

## Supplemental Online Content

Assad TR, Maron BA, Robbins IM, et al. Prognostic effect and longitudinal hemodynamic assessment of borderline pulmonary hypertension. *JAMA Cardiol*. Published online October 25, 2017. doi:10.1001/jamacardio.2017.3882

**eMethods.** Further Details on the Cohort and Statistical Methods

**eFigure 1.** Flow Diagram for Patient Categorization.

**eFigure 2.** Incremental Increase In Hazard Of Death Per 1 mmHg Increase In Mean Pulmonary Arterial Pressure.

**eFigure 3.** Receiver Operator Characteristic Curve Analysis of Mean Pulmonary Artery Pressure and Mortality

**eTable 1.** Indications for Right Heart Catheterization.

**eTable 2.** Univariate and Multivariate Associations of Borderline Pulmonary Hypertension in Patients with a Mean Pulmonary Arterial Pressure < 25 mmHg.

**eTable 3.** Adjusted Mortality by Mean Pulmonary Arterial Pressure Categorization.

**eTable 4.** Complete Hemodynamics of Borderline Pulmonary Hypertension Patients Undergoing Repeat Right Heart Catheterization.

**eTable 5.** Univariate and Multivariate Associations of Developing Overt Pulmonary Hypertension in Patients Initially Diagnosed with Borderline Pulmonary Hypertension.

This supplementary material has been provided by the authors to give readers additional information about their work.

## eMethods

### *Study population*

We queried the Synthetic Derivative database, a de-identified mirror of the Vanderbilt electronic health record, for all right heart catheterization (RHC) reports between 1998 (when the catheterization reports became digitalized) and 2014. A unique algorithm based on regular expressions and pattern matching was developed to extract structured, quantitative data from all RHC reports. Both inpatients and outpatients were included in this study, but we excluded patients with values suggestive of decompensated physiology such as profound bradycardia, tachycardia, hypertension, or shock(1, 2). Subjects with missing mean pulmonary arterial pressure or pulmonary arterial wedge pressure were also excluded. Data suggestive of entry error (e.g. arterial saturation > 100% or negative cardiac output) were deleted, and missing or deleted data were imputed for the purpose of all regression analyses (see *Statistical Analysis* for details).

Demographic and hemodynamic data were determined on the date of RHC. Hemodynamic variables were extracted from the RHC report, other than pulmonary arterial capacitance, which was calculated as the stroke volume (in mL) divided by the pulmonary arterial pulse pressure (in mmHg). When available, the cardiac output and index were calculated using the Fick method. Comorbidity, echocardiographic, and laboratory data were restricted to 6 months before or after RHC. We defined comorbidities based on ICD-9 coding or previously validated algorithms, as previously reported(1-3). Quantitative and semi-quantitative echocardiographic data were extracted as described previously(2, 4). We evaluated laboratory values that reflect disease severity (brain natriuretic peptide [BNP]) or co-morbid conditions (hemoglobin, glomerular filtration rate [GFR], hemoglobin A1c). We defined left ventricular (LV) hypertrophy and left atrial enlargement as LV posterior wall thickness  $\geq 12$ mm and anterior-posterior left atrial diameter >40mm, respectively(5, 6). Finally, medications were restricted to those included on the subject's medication list in the 6 months prior to RHC.

The Synthetic Derivative is linked to the Social Security Death Index, which was used to determine vital status. Follow-up time was calculated from the date of RHC. If death from any cause was reported to the Social Security Death Index, the reported date of death was recorded. Otherwise, patients were considered alive and were censored on the date of last Social Security Death Index search (June 1, 2016).

### *Statistical analysis*

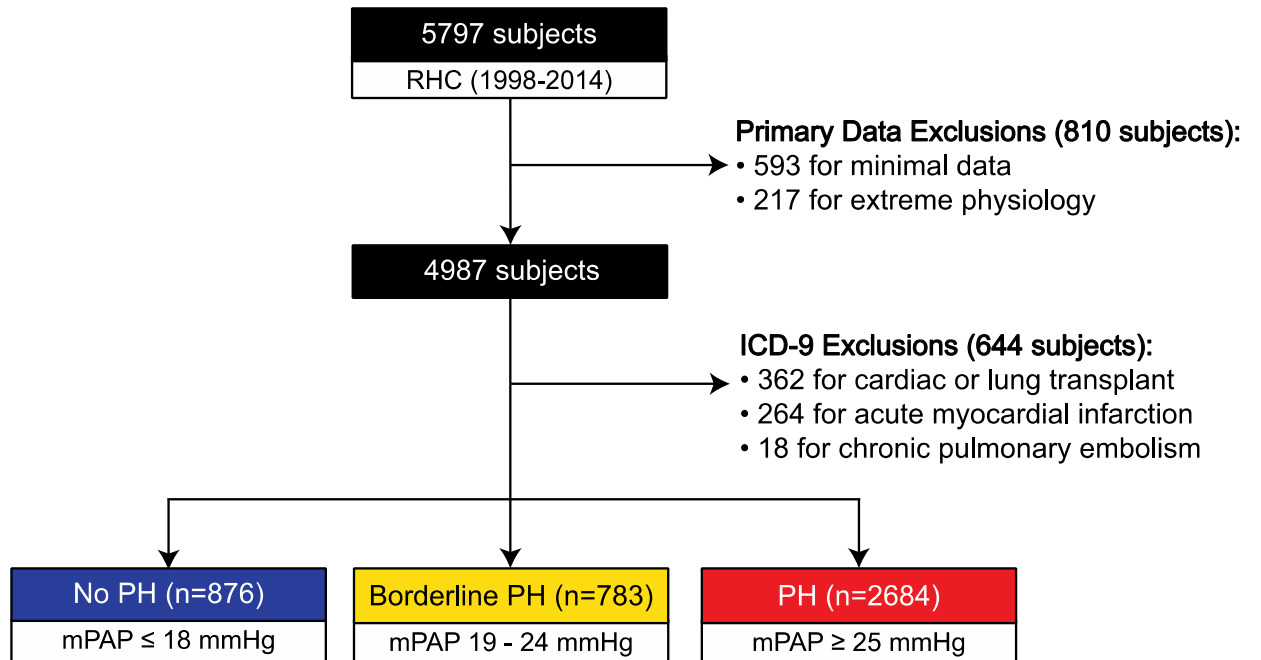
We used the R function `aregImpute` to generate 5 imputed datasets, which is adequate when a moderate amount of data are missing<sup>7</sup>. The variables used for imputation are those presented in eTable 3, consistent with the recommendation that the imputation and analysis models should align<sup>8</sup>. Imputations were pooled by

calculating the arithmetic mean of the estimates. Standard errors were generated from a formula combining between imputation and within-imputation variance<sup>7</sup>. Receiver Operator Characteristic curves for 1-year, 3-year and 5-year mortality were generated from logistic regression with mortality as the dependent variable and mPAP as the predictor. Sensitivity, specificity, positive predictive value and negative predictive value at mPAP levels from 12 to 31 were calculated based on the cross-table of observed death status and that classified by mPAP levels.

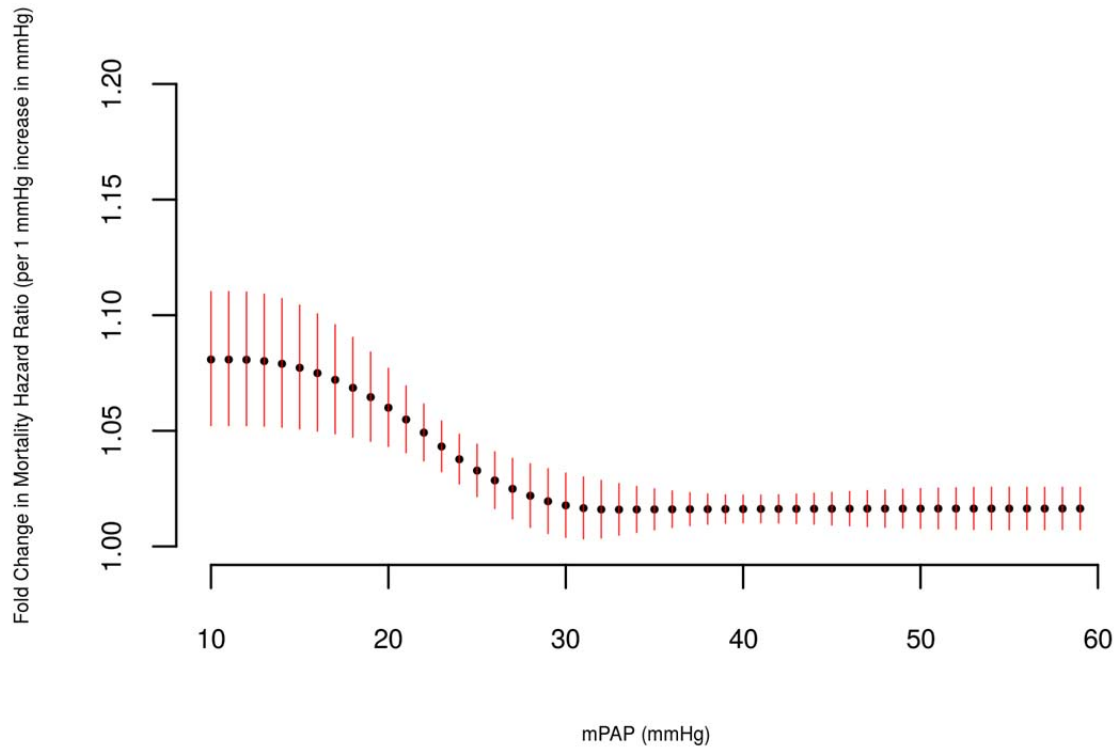
## References

1. Assad TR, Brittain EL, Wells QS, Farber-Eger EH, Halliday SJ, Doss LN, Xu M, Wang L, Harrell FE, Yu C, Robbins IM, Newman JH, Hemnes AR. Hemodynamic evidence of vascular remodeling in combined post- and precapillary pulmonary hypertension. *Pulmonary circulation* 2016; 6: 313-321.
2. Assad TR, Hemnes AR, Larkin EK, Glazer AM, Xu M, Wells QS, Farber-Eger EH, Sheng Q, Shyr Y, Harrell FE, Newman JH, Brittain EL. Clinical and Biological Insights Into Combined Post- and Pre-Capillary Pulmonary Hypertension. *Journal of the American College of Cardiology* 2016; 68: 2525-2536.
3. Gottesman O, Kuivaniemi H, Tromp G, Faucett WA, Li R, Manolio TA, Sanderson SC, Kannry J, Zinberg R, Basford MA, Brilliant M, Carey DJ, Chisholm RL, Chute CG, Connolly JJ, Crosslin D, Denny JC, Gallego CJ, Haines JL, Hakonarson H, Harley J, Jarvik GP, Kohane I, Kullo IJ, Larson EB, McCarty C, Ritchie MD, Roden DM, Smith ME, Bottinger EP, Williams MS. The Electronic Medical Records and Genomics (eMERGE) Network: past, present, and future. *Genetics in medicine : official journal of the American College of Medical Genetics* 2013; 15: 761-771.
4. Wells QS, Farber-Eger E, Crawford DC. Extraction of echocardiographic data from the electronic medical record is a rapid and efficient method for study of cardiac structure and function. *Journal of clinical bioinformatics* 2014; 4: 12.
5. Hirata T, Wolfe SB, Popp RL, Helmen CH, Feigenbaum H. Estimation of left atrial size using ultrasound. *American heart journal* 1969; 78: 43-52.
6. Thenappan T, Shah SJ, Gomberg-Maitland M, Collander B, Vallakati A, Shroff P, Rich S. Clinical characteristics of pulmonary hypertension in patients with heart failure and preserved ejection fraction. *Circulation Heart failure* 2011; 4: 257-265.
7. Little R, DB R. *Statistical Analysis with Missing Data*. Hoboken, New Jersey: John Wiley and Sons, Inc.; 2002.
8. Allison PD. Missing data: Quantitative applications in the social sciences. *British Journal of Mathematical and Statistical Psychology*. 55(1):193-196.

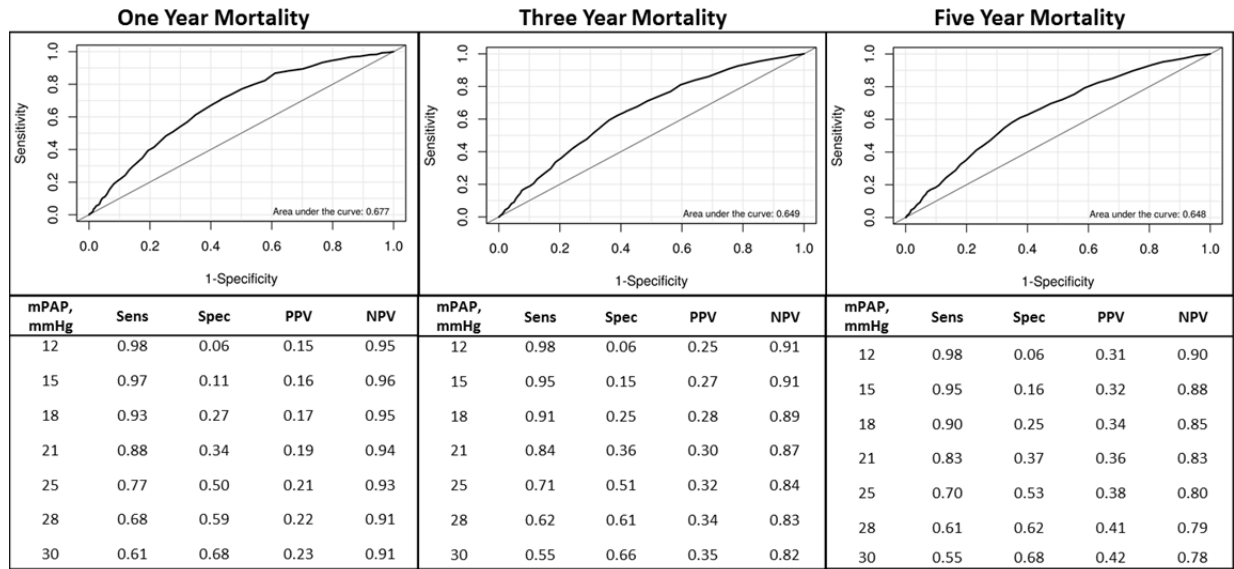
**eFigure 1. Flow Diagram for Patient Categorization.** This schematic represents the initial cohort and subsequent exclusions. ICD-9 indicates international classification of diseases, ninth revision; mPAP, mean pulmonary arterial pressure; PH, pulmonary hypertension; RHC, right heart catheterization.



**eFigure 2. Incremental Increase In Hazard Of Death Per 1 mmHg Increase In Mean Pulmonary Arterial Pressure.** The hazard of death in our Cox proportional hazard model was increased at each mPAP value, however the highest interval change was seen in patients with a mPAP 11 – 24 mmHg. mPAP indicates mean pulmonary arterial pressure.



**eFigure 3. Receiver Operator Characteristic Curve Analysis of Mean Pulmonary Artery Pressure and Mortality.** Sensitivity (Sens), specificity (Spec), positive predictive value (PPV), and negative predictive value (NPV) are presented at various mean pulmonary artery pressure cutoffs for the prediction of 1, 3, and 5 year mortality.



**eTable 1. Indications for Right Heart Catheterization.**

<b>Right Heart Catheterization Indication</b>	<b>Number</b>	<b>Percentage</b>
Coronary artery disease	1,197	25.0%
Congestive heart failure	951	19.9%
Pulmonary hypertension	619	12.9%
Valve, aortic	421	8.8%
None given	408	8.5%
Valve, mitral	249	5.2%
Pre-operative Evaluation	214	4.5%
Congenital heart disease	161	3.4%
Cardiac transplant	153	3.2%
Cardiomyopathy	124	2.6%
Atrial septal defect / Patent foramen ovale	78	1.6%
Pericardial disease	60	1.4%
Dyspnea	52	1.1%
Valve, other	32	0.7%
Arrhythmia	24	0.5%
Shock	19	0.4%
Other	15	0.3%

**eTable 2. Univariate and Multivariate Associations of Borderline Pulmonary Hypertension in Patients with a Mean Pulmonary Arterial Pressure < 25 mmHg.**

<b>Variable</b>	<b>Odds Ratio (95% CI)</b>	<b>P-value</b>	<b>Adjusted Odds Ratio (95%CI)</b>	<b>P-value</b>
Age (per 10 years)	1.17 (1.10-1.23)	< 0.001	1.13 (1.04-1.22)	0.005
Female gender	1.00 (0.82-1.21)	0.96	0.75 (0.56-1.03)	0.073
Black race (vs. white race)	1.46 (1.03-2.07)	0.033	1.31 (0.88-1.96)	0.19
Body mass index (per kg/m <sup>2</sup> ) <sup>a</sup>	1.05 (1.03-1.07)	<0.001	1.05 (1.02-1.08)	0.001
<b>Comorbidities</b>				
Hypertension	1.64 (1.30-2.08)	<0.001	1.04 (0.79-1.38)	0.78
Heart failure	1.91 (1.55-2.35)	<0.001	1.27 (0.95 -1.69)	0.11
Diabetes Mellitus <sup>a</sup>	1.77 (1.44-2.19)	<0.001	-----	-----
Obesity <sup>a</sup>	1.87 (1.49-2.35)	<0.001	-----	-----
CAD	1.27 (1.02-1.58)	0.035	0.92 (0.70-1.19)	0.52
AF	1.42 (1.13-1.78)	0.0027	1.14 (0.87-1.51)	0.35
COPD	2.95 (2.06-4.24)	<0.001	3.19 (2.14-4.73)	<0.001
ILD	1.21 (0.78-1.88)	0.39	1.17 (0.72-1.91)	0.52
OSA	1.72 (1.18-2.51)	0.0051	1.09 (0.71-1.66)	0.71
Anemia <sup>a</sup>	1.38 (1.13-1.67)	0.0015	-----	-----
<b>Medications</b>				
Anticoagulation	1.44 (1.15-1.81)	0.0015	1.10 (0.84-1.43)	0.50
CCB	1.26 (0.97-1.64)	0.084	1.07 (0.80-1.43)	0.63
Diuretics	1.67 (1.37-2.03)	<0.001	0.94 (0.73-1.21)	0.64
B-blockers	1.50 (1.22-1.83)	<0.001	1.27 (0.99-1.62)	0.058
ACE inhibitors	1.13 (0.90-1.41)	0.27	0.89 (0.68-1.15)	0.37
ARB	1.29 (0.94-1.78)	0.11	0.98 (0.69-1.39)	0.91
Endothelin blockers	1.12 (0.07-17.9)	0.94	1.60 (0.09-27.53)	0.75
PDE5 Inhibitors	1.28 (0.46-3.55)	0.63	1.22 (0.41-3.59)	0.72
<b>Labs</b>				
BNP (per 100 pg/ml)	1.02 (1.01-1.05)	0.007	1.02 (1.00-1.03)	0.078
Hemoglobin A1c (per 1 %) <sup>a</sup>	1.24 (1.12-1.37)	<0.001	1.12 (1.01-1.26)	0.036
GFR (per 10 ml/min per 1.73 m <sup>2</sup> )	0.95 (0.92-0.99)	0.0081	1.03 (0.99-1.07)	0.19
Hemoglobin (per 1 g/dl) <sup>a</sup>	0.92 (0.88-0.97)	0.0023	0.96 (0.91-1.02)	0.20
<b>Hemodynamics</b>				
Heart rate (per beat/min)	1.01 (1.00-1.02)	0.0083	-----	-----
Systolic BP (per 10 mmHg)	1.10 (1.05-1.14)	<0.001	-----	-----
Diastolic BP (per 10 mmHg)	1.14 (1.07-1.22)	<0.001	-----	-----
RAP (per mmHg)	1.35 (1.29-1.40)	<0.001	-----	-----
Systolic PA pressure (per mmHg)	1.62 (1.54-1.69)	<0.001	-----	-----
Diastolic PA pressure (per mmHg)	1.62 (1.55-1.69)	<0.001	-----	-----
PAWP (per mmHg)	1.49 (1.43-1.55)	<0.001	-----	-----
PVR (per Wood Unit)	1.75 (1.54-1.99)	<0.001	-----	-----
Cardiac Index (per l/min/m <sup>2</sup> )	0.89 (0.80-0.99)	0.029	-----	-----
Stroke volume (per 10 mL)	0.98 (0.95-1.00)	0.16	-----	-----
PA oxygen saturation (per %)	0.95 (0.94-0.97)	<0.001	-----	-----
PA Capacitance (per ml/mmHg)	0.90 (0.86-0.93)	<0.001	-----	-----
<b>Echocardiography</b>				
LVEDD (per mm)	1.14 (1.03-1.24)	0.0011	1.07 (0.59-1.58)	0.78
LVESD (per mm)	1.14 (1.06-1.23)	0.0014	1.11 (0.86-1.37)	0.38
LV IVS thickness (per mm)	1.96 (1.51-2.14)	<0.001	1.83 (0.80-2.20)	0.12
LVPWD (per mm) <sup>a</sup>	1.84 (1.34-2.14)	<0.001	1.21 (0.25-2.13)	0.68
Left atrial diameter (per mm) <sup>a</sup>	1.41 (1.27-2.05)	<0.001	1.21 (1.05-1.38)	0.013



LV mass index (per 10 g/m <sup>2</sup> )	1.05 (1.02-1.08)	0.0011	0.96 (0.84-1.08)	0.51
LV ejection fraction (per 10 %)	0.89 (0.82-0.96)	0.003	1.01 (0.87-1.15)	0.92
LAE <sup>a</sup>	1.90 (1.55-2.34)	<0.001	-----	-----
LV hypertrophy <sup>a</sup>	1.60 (1.28-1.99)	<0.001	-----	-----

Abbreviations: ACE, angiotensin converting enzyme; AF, atrial fibrillation; ARB, angiotensin receptor blocker; BNP, brain natriuretic peptide; BP, blood pressure; CAD, coronary artery disease; CCB, calcium channel blocker; COPD, chronic obstructive pulmonary disease; ERA, endothelin receptor antagonist; GFR, glomerular filtration rate; ILD, interstitial lung disease; IVS, interventricular septum; mPAP, mean pulmonary arterial pressure; LAE, left atrial enlargement; LV, left ventricular; LVEDD, left ventricular end diastolic diameter; LVESD, left ventricular end systolic diameter; LVPWD, left ventricular posterior wall diameter; OSA, obstructive sleep apnea; PA, pulmonary arterial; PAWP, pulmonary arterial wedge pressure; PDE, phosphodiesterase; PVR, pulmonary vascular resistance; RAP, right atrial pressure.

<sup>a</sup> When continuous variables (BMI, hemoglobin A1c, hemoglobin, left atrial diameter, and left ventricular posterior wall diameter) and categorical variables (prevalent obesity, diabetes mellitus, anemia, left atrial enlargement, and left ventricular hypertrophy) were both available, categorical variables were excluded from the adjusted model.

**eTable 3. Adjusted Mortality by Mean Pulmonary Arterial Pressure Categorization.**

<b>Mean Pulmonary Arterial Pressure (mmHg)</b>	<b>Unadjusted Hazard Ratio of Mortality</b>	<b>P-value</b>	<b>Adjusted Hazard Ratio of Mortality<sup>a</sup></b>	<b>P-value</b>
<b>≤ 18 mmHg</b>	1.0 (referent)	-----	1.0 (referent)	-----
<b>19 – 24 mmHg</b>	1.56 (1.28-1.90)	<0.0001	1.31 (1.04-1.65)	0.001
<b>≥ 25 mmHg</b>	2.73 (2.36-3.16)	<0.0001	1.70 (1.37-2.10)	<0.0001

<sup>a</sup> Mortality adjusted for the following variables in a Cox proportional hazards model: age, gender, race, body mass index, glomerular filtration rate, brain natriuretic peptide, hemoglobin, cardiac output, pulmonary wedge pressure, ejection fraction, left atrial diameter, left ventricular posterior wall diameter, left ventricular mass index, and prevalent hypertension, coronary artery disease, heart failure, atrial fibrillation, diabetes, chronic obstructive pulmonary disease, obstructive sleep apnea, interstitial lung disease, systemic lupus erythematosus, scleroderma, valvular disease, and treatment with endothelin receptor antagonists, phosphodiesterase type 5 inhibitors, prostacyclins, calcium channel blockers, diuretics, beta blockers, angiotensin converting enzyme inhibitors, angiotensin receptor blockers, lipid lowering medications, and anticoagulants.

**eTable 4. Complete Hemodynamics of Borderline Pulmonary Hypertension Patients Undergoing Repeat Right Heart Catheterization.**

Characteristics	Initial Right Heart Catheterization	Repeat Right Heart Catheterization
Age, median [IQR], years	57 [48, 63] <sup>a</sup>	58 [49, 67] <sup>b</sup>
Female no. (%)	26 (37)	26 (37)
Body mass index, median [IQR], (kg/m <sup>2</sup> )	28 [23, 32]	29 [24, 32]
Race, no. (%)		
White	57 (81)	57 (81)
Black	10 (14)	10 (14)
Other	3 (5)	3 (5)
Co-morbidities, no. (%)		
Hypertension	63 (90) <sup>a</sup>	70 (100) <sup>b</sup>
Diabetes Mellitus	32 (46)	42 (60) <sup>b</sup>
CAD	63 (90) <sup>a</sup>	60 (86)
AF	22 (31)	27 (39) <sup>b</sup>
COPD	8 (11)	10 (14)
OSA	8 (11)	14 (20) <sup>b</sup>
Heart failure	54 (77) <sup>a</sup>	47 (67) <sup>b</sup>
Connective tissue disease	0 (0)	1 (1)
Medications, no. (%)		
Diuretics	46 (66) <sup>a</sup>	58 (83) <sup>b</sup>
Anti-hypertensives	58 (83)	67 (96) <sup>b</sup>
Labs, median [IQR]		
BNP, pg/ml	295 [163, 839] <sup>a</sup>	232 [127, 759]
Creatinine	1 [0.85, 1.28]	1.17 [0.93, 1.45]
Hemoglobin, g/dl	13.4 [10.7, 14.2]	12 [9.9, 13.8] <sup>b</sup>
Hemoglobin A1c, %	6 [5.6, 6.7]	6 [5.5, 6.6]
Invasive Catheterization, median [IQR]		
Heart rate, beats/minute	69 [59, 80]	69 [60, 74]
Mean arterial pressure, mmHg	89 [77, 102]	86 [80, 100]
RAP, mmHg	6 [3, 8]	8 [4, 13] <sup>b</sup>
Systolic PA pressure, mmHg	32 [29, 35]	41 [34, 47] <sup>b</sup>
Diastolic PA pressure, mmHg	14 [12, 16]	19 [14, 23] <sup>b</sup>
mPAP, mmHg	21 [20, 23]	26 [19, 32] <sup>b</sup>
PAWP, mmHg	13 [10, 15]	16 [11, 21] <sup>b</sup>
DPG, mmHg	2 [-1, 3]	1 [-2, 5]
TPG, mmHg	9 [7, 12]	10 [8, 14] <sup>b</sup>
PVR, Woods units	1.6 [1.2, 2.4]	1.9 [1.4, 2.8] <sup>b</sup>
Cardiac output, l/min	5.3 [4.6, 6.5] <sup>a</sup>	5.5 [4.1, 6.6]
Cardiac Index, l/min/m <sup>2</sup>	2.6 [2.4, 3.2] <sup>a</sup>	2.7 [2.2, 3.2]
Stroke volume, mL	75 [57, 105]	80 [62, 110] <sup>b</sup>
PA O <sub>2</sub> saturation, %	68 [62, 72] <sup>a</sup>	67 [62, 70]
PA capacitance, ml/mmHg	4.6 [3.1, 6.1]	3.9 [2.8, 4.6]
Echocardiography		
LVEDD, median [IQR], mm	52 [45, 63] <sup>a</sup>	51 [44, 62]
LVESD, median [IQR], mm	40 [29, 53] <sup>a</sup>	36 [27, 54]
LV IVS thickness, median [IQR], mm	12 [10, 14]	12 [11, 13]
Left atrial diameter, median [IQR], mm	43 [37, 50]	43 [37, 50]
LV ejection fraction, median [IQR], %	40 [20, 55] <sup>a</sup>	48 [20, 55]

LV hypertrophy, no. (%)	23 (34)	19 (28)
LAE, no. (%)	42 (63)	39 (62)

Abbreviations: BP, blood pressure. DPG, diastolic pressure gradient; mPAP, mean pulmonary arterial pressure; PA, pulmonary arterial; PAWP, pulmonary arterial wedge pressure; PVR, pulmonary vascular resistance; RAP, right atrial pressure; TPG, transpulmonary gradient.

<sup>a</sup>  $p < 0.05$  initial right heart catheterization in borderline pulmonary hypertension patients who underwent repeat right heart catheterization vs. borderline pulmonary hypertension patients who did not undergo repeat right heart catheterization.

<sup>b</sup>  $p < 0.05$  for initial right heart catheterization vs. repeat right heart catheterization.

**eTable 5. Univariate and Multivariate Associations of Developing Overt Pulmonary Hypertension in Patients Initially Diagnosed with Borderline Pulmonary Hypertension.**

<b>Variable</b>	<b>Odds Ratio (95% CI)</b>	<b>P-value</b>	<b>Age- and Sex-Adjusted Odds Ratio (95%CI)</b>	<b>P-value</b>
Age (per year)	1.02 (0.98-1.06)	0.31	1.03 (0.99-1.07)	0.20
Female gender	0.58 (0.21-1.63)	0.31	0.50 (0.17-1.45)	0.20
White race (vs. all other races)	2.16 (0.22-7.30)	0.033	1.82 (0.50-6.64)	0.37
Body mass index (per kg/m <sup>2</sup> )	1.00 (0.92-1.07)	0.92	1.00 (0.93-1.08)	0.97
<b>Comorbidities</b>				
Hypertension	0.61 (0.11-3.38)	0.57	0.66 (0.11-3.77)	0.64
Heart failure	1.32 (0.43-4.10)	0.63	1.72 (0.51-5.79)	0.38
Diabetes Mellitus	1.39 (0.52-3.67)	0.51	1.87 (0.65-5.33)	0.24
Obesity	0.69 (0.24-1.94)	0.48	0.85 (0.28-2.53)	0.77
CAD	2.32 (0.48-11.28)	0.30	2.03 (0.39-10.47)	0.40
AF	0.87 (0.31-2.43)	0.79	0.82 (0.28-2.37)	0.71
COPD	2.03 (0.38-10.86)	0.41	2.01 (0.37-11.03)	0.42
ILD	1.95 (0.19-19.77)	0.57	1.61 (0.15-17.17)	0.69
OSA	1.05 (0.23-4.81)	0.95	1.07 (0.22-5.11)	0.93
<b>Medications</b>				
Anticoagulation	1.35 (0.50-3.61)	0.56	1.54 (0.56-4.24)	0.41
CCB	0.98 (0.33-2.95)	0.97	0.95 (0.31-2.93)	0.93
Diuretics	1.22 (0.44-3.34)	0.70	1.25 (0.45-3.53)	0.67
B-blockers	1.17 (0.45-3.08)	0.75	1.36 (0.50-3.71)	0.55
ACE inhibitors	1.11 (0.37-3.28)	0.27	1.18 (0.39-3.60)	0.77
ARB	5.06 (0.59-43.6)	0.14	6.21 (0.70-55.39)	0.10
<b>Labs</b>				
BNP (per 100 pg/ml)	0.96 (0.87-1.05)	0.34	0.95 (0.86-1.04)	0.30
Hemoglobin A1c (per 1 %)	1.28 (0.83-1.98)	0.26	1.46 (0.87-2.44)	0.15
GFR (per 10 ml/min per 1.73m <sup>2</sup> )	1.02 (0.84-1.20)	0.82	1.04 (0.85-1.23)	0.69
Hemoglobin (per 1 g/dl)	1.11 (0.88-1.40)	0.36	1.20 (0.93-1.53)	0.16
<b>Hemodynamics</b>				
Heart rate (per beat/min)	1.05 (0.99-1.11)	0.10	1.05 (0.99-1.12)	0.08
Systolic BP (per 10 mmHg)	0.79 (0.53-1.06)	0.12	0.79 (0.53-1.05)	0.12
Diastolic BP (per 10 mmHg)	0.73 (0.33-1.13)	0.19	0.70 (0.29-1.14)	0.18
RAP (per mmHg)	0.92 (0.81-1.04)	0.20	0.94 (0.82-1.06)	0.30
Systolic PA pressure (per mmHg)	1.03 (0.91-1.16)	0.65	1.00 (0.88-1.13)	0.94
Diastolic PA pressure (per mmHg)	0.95 (0.82 -1.10)	0.46	0.98 (0.84-1.14)	0.80
PAWP (per mmHg)	0.93 (0.82-1.06)	0.28	0.95 (0.83-1.08)	0.43
PVR (per Wood Unit)	1.00 (0.61-1.62)	0.99	0.97 (0.59-1.59)	0.90
Cardiac Index (per l/min/m <sup>2</sup> )	1.28 (0.65-2.53)	0.48	1.20 (0.60-2.41)	0.60
Stroke volume (per 10 mL)	0.91 (0.64-1.18)	0.51	0.93 (0.66-1.21)	0.62
PA oxygen saturation (per %)	1.02 (0.96-1.09)	0.47	1.02 (0.96-1.09)	0.57
PA Capacitance (per ml/mmHg)	0.99 (0.71-1.39)	0.97	1.12 (0.76-1.67)	0.56
<b>Echocardiography</b>				
LVEDD (per mm)	1.00 (0.96-1.04)	0.90	1.02 (0.97-1.06)	0.46
LVESD (per mm)	1.00 (0.97-1.03)	0.81	1.01 (0.97-1.04)	0.73
LV IVS thickness (per mm)	0.91 (0.79-1.06)	0.25	0.91 (0.78-1.08)	0.28
LVPWD (per mm)	0.93 (0.73-1.17)	0.52	0.93 (0.72-1.19)	0.55
Left atrial diameter (per mm)	1.00 (0.95-1.06)	0.88	1.01 (0.95-1.07)	0.86
LV mass index (per 10 g/m <sup>2</sup> )	1.00 (0.99-1.01)	0.80	1.01 (0.90-1.12)	0.88
LV ejection fraction (per 10 %)	0.99 (0.97-1.02)	0.70	0.83 (0.53-1.15)	0.28

LAE	1.41 (0.51-3.87)	0.51	1.43 (0.48-4.21)	0.52
LV hypertrophy	1.25 (0.44-3.57)	0.67	1.28 (0.42-3.89)	0.66

Abbreviations: ACE, angiotensin converting enzyme; AF, atrial fibrillation; ARB, angiotensin receptor blocker; BNP, brain natriuretic peptide; BP, blood pressure; CAD, coronary artery disease; CCB, calcium channel blocker; COPD, chronic obstructive pulmonary disease; ERA, endothelin receptor antagonist; GFR, glomerular filtration rate; ILD, interstitial lung disease; IVS, interventricular septum; mPAP, mean pulmonary arterial pressure; LAE, left atrial enlargement; LV, left ventricular; LVEDD, left ventricular end diastolic diameter; LVESD, left ventricular end systolic diameter; OSA, obstructive sleep apnea; PA, pulmonary arterial; PAWP, pulmonary arterial wedge pressure; PDE, phosphodiesterase; PVR, pulmonary vascular resistance; RAP, right atrial pressure; TPG, transpulmonary gradient.