



TECHNOLOGY

eLVOTD: Estimation of the Left Ventricular Outflow Tract Diameter

OVERVIEW

The left ventricular outflow tract diameter (LVOTD) is one of two measurements needed to calculate cardiac stroke volume and cardiac output (CO). CO is an important measure of heart function and can help determine the need for inotropic support of the heart. In combination with mean arterial blood pressure, CO can also be used to determine the systemic vascular resistance, which directs the use of vasopressors. Currently, LVOTD (and therefore CO) is measured using an indwelling pulmonary artery catheter. This technique requires a highly advanced hospital setting to insert and maintain. As a result, the LVOTD is determined for only about half of all patients that could benefit from the measurement. This invention is a novel algorithm that estimates LVOTD using ultrasound and several patient characteristics, which simplifies and standardizes how CO is measured. The algorithm allows an estimated LVOTD (eLVOTD) value to be obtained with any ultrasound system, including console-based, laptop, tablet, handheld, continuous patch/cutaneous monitors, and point of care ultrasounds (POCUS). eLVOTD is related to another technology by the same inventor used to measure stroke volume using ultrasound (SM-2016-067). Together, these tools allow clinicians to make better decisions regarding inotropic vasopressor use and volume management in critically ill patients.

This technology is an algorithm that uses a patient's age, sex, height, weight, etc., as well as the left ventricular velocity time integral (LV VTI) to calculate the estimated left ventricular outflow tract diameter (eLVOTD). A retrospective review of 182 patients who had undergone an echocardiogram to determine left ventricular outflow tract demonstrated eLVOTD was a good estimate of LVOTD (RMSE = 0.15, $R^2 = 0.74$). Use of eLVOTD will allow the echocardiographic calculation of CO and stroke volume to be more easily performed by the physician.

APPLICATIONS

POCUS is a \$700 million dollar market with a 7-8% annual growth rate. The POCUS market is expanding as units are very portable, relatively inexpensive, and the procedures can be performed quickly. Despite this, there are no other significant applications designed to assist physicians using POCUS to direct the care of critically ill patients. As a result, the full potential of POCUS to affect patient care has not been fully realized. This technology can be incorporated into POCUS systems to significantly expand their functionality and direct patient care.

ADVANTAGES

Can be used by or with any ultrasound system, including at the point-of-care

Increases the accuracy of echocardiographic calculation of cardiac output and stroke volume

STAGE OF DEVELOPMENT

This technology is ready for further development and commercialization. (As of 5/15/2017)

LICENSING POTENTIAL

Available for licensing and commercial development

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

LICENSE STATUS

Available for licensing and commercialization

CATEGORIES

- Diagnostics
- Imaging
- Software + Algorithm

INVESTIGATOR(S)

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ATTACHMENTS

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SM-2017-060