

DAFTAR PUSTAKA

1. Muliawan H, Hartopo A, Dinarti L, Irnizarifika, Dewangga M, Yanni M, et al. Pedoman Diagnosis dan Tatalaksana Hipertensi Pulmonal. Jakarta: Perhimpunan Dokter Spesialis Kardiologi Indonesia; 2021
2. Simonneau G, Montani D, Celermajer DS, Denton C, Gatzoulis M, Krowka M, et al. Haemodynamic definitions and updated clinical classification of pulmonary hypertension. *Eur Respir J*. 2019;53(1):180–191
3. Humbert M, Kovacs G, Hoeper M, Badagliacca R, Berger R, Brida M, et al. 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension. *European Society of Cardiology*. 2022;43(38):3618–3731
4. Utami M. Gambaran Karakteristik Pasien Hipertensi Arteri Pulmonal di RSUP DR. M. Djamil Padang Tahun 2017-2021. Universitas Andalas. 2022: 1–18
5. Humbert M, Sitbon O, Chaouat A, Bertocchi M, Habib G, Gressin V, et al. Pulmonary arterial hypertension in France: results from a national registry. *Am J Respir Crit Care Med*. 2006; 173(9):1023–1030
6. Charalampopoulos A, Lewis R, Hickey P, Durrington C, Elliot C, Condliffe R, et al. Pathophysiology and diagnosis of pulmonary hypertension due to left heart disease. *Frontiers*. 2018;5(174):1–8
7. Beshay S, Guha A, Sahay S. Evaluation, diagnosis, and classification of pulmonary hypertension. *Methodist Debaque Cardiovasc J*. 2021;17(2): 86–91
8. Wu V, Takeuchi M. Echocardiographic assessment of right ventricular systolic function. *Cardiovasc Diagn Ther*. 2019;8(1):70–79
9. Bogaard HJ, Abe K, Vonk Noordegraaf A, Voelkel N. The right ventricle under pressure: cellular and molecular mechanisms of right-heart failure in pulmonary hypertension. *Chest* 2009; 135: 794–804
10. Sano M, Minamino T, Toko H, Miyauchi H, Orimo M, Qin Y, et al. p53-induced inhibition of Hif-1 causes cardiac dysfunction during pressure overload. *Nature*. 2007; 446: 444–448
11. Gorter TM, Hoendermis ES, van Veldhuisen DJ, Voors AA, Lam CS, Geelhoed B, et al. Right ventricular dysfunction in heart failure with preserved ejection fraction: a systematic review and meta-analysis. *Eur J Heart Fail*. 2016;18:1472–1487
12. Simmoneau G, Gatzoulis MA, Adatia I, Celermajer D, Denton C, et al.

- Updated clinical classification of pulmonary hypertension. *J. Am. Coll. Cardiol.* 2013;62(25):34–41
13. Vachiéry J-L, Tedford RJ, Rosenkranz S, Palazzini M, Lang I, Guazzi M, et al. Pulmonary hypertension due to left heart disease. *Eur Respir J.* 2019;53(1): 180–189
 14. Baselet B, Rombouts C, Benotmane A, Baatout S, and Aerts A. Cardiovascular diseases related to ionizing radiation: The risk of low-dose exposure. *International Journal of Molecular Medicine.* 2016;38(1): 8
 15. Mandras S, Mehta H, Vaidya A. Pulmonary hypertension: a brief guide for clinicians. *Mayo Clin Proc.* 2020; 95(9):1978–1988
 16. Peacock AJ, Murphy NF, McMurray JJV, Caballero L, Stewart S. An epidemiological study of pulmonary arterial hypertension. *Eur Respir J.* 2007; 30(1):104–109
 17. Thenappan T, Shah SJ, Rich S, Gomberg-Maitland M. A USA-based registry for pulmonary arterial hypertension: 1982–2006. *Eur Respir J.* 2007; 30(6):1103–1110
 18. Badesch DB, Raskob GE, Elliott GC, Krichman AM, Farber HW, Frost A, et al. Pulmonary arterial hypertension: baseline characteristics from the REVEAL Registry. *Chest.* 2010; 137(2):376–387
 19. Prins K, Thenappan T. WHO group I pulmonary hypertension: epidemiology and pathophysiology. *Cardiol Clin.* 2016;34(3):363–374
 20. Rich S, Dantzker DR, Ayres SM, Bergofsky EH, Brundage BH, Detre KM, et al. Primary pulmonary hypertension. A national prospective study. *Ann Intern Med.* 1987; 107(2):216–223
 21. Leber L, Beaudet A, Muller A. Epidemiology of pulmonary arterial hypertension and chronic thromboembolic pulmonary hypertension: identification of the most accurate estimates from a systematic literature review. *Pulmonary Circul.* 2021;11(1):1–12
 22. Culivan S, Lennon D, Meghani S, Minnock C, McCullagh B, Gaine S. Incidence and outcomes of pulmonary hypertension in the Ireland. *BMJ Open Resp Res.* 2022;9(1): 1–8
 23. Dinarti L, Anggrahini D, Lilyasari O, Siswanto B, Hartopo A. Pulmonary arterial hypertension in Indonesia: current status and local application of international guidelines. *Global Heart.* 2021; 16(1): 1–11
 24. Gerges M, Gerges C, Pisritto A, Lang M, Trip P, Jakowitsch J, et al. Pulmonary hypertension in heart failure. *American Journal of Respiratory*

and Critical Care Medicine. 2015;192(10):1234–1246

25. Simonneau G, Robbins IM, Beghetti M, Channick R, Delcroix M, Denton CP, et al. Updated clinical classification of pulmonary hypertension. *J Am Coll Cardiol*. 2009;54(Suppl. 1):43–54
26. Guazzi M, Borlaug BA. Pulmonary hypertension due to left heart disease. *Circulation*. 2012;126:975–990
27. Zolty R. Challenges in pulmonary hypertension associated with left heart disease. *Expert Review of Cardiovascular Therapy*. 2019
28. Haddad F, Kudelko K, Mercier O, Vrtovec B, Zamanian RT, Perez V. Pulmonary hypertension associated with left heart disease: characteristics, emerging concepts, and treatment strategies. *Prog Cardiovasc Dis*. 2011;54:154–167
29. Rajagopal S, Rei Y. The pathobiology of pulmonary arterial hypertension. *Cardiol Clin*. 2022;40: 1–12
30. Sakao S., Tatsumi K., Voelkel N.F. 2010. Reversible or irreversible remodeling in pulmonary arterial hypertension. *Am J Respir Cell Mol Biol*, 43:629–634
31. Hartopo A, Dinarti L. The shared pathogenesis of pulmonary artery hypertension. *Acta Cardiologia Indonesiana*. 2018;4(1):22–27
32. Dorfmueller P. 2016. Pathology of pulmonary vascular disease. In: Peacock, et al (eds), *Pulmonary circulation disease and their treatment*. 4th edition. CRC Press, USA
33. Jeffery T.K., Morrell N.W. 2002. Molecular and cellular basis of pulmonary vascular remodeling in pulmonary hypertension. *Prog Cardiovasc Dis*, 45:173–202
34. Tuder R.M. 2017. Pulmonary vascular remodeling in pulmonary hypertension. *Cell Tissue Res*, 367:643–649
35. Stenmark K.R., Frid M.G., Yeager M., Li M., Riddle S., McKinsey T., et al. 2012. Targeting the adventitial microenvironment in pulmonary hypertension: A potential approach to therapy that considers epigenetic change. *Pulm Circ*, 2(1):3–14
36. Yeager M.E., Frid M.G., Stenmark K.R. 2011. Progenitor cells in pulmonary vascular remodeling. *Pulm Circ*, 1:3–16
37. Sakao S., Tatsumi K. 2011. Vascular remodeling in pulmonary arterial hypertension: multiple cancer-like pathways and possible treatment

- modalities. *Int J Cardiol*, 147:4–12
38. Tuder R.M., Archer S.L., Dorfmueller P., Erzurum S.C., Guignabert C., Michelakis E., et al. 2013. Relevant issues in the pathology and pathobiology of pulmonary hypertension. *J Am Coll Cardiol*, 62:4–12
 39. Archer S.L., Weir E.K., Wilkins M.R. 2010. Basic science of pulmonary arterial hypertension for clinicians: new concepts and experimental therapies. *Circulation*, 121:2045–2066
 40. Ormiston M.L., Morrell N.W. 2016. Pathobiology of pulmonary hypertension. In: Peacock, et al (eds), *Pulmonary circulation disease and their treatment*. 4th edition. CRC Press, USA
 41. Gerges C, Gerges M, Lang MB, Zhang Y, Jakowitsch J, Probst P, et al. Diastolic pulmonary vascular pressure gradient: a predictor of prognosis in “out of proportion” pulmonary hypertension. *Chest* 2013;143:758–766
 42. Guazzi M, Gomberg-Maitland M, Arena R. Pulmonary hypertension in heart failure with preserved ejection fraction. *J Heart Lung Transplant* 2015;34: 273–281
 43. Tedford RJ, Hassoun PM, Mathai SC, Girgis RE, Russell SD, Thiemann DR, et al. Pulmonary capillary wedge pressure augments right ventricular pulsatile loading. *Circulation* 2012;124: 289–297
 44. Al-Naamani N, Preston IR, Paulus JK, Hill NS, Roberts KE. Pulmonary arterial capacitance is an important predictor of mortality in heart failure with a preserved ejection fraction. *JACC Heart Fail* 2015;3:467–474
 45. Fang JC, DeMarco T, Givertz MM, Borlaug BA, Lewis GD, Rame JE, et al. World Health Organization pulmonary hypertension group 2: pulmonary hypertension due to left heart disease in the adult—a summary statement from the Pulmonary Hypertension Council of the International Society for Heart and Lung Transplantation. *J Heart Lung Transplant* 2012;31:913–933
 46. Delgado JF, Conde E, Sa'nchez V, Lopez-Rios F, Gomez-Sanchez MA, Escribano P, et al. Pulmonary vascular remodeling in pulmonary hypertension due to chronic heart failure. *Eur J Heart Fail* 2005;7: 1011–1016
 47. Palestini P, Calvi C, Conforti E, Botto L, Fenoglio C, Miserocchi G. Composition, biophysical properties, and morphometry of plasma membranes in pulmonary interstitial edema. *Am J Physiol Lung Cell Mol Physiol* 2002;282:L1382–1390
 48. Klotz S, Deng MC, Hanafy D, Schmid C, Stypmann J, Schmidt C, et al. Reversible pulmonary hypertension in heart transplant candidates—

- pretransplant evaluation and outcome after orthotopic heart transplantation. *Eur J Heart Fail* 2003;5:645–653
49. Vachiery JL, Simonneau G. Management of severe pulmonary arterial hypertension. *Eur Respir Rev* 2010; 19: 118, 279–287
 50. Bossone E, Paciocco G, Iarussi D, Agretto A, Lacono A, Gillespie BW, et al. The prognostic role of the ECG in primary pulmonary hypertension. *Chest*. 2002;121(2):513–518
 51. Frost A, Badesch D, Gibbs JS, Gopalan D, Khanna D, Manes A. Diagnosis of pulmonary hypertension. *Eur Respir J*. 2019 Jan 24;53(1):180–190.
 52. D’Alto M, Di Maio M, Romeo E, Argiento P, Blasi E, Di Vilio A, et al. Echocardiographic probability of pulmonary hypertension: a validation study. *Eur Respir J*. 2022;210–254.
 53. Markley RP, Ali A, Potfay J, et al. Echocardiographic evaluation of the right heart. *J Cardiovasc Ultrasound*. 2016;3:183–190
 54. Lang RM, Badano LP, Mor-Avi V, Afilalo J, Armstrong A, Ernande L, Flachskampf, et al. Recommendations for cardiac chamber quantification by echocardiography in adults: an update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. *J Am Soc Echocardiogr*. 2015;28:1–39
 55. Rudski LG, Lai WW, Afilalo J, Hua L, Handschumacher MD, Chandrasekaran K, et al. Guidelines for the echocardiographic assessment of the right heart in adults: a report from the American Society of Echocardiography. *J Am Soc Echocardiogr*. 2010;23:685–713
 56. Pieske B, Tschope C, de Boer RA, Fraser AG, Anker SD, Donal E, et al. How to diagnose heart failure with preserved ejection fraction: the HFA-PEFF diagnostic algorithm. *Eur Heart J* 2019;40:3297–3317
 57. Baumgartner H, De Backer J, Babu-Narayan SV, Budts W, Chessa M, Diller GP, et al. 2020 ESC Guidelines for the management of adult congenital heart disease. *Eur Heart J* 2021;42:563–645
 58. Haddad F, Hunt SA, Rosenthal DN, Murphy D. Right ventricular function in cardiovascular disease, part I. Anatomy, physiology, aging and functional assessment of the right ventricle. *Circulation* 2008; 117: 1436–1448
 59. Naeije R, Manes A. The right ventricle in pulmonary arterial hypertension. *Eur Respir Rev*. 2014;23:476–487
 60. Handoko ML, de Man FS, Allaart CP, Paulus WJ, Westerhof N, Noordegraaf AV. Perspectives on novel therapeutic strategies for right heart

- failure in pulmonary arterial hypertension: lessons from the left heart. *Eur Respir Rev* 2010; 19: 72–82
61. Velez-Roa S, Ciarka A, Najem B, Vachieri JL, Naejie R, Borne P. Increased sympathetic nerve activity in pulmonary artery hypertension. *Circulation* 2004; 110: 1308–1312
 62. Ciarka A, Vachie`ry JL, Houssie`re A, Gujic M, Stoupel E, Roa S, et al. Atrial septostomy decreases sympathetic overactivity in pulmonary arterial hypertension. *Chest* 2007; 131: 1831–1837
 63. Galie` N, Manes A, Palazzini, Negro L, Romanazzi S, Branzi A. Pharmacological impact on right ventricular remodelling in pulmonary arterial hypertension. *Eur Heart J* 2007; 9: 68–74
 64. Vonk-Noordegraaf A, Marcus JT, Gan CT, Boonstra A, Postmus P. Interventricular mechanical asynchrony due to right ventricular pressure overload in pulmonary hypertension plays an important role in impaired left ventricular filling. *Chest* 2005; 128: Suppl. 6, 628–630
 65. Gan CT, Lankhaar JW, Marcus JT, Westerhof N, Marques K, Bronzwaer JGF, et al. Impaired left ventricular filling due to right-to-left ventricular interaction in patients with pulmonary arterial hypertension. *Am J Physiol Heart Circ Physiol* 2006; 290:1528–1533
 66. Marcus JT, Gan CT, Zwanenburg JJ, Boonstra A, Allart CP, Gotte MJW, et al. Interventricular mechanical asynchrony in pulmonary arterial hypertension: left-to-right delay in peak shortening is related to right ventricular overload and left ventricular underfilling. *J Am Coll Cardiol* 2008; 51: 750–757
 67. Noordegraaf A, Galie N. The role of the right ventricle in pulmonary arterial hypertension. *Eur Respir Rev.* 2011;20(122):243–253
 68. Melenovsky V, Hwang SJ, Lin G, Redfield MM, Borlaug BA. Right heart dysfunction in heart failure with preserved ejection fraction. *Eur Heart J.* (2014) 35:3452–3462
 69. Patel M, Patel N. Exploring research methodology: review article. *IJRR.* 2019;6(3):48-55
 70. Badan Penelitian dan Pengembangan Kesehatan. Laporan Nasional Riset Kesehatan Dasar. Kementerian Kesehatan RI. Jakarta; 2019
 71. Gall H, Felix J, Schneck F, Milger K, Sommer N, et al. The giessen pulmonary hypertension registry: survival in pulmonary hypertension subgroups. *JHLT.* 2017;36(9):957–967

72. Hurdman J, Condliffe R, Elliot CA, Davies C, Hill C. Aspire registry: assessing the spectrum of pulmonary hypertension identified at a referral centre. *Eur Respir J.* 2012; 39: 945–955
73. Dinarti LK, Hartopo AB, Kusuma AD, Satwiko MG, Hadwiono MR, Pradana AD, et al. The COngenital HeARt Disease in adult and Pulmonary Hypertension (COHARD-PH) registry: A descriptive study from single-center hospital registry of adult congenital heart disease and pulmonary hypertension in Indonesia. *BMC Cardiovasc Disord.* 2020;20(1):1–11.
74. Thienemann F, Dzudie A, Mocumbi AO, Blauwet L, Sani M, et al. The causes, treatment, and outcome of pulmonary hypertension in africa: insights from the pan african pulmonary hypertension cohort (PAPUCO) registry. *Int Journal of Cardio.* 2016;221: 205–211
75. Badlam JB, Badesch DB, Austin ED, Benza RL, Chung WK, Farber HW, et al. United states pulmonary hypertension scientific registry: baseline characteristics. *Chest.* 2021;159(1):311–327
76. Ling Y, Johnson M, Kiely D, Condliffe R, Elliot CA, et al. Changing demographics, epidemiology, and survival of incident pulmonary arterial hypertension. *Am J Respir Crit Care Med.* 2012;186(8): 790–796
77. Harikrishnan S, Sanjay G, Ashishkumar M, Menon J, Rajesh G. Pulmonary hypertension registry of Kerala, India (PRO-KERALA) — Clinical characteristics and practice patterns. *Int Journal of Cardio.* 2018;265: 212–217
78. Hildenbrand F, Fauchere I, Huber L, Keusch S, Speich R, et al. A low resting heart rate at diagnosis predicts favourable long-term outcome in pulmonary arterial and chronic thromboembolic pulmonary hypertension. A prospective observational study. *Resp Res.* 2012;13(76): 1–7
79. Hjalmarsson C, Radegran G, Kylhammar D, Rundqvist B, Multing J. Impact of age and comorbidity on risk stratification in idiopathic pulmonary arterial hypertension. *Eur Respir J* 2018; 51: 1–9
80. Abernethy A, Stackhouse K, Hart S, Devendra G, Bashore T, et al. Impact of diabetes in patients with pulmonary hypertension. *Pulmo Vasc Res Inst.* 2014;5(1): 118–123
81. Raitière O, Berthelot E, Fauvel C, Guignant P, Belkacem NS, et al. The dangerous and contradictory prognostic significance of PVR<3WU when

TAPSE<16mm in postcapillary pulmonary hypertension. *ESC Heart Failure*.2020;7:2398–2405

82. Chen L, Larsen C, Le R, Connolly H, Pislaru S, Murphy J. The prognostic significance of tricuspid valve regurgitation in pulmonary arterial hypertension. *Clin Respir J*. 2019;12(4):1572–1580
83. Medvedofsky D, Aronson D, Maitland M, Thomeas V, Rich S. Tricuspid regurgitation progression and regression in pulmonary arterial hypertension: implications for right ventricular and tricuspid valve apparatus geometry and patients outcome. *Euro Heart J*. 2017;18:86–94
84. Ltaief Z, Yerly P, Liaudet L. Pulmonary hypertension in left heart diseases: pathophysiology, hemodynamic assessment and therapeutic management. *Int J Mol*. 2023;24:1–33
85. Shiran A, Sagie A. Tricuspid regurgitation in mitral valve disease: incidence, prognostic implications, mechanism, and management. *American College of Card J*. 2009; 53(5):401–408
86. Montané BE, Fiore AM, Reznicek EC, Jain V, Jellis C, Rokadia H, et al. Optimal tricuspid regurgitation velocity to screen for pulmonary hypertension in tertiary referral centers. *Chest*. 2021;160(6):2209–2219
87. Casa LDC, Dolensky JR, Spinner EM, Veledar E, Lerakis S, Yoganathan AP. Impact of pulmonary hypertension on tricuspid valve function. *Ann Biomed Eng*. 2013;41(4):709–724
88. Swinnen K, Verstraete K, Baratto C, Hardy L, Vos MD, et al. Machine learning to differentiate pulmonary hypertension due to left heart disease from pulmonary arterial hypertension. *ERJ Open Res*.2023;9(4):1–45
89. Murata M, Tsugu T, Kawakami T, Kataoka M, Minakata Y. Prognostic value of three-dimensional echocardiographic right ventricular ejection fraction in patients with pulmonary arterial hypertension. *Oncotarget*.2016;7(52):86781–86790
90. Murata M. Clinical significance of right ventricular function in pulmonary hypertension. *Keio Journal of Medicine*. 2020;70(3):60–67
91. Bernardo R, Haddad F, Couture E, Hansmann G, Perez V. Mechanics of right ventricular dysfunction in pulmonary arterial hypertension and heart failure with preserved ejection fraction. *Cardiovasc Diagn Ther* 2020;10(5):1580–1603