. The data also supports the clinical research recently published by Smith’s predoctoral mentor, Anatole D. Martin, PT, PhD.

As for the next steps, Smith and her team are using animal and human models to determine the optimal frequency and intensity of inspiratory
muscle training for weaning patients off the ventilator. They also hope to study these factors in patients with neuromuscular diseases, as these patients have underlying muscular dysfunction that would affect the rate at which they train.

In addition to her research, Smith serves as a Research Assistant Professor in the UF Department of Physical Therapy.

“I took the APTA’s Vision 2020 to heart. We need to make a strong commitment to the future right now, by training our next generation of therapists to become collaborators and clinical thinkers. It also means answering clinical effectiveness questions. Both the education and research are necessary to deliver the best clinical delivery possible,” Smith said.

Smith is very grateful for the support she received from the Foundation early in her research career and encourages others to support its mission as well.

“Three important things I’d like to share about the Foundation are my awe for its vision and unfailing mission to move the profession forward in rehabilitation research; my sincere gratitude for the faith the Foundation has had in my work; and my optimism for the future of rehabilitation research,” she said.

A patient performs baseline breathing as Smith observes measurements on the computer. Smith reviews respiratory muscle images in the UF Department of Physical Therapy laboratory.

Help fund researchers like Barbara