POSTSCRIPT

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Picture-perfect? Heart-test simulator leaps forward

A UW Medicine cardiologist has created a one-of-a-kind simulator that uses diagnostic imaging of patients' hearts instead of drawings.

Brian Donohue

Florence Sheehan shows structural heart ultrasound images displayed by the TEE simulator.

What looks like a futuristic fishing rod helps cardiologists see what's malfunctioning in a patient's heart. It's a diagnostic called transesophageal echocardiography. Doctors maneuver the flexible probe down a patient's esophagus until its tip is adjacent to the heart. The resulting ultrasound visualization looks much like a black-and-white movie on a TV with poor reception, but nevertheless holds clues to the patient's condition, its severity, and how to treat it.

One of these diagnostic probes – the only one in the world, in fact – represents a technological leap forward. It's a simulator used to train cardiology fellows and anesthesiology residents at the University of Washington School of Medicine.

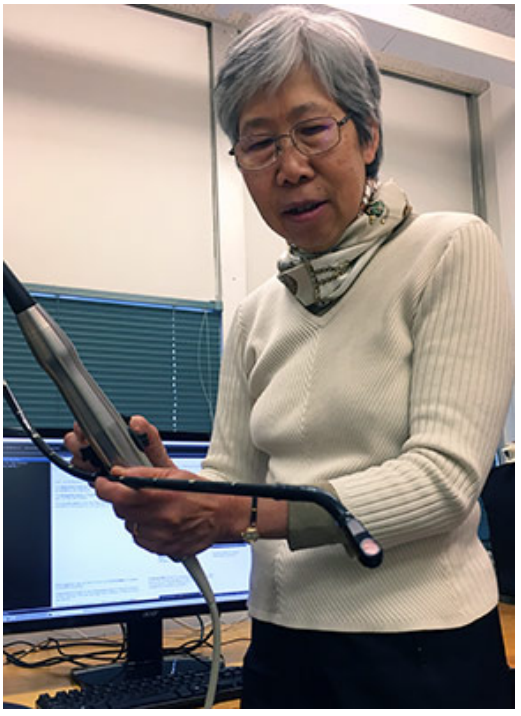
"TEE simulators are commercially available, but they use artificial images – drawings. This is the only one with real patient images," said **Florence Sheehan**, who directs UW Medicine's cardiovascular research and training.

Sheehan has led development of this simulator, which, like other others, helps trainees learn without the pressure of a real-time procedure.

[Watch a brief video of Sheehan demoing the simulator.]

"Real patient images are important because if you only look at an artist's rendering, you can't appreciate everything else that an image reveals. For example, the ultrasound modality creates visual artifacts that aren't meaningful and can be misleading. You have to learn how to distinguish those from an actual pathology," she said.

"The other main consideration is that the image can provide a lot of helpful anatomic information beyond the heart structure you're focused on. Drawings may not have all that detail."



Florence Sheehan shows how the TEE probe's tip can be flexed in multiple orientations.

On a monitor Sheehan displays a 3D image of a patient's left atrial appendage, which is important to examine for blood clots that might cause a stroke. This appendage can be differently shaped – smooth or like a piece of cauliflower, she said. Real patient images would include these variances, but if the simulator shows only "cartoons," as Sheehan calls them, trainees will see a single, simplified image.

Seven cases have so far been loaded into the teaching module's software; those patients signed consent forms to allow use of their images. There's tedious digital handiwork needed to ensure that that the probe's location and orientation, in the simulated patient, yields the appropriate corresponding heart image. But the work is worth it, Sheehan said, because each case gives trainees more useful context to reference when they scan real patients.

The simulator's development began with a grant from the American Heart Association. Sheehan also credits Larry Nguyen, a UW alum whose Seattle-area company, Summit Imaging, donated time and technical expertise at a pivotal point.

The simulator is intellectual property that belongs to the UW. Sheehan has licensed it and is leading future development under the mantle of her own company, Sheehan Medical LLC.

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