

# Utility of continuously-available Transesophageal Echocardiography (TEE) in the ICU for Patient Monitoring:



## A Preliminary Perspective

A. Murat Kaynar<sup>1,2</sup>, Dennis Phillips<sup>1,2</sup>, Hernando Gomez<sup>1</sup>, Mark Lischner<sup>1,2</sup>, Samer Melhem<sup>1,2</sup>, Kathirvel Subramaniam<sup>2</sup>, Michael R. Pinsky<sup>1</sup>

<sup>1</sup> Department of Critical Care Medicine, University of Pittsburgh School of Medicine, Pittsburgh, PA, USA

<sup>2</sup> Department of Anesthesiology, University of Pittsburgh School of Medicine, Pittsburgh, PA, USA

## Background

- While TEE is providing a direct assessment of the cardiac function and volume status as a diagnostic tool, until recently it has been impractical to be continuously available for monitoring.
- A new disposable, mono-planar TEE probe (ImaCor) can remain in the patient for up to 72h, allowing repeated measures of ventricular function and volume status, parameters needed to monitor response to therapy.

## Objective

- We aimed at assessing the contribution of a continuously-available TEE probe to aid the clinicians narrowing their differential diagnosis.

## Methods

- We enrolled hemodynamically unstable ICU patients with ongoing needs for fluid resuscitation and vasopressors. TEE was performed assessing the three basic images:
  - (a) transgastric short axis,
  - (b) four chamber, and
  - (c) superior vena cava
- We designed a survey tool to assess the diagnostic likelihood as perceived by the bedside clinician using a Likert scale (1-6) before and after the TEE examination.
- The Likert scale had the following domains:
  - (a) hypovolemia,
  - (b) LV failure,
  - (c) RV failure,
  - (d) sepsis, and
  - (e) valvular abnormality.
- We also surveyed the clinicians whether the TEE narrowed the differential diagnosis and changed their clinical practice.

## Results

Figure 1. Is the right ventricular function under-appreciated in the ICU?

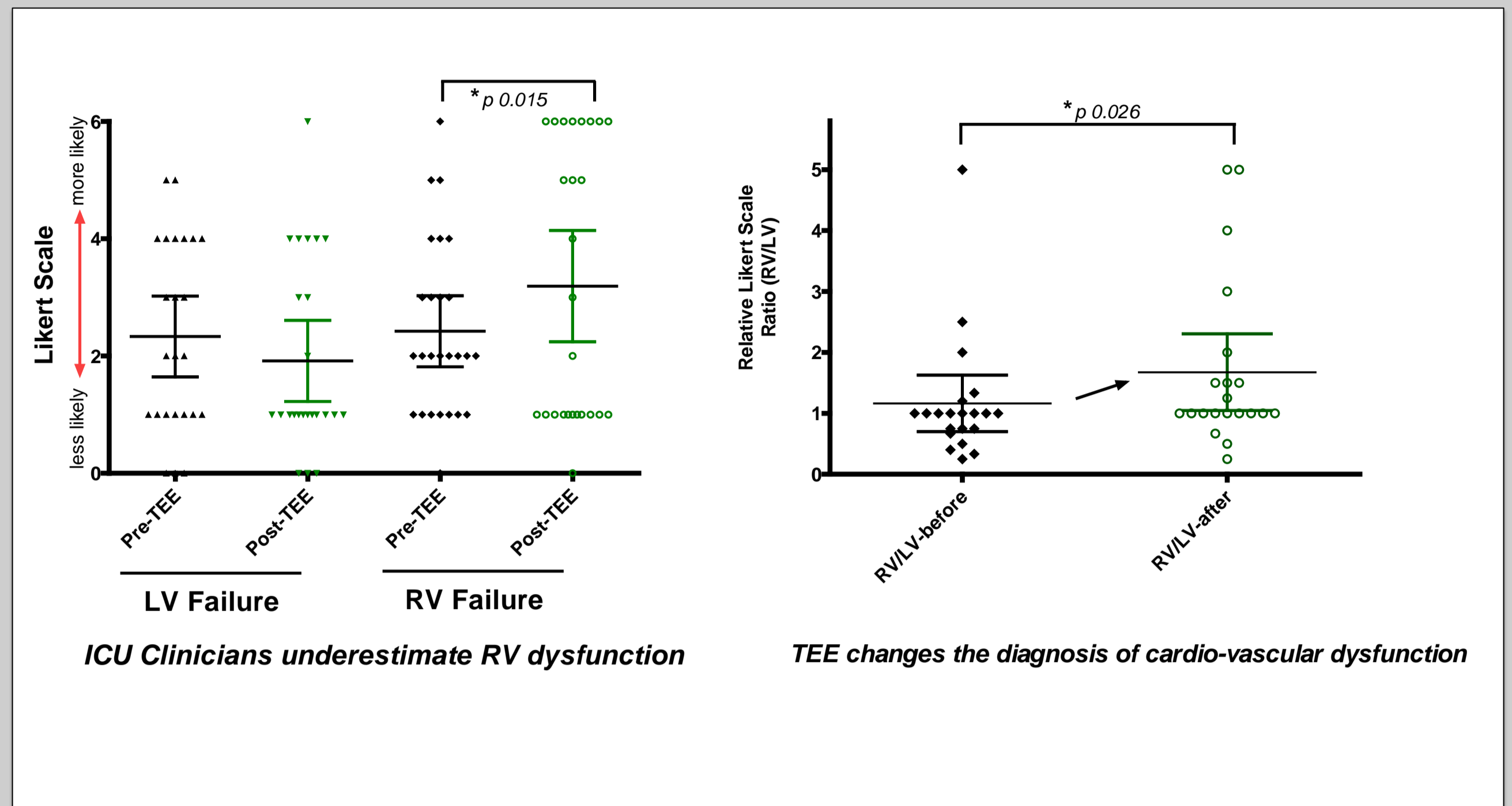


Figure 2. How well do clinicians predict the volume status and vascular tone in the ICU?

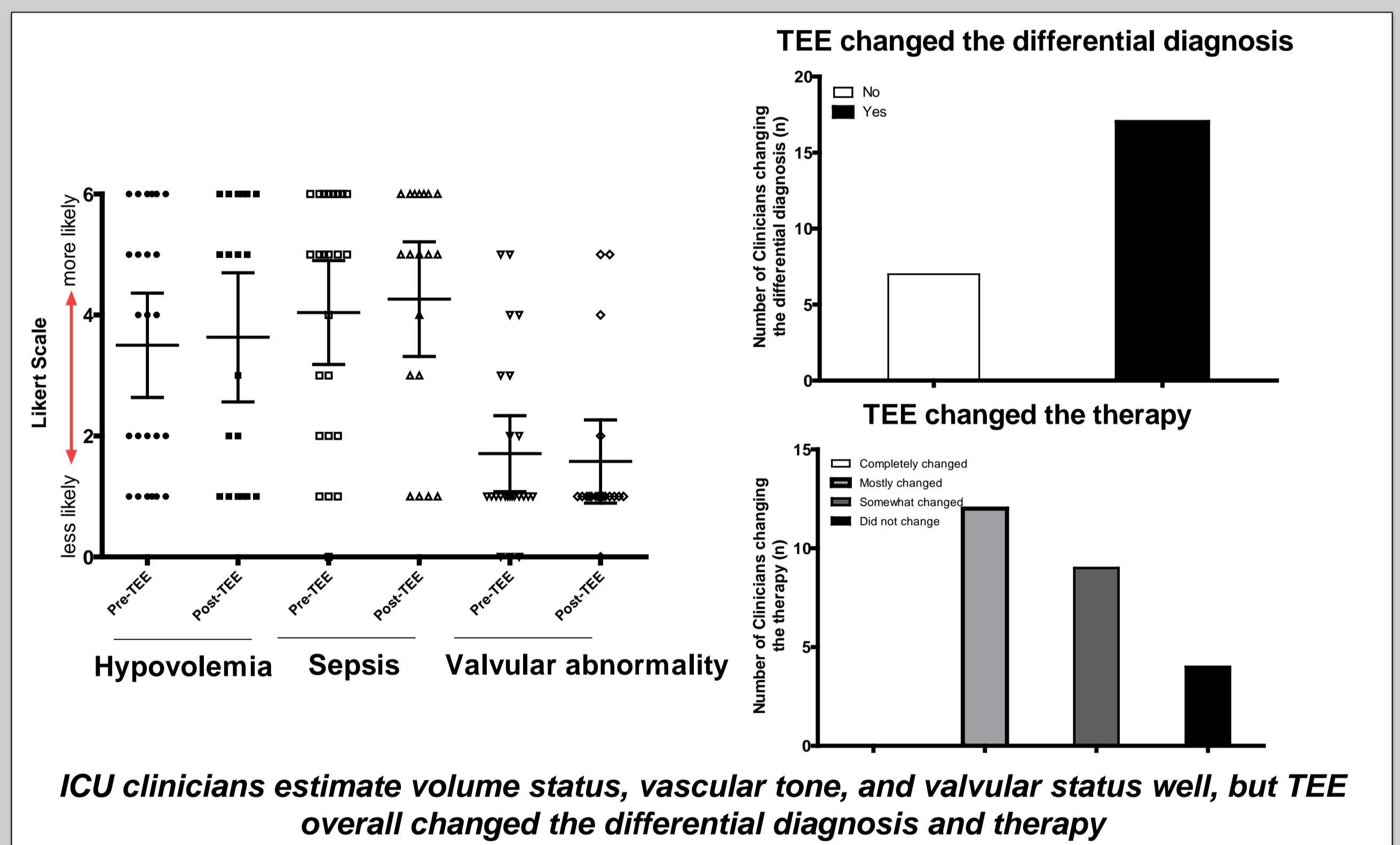


Table 1. Patient demographics.

	Female		Male	
Screened (%)	15	45.5	18	54.5
Enrolled (%)	11	42	15	58
Age (± SD)	64	5.8	68	6.4

## Conclusions

- The survey results suggested that the right ventricular (dys)function is under-appreciated and possibly not acted upon (Figure 1). Clinician were estimating the volume status, valvular abnormalities, and vascular tone (sepsis) fairly well (Figure 2).
- Continuously-available TEE proved to narrow the differential diagnosis for the clinicians and changed their therapies.

## Implications

- The use of continuously-available TEE proves to be a valuable addition to the cardio-vascular monitoring in ICU patients.
- The right ventricle continues to be the under-appreciated and difficult to manage component of the cardiovascular system.

