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Casting a wider net to catch more cases of pulmonary hypertension

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When most people think of high blood pressure, they think of being tested with an arm cuff at a doctor's appointment. That type of blood pressure is separate from pulmonary hypertension (PH), which is high blood pressure in the lung arteries. In a study published today in *The Lancet Respiratory Medicine*, investigators from Brigham and Women's Hospital took an evidence-based approach to determine the lower end of the risk spectrum for PH based on pulmonary vascular resistance (PVR), which is resistance against blood flow from the pulmonary artery to the lungs. The team presents evidence that by redefining the lower risk level for PVR, 60 percent more patients who are at risk for death due to PH can be diagnosed.

"The findings of this study cast the clinical profile of patients who have PH and are at risk for major clinical events into a new and wider light," said corresponding author Bradley Maron, MD, an associate physician in the Division of Cardiovascular Medicine at the Brigham. "We can use this information to raise awareness among clinicians on those patients that may need reconsideration for risk factor modification, conventional treatment, and potential clinical trial enrollment."

PH affects 70 million people worldwide across a broad age, geographic and socioeconomic spectrum. Left untreated, average survival is 2 to 3 years after diagnosis. PH can cause serious problems because changes in blood pressure in the lung arteries are not tolerated well by the heart and can lead to hospitalization, heart failure and death. Despite being a grave condition, the way PH was defined in clinical practice previously was

not evidence-based and did not account for physiological changes in blood pressure, such as may occur due to circumstances that are immediately reversible. Although PVR was already considered important in the prognosis of PH, the actual range of PVR that is informative of PH was not known.

The researchers analyzed the association of PVR and mortality using the Veterans Association (VA) national database, which includes comprehensive information on patients' medical histories and clinical events. The researchers acknowledge the limitations to working with a national population relative to errors in measurements. Also, the VA population is almost entirely male, so the team validated the findings in a sex-balanced cohort at Vanderbilt University Medical Center to account for both men and women. The data analysis did account for comorbidities but was not positioned to distinguish between the different stages of diseases that could affect outcome, such as the degree of lung disease in individual patients.

The results indicated that starting at a PVR of around 2.2 Wood Units (a standard unit of measurement for PVR), there is an increase in association with mortality among patients with increased pulmonary artery pressure. This 2.2 level is well below what is currently associated with the disease in clinical practice. The new, lower threshold expands the range of patients who are considered to have PH and optimizes the specificity of PH criteria used clinically.

"Pulmonary hypertension is often overlooked in clinical practice, but this study provides a specific context for clinicians and health care workers to understand the range of risk for a large group of patients," said Maron. "We have established an evidence-based way to recognize patients with PH who would have otherwise been considered to be normal, but, in fact, have a concerning profile."

From here, the team is interested in looking at populations that were not included in this study, including patients with less common forms of PH or PH that exists in the absence of heart and lung disease.

More information: Bradley A Maron et al, Pulmonary vascular resistance and clinical outcomes in patients with pulmonary hypertension: a retrospective cohort study, *The Lancet Respiratory Medicine* (2020). DOI: 10.1016/S2213-2600(20)30317-9

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