

## DAFTAR PUSTAKA

- Ackermann, M., Verleden, S.E., Kuehnel, M., Haverich, A., Welte, T., Laenger, F., *et al.* 2020. Pulmonary Vascular Endothelialitis, Thrombosis, and Angiogenesis in Covid-19. *New England Journal Medicine.* 383, 120–128. <https://doi.org/10.1056/NEJMoa2015432>
- Alanli, R., Kucukay, M.B., Yalcin, S., 2020. Procalcitonin/Albumin Ratio: Could It Be a Novel Marker Indicating Severity of Inflammation in Pneumonia? A Retrospective Study in Elderly Patients with Community-Acquired Pneumonia. *Geriatrik Bilimler Dergisi.* 11–17
- Bhaskar, S., Sinha, A., Banach, M., Mittoo, S., Weissert, R., Kass, J.S., Rajagopal, S., 2020. Cytokine Storm in COVID-19 Immunopathological Mechanisms, Clinical Considerations, and Therapeutic Approaches: The REPROGRAM Consortium Position Paper. *Frontier. Immunol.* 11, 1648. <https://doi.org/10.3389/fimmu.2020.01648>
- Bonanad C, García-Blas S, Tarazona-Santabalbina F, Sanchis J, Bertomeu-González V, Fácila L, Ariza A, Núñez J, Cordero A. The Effect of Age on Mortality in Patients With COVID-19: A Meta-Analysis With 611,583 Subjects. *J Am Med Dir Assoc.* 2020 Jul;21(7):915-918. doi: 10.1016/j.jamda.2020.05.045. Epub 2020 May 25. PMID: 32674819; PMCID: PMC7247470.
- Borczuk, A.C., Salvatore, S.P., Seshan, S.V., Patel, S.S., Bussel, J.B., Mostyka, M., 2020. COVID-19 pulmonary pathology: a multi-institutional autopsy cohort from Italy and New York City. *Modern Pathology.* 33, 2156–2168. <https://doi.org/10.1038/s41379-020-00661-1>
- Burhan, E., Dwi Susanto, A., Isbaniah, F., Aman Nasution, S., Ginanjar, E., *et al.* 2022. Pedoman tatalaksana covid-19 Edisi 4. Perhimpunan Dokter Paru Indonesia (PDPI) Perhimpunan Dokter Spesialis Kardiovaskular Indonesia (PERKI) Perhimpunan Dokter Spesialis Penyakit Dalam Indonesia (PAPDI) Perhimpunan Dokter Anestesiologi dan Terapi Intensif Indonesia (PERDATIN) Ikatan Dokter Anak Indonesia (IDAI). Jakarta

- Bhatti J.M., Raza S.A., Shahid M.O., Akhtar A., Ahmed T., Das B. Association between glyceimic control and the outcome in hospitalized patients with COVID-19. *Endocrine*. 2022;77:213–220. doi: 10.1007/s12020-022-03078-9.
- Cabral, L., Afreixo, V., Meireles, R., Vaz, M., Marques, M., Tourais, I., Chaves, C., 2018. Procalcitonin kinetics after burn injury and burn surgery in septic and non-septic patients – a retrospective observational study. *BMC Anesthesiol*. 18, 122. <https://doi.org/10.1186/s12871-018-0585-6>
- Cevik, M., Kuppalli, K., Kindrachuk, J., Peiris, M., 2020. Virology, transmission, and pathogenesis of SARS-CoV-2. *The BMJ*, 3862. <https://doi.org/10.1136/bmj.m3862>
- Chen, L., Wu, X., Qin, H., Zhu, H., 2021. The PCT to Albumin Ratio Predicts Mortality in Patients With Acute Kidney Injury Caused by Abdominal Infection - Evoked Sepsis. *Frontiers in Nutrition*., 8. <https://doi.org/10.3389/fnut.2021.584461>
- Chen, N., Zhou, M., Dong, X., Qu, J., Gong, F., Han, Y., *et al.* (2020). *Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study*. *Lancet* (London, England), 395(10223), 507–513. [https://doi.org/10.1016/S0140-6736\(20\)30211-7](https://doi.org/10.1016/S0140-6736(20)30211-7).
- Chidambaram, V., Tun, N.L., Haque, W.Z., Majella, M.G., Sivakumar, R.K., Kumar, A., *et al.* 2020. Factors associated with disease severity and mortality among patients with COVID-19: A systematic review and meta-analysis. *PLoS ONE*. 15, e0241541. <https://doi.org/10.1371/journal.pone.0241541>
- Chu, D.K., Akl, E.A., Duda, S., Solo, K., Yaacoub, S., Schünemann, H.J., Chu, D.K., 2020. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *The Lancet*. 395, 1973–1987. [https://doi.org/10.1016/S0140-6736\(20\)31142-9](https://doi.org/10.1016/S0140-6736(20)31142-9)
- COVID-ICU Group on behalf of the REVA Network and the COVID-ICU Investigators, ‘Clinical characteristics and day-90 outcomes of 4244 critically ill adults with COVID-19: a prospective cohort study’ *Intensive Care Med*, 2021 Jan;47(1):60-73.

- Dahlan, M. S. (2018). Statistik untuk kedokteran dan kesehatan. Cetakan ke-7. Jakarta: Epidemiologi Indonesia
- Damar Çakırca, T., Çakırca, G., Torun, A., Bindal, A., Üstünel, M., Kaya, A., 2023. Comparing the predictive values of procalcitonin/albumin ratio and other inflammatory markers in determining COVID-19 severity. *Pak J Med Sci.* 39. <https://doi.org/10.12669/pjms.39.2.6856>
- D'Elia L, Giaquinto A, Zarrella AF, Rendina D, Iaccarino Idelson P, Strazzullo P, Galletti F. Hypertension and mortality in SARS-COV-2 infection: A meta-analysis of observational studies after 2 years of pandemic. *Eur J Intern Med.* 2023 Feb;108:28-36. doi: 10.1016/j.ejim.2022.11.018. Epub 2022 Nov 17. PMID: 36411156; PMCID: PMC9671636.
- Deng, S., Gao, J., Zhao, Z., Tian, M., Li, Y., Gong, Y., 2019. Albumin/Procalcitonin Ratio Is a Sensitive Early Marker of Nosocomial Blood Stream Infection in Patients with Intra-Cerebral Hemorrhage. *Surg Infect (Larchmt).* 20, 643–649. <https://doi.org/10.1089/sur.2018.260>
- Dharaniyadewi, D., Chen, L.K., Suwanto, S., 2017. Peran Procalcitonin sebagai Penanda Inflamasi Sistemik pada Sepsis. *Jurnal Penyakit Dalam Indonesia.* 2, 116. <https://doi.org/10.7454/jpdi.v2i2.74>
- Dongelmans, D.A., Termorshuizen, F., Brinkman, S. *et al* 2022, ‘Characteristics and outcome of COVID-19 patients admitted to the ICU: a nationwide cohort study on the comparison between the first and the consecutive upsurges of the second wave of the COVID-19 pandemic in the Netherland’ *Ann. Intensive Care* **12**, 5 (2022), <https://doi.org/10.1186/s13613-021-00978-3>
- Emami, A., Javanmardi, F., Pirbonyeh, N., Akbari, A., 2020. Prevalence of Underlying Diseases in Hospitalized Patients with COVID-19: a Systematic Review and Meta-Analysis. *Arch Acad Emerg Med* 8, e35.
- Ergenç, H., Ergenç, Z., Koray Öztürk, C., Gozdas, H.T., Ocak, Ö.K., İnce, Ö., 2022. Histopathological distribution of thyroid cancers: A retrospective analysis of 570 patients View project Procalcitonin/Albumin Ratio as a Novel Biomarker for Predicting Mortality in COVID-19. *Journal of Pioneering Medical Sciences.* 3. 78.

- Fasano, M., Curry, S., Terreno, E., Galliano, M., Fanali, G., Narciso, P., Notari, S., Ascenzi, P., 2005. The extraordinary ligand binding properties of human serum albumin. *International Union of Biochemistry and Molecular Biology: Life*. 57, 787–796. <https://doi.org/10.1080/15216540500404093>
- Fu, L., Wang, B., Yuan, T., Chen, X., Ao, Y., Fitzpatrick, T., Li, P., Zhou, Y., 2020. Clinical characteristics of coronavirus disease 2019 (COVID-19) in China: A systematic review and meta-analysis. *Journal of Infection*. 80, 656–665. <https://doi.org/10.1016/j.jinf.2020.03.041>
- Gao C, Cai Y, Zhang K, Zhou L, Zhang Y, Zhang X, et al. Association of hypertension and antihypertensive treatment with COVID-19 mortality: a retrospective observational study. *Eur Heart J*. 2020;41(22):2058–2066. doi: 10.1093/eurheartj/ehaa433
- Guo, J., Wang, S., Xia, H., Shi, D., Chen, Yu, Zheng, S., Chen, Yanfei, Gao, H., 2021. Cytokine Signature Associated With Disease Severity in COVID-19. *Front. Immunol*. 12, 681516. <https://doi.org/10.3389/fimmu.2021.681516>
- Guo, S.Y., Zhou, Y., Hu, Q.F., Yao, J., Wang, H., 2015. Procalcitonin is a marker of gram-negative bacteremia in patients with sepsis. *American Journal of the Medical Sciences*. 349, 499–504. <https://doi.org/10.1097/MAJ.0000000477>
- He, Y., Li, W., Wang Z., Chen, H., Tian, L., Liu, D. (2020). *Nosocomial infection among patients with COVID-19: a retrospective data analysis of 918 cases from a single center in Wuhan, China. Infect Control Hosp Epidemiol*. 2020;41:982-983.
- Higashikawa, T., Okuro, M., Ishigami, K., Mae, K., Sangen, R., Mizuno, T., Usuda, D., 2018. Procalcitonin and albumin as prognostic biomarkers in elderly patients with a risk of bacterial infection. *Journal of International Medical Research*. 46, 2606–2614. <https://doi.org/10.1177/0300060518766640>
- Hoodbhoy, Z., Jafri, L., Ahmed, S., 2021. Prognostic Value of Serum Procalcitonin in COVID-19 Patients: A Systematic Review. *Indian Journal of Critical Care Medicine*. 25, 77–84. <https://doi.org/10.5005/jp-journals-10071-23706>

- Hu, B., Guo, H., Zhou, P., Shi, Z.-L., 2021. Characteristics of SARS-CoV-2 and COVID-19. *Nat Rev Microbiol.* 19, 141–154. <https://doi.org/10.1038/s41579-020-00459-7>
- Huang, J., Cheng, A., Kumar, R., Fang, Y., Chen, G., Zhu, Y., Lin, S., 2020. Hypoalbuminemia predicts the outcome of COVID-19 independent of age and co-morbidity. *J Med Virol* 92, 2152–2158. <https://doi.org/10.1002/jmv.26003>
- Huertas, A., Montani, D., Savale, L., Pichon, J., Tu, L., Parent, F., Guignabert, C., Humbert, M., 2020. Endothelial cell dysfunction: a major player in SARS-CoV-2 infection (COVID-19)? *Eur Respir J.* 56, 2001634. <https://doi.org/10.1183/13993003.01634-2020>
- Jackson, I., Jaradeh, H., Aurit, S., Aldamen, A., Narechania, S., Destache, C., Velagapudi, M., 2022. Role of procalcitonin as a predictor of clinical outcomes in hospitalized patients with COVID-19. *International Journal of Infectious Diseases.* 119, 47–52. <https://doi.org/10.1016/j.ijid.2022.03.044>
- Ji, W., Wang, W., Zhao, X., Zai, J., Li, X., 2020. Cross-species transmission of the newly identified coronavirus 2019-nCoV. *J Med Virol.* 92, 433–440. <https://doi.org/10.1002/jmv.25682>
- Kheir, M., Saleem, F., Wang, C., Mann, A., Chua, J., 2021. Higher albumin levels on admission predict better prognosis in patients with confirmed COVID-19. *PLoS ONE.* 16. <https://doi.org/10.1371/journal.pone.0248358>
- Lee, H., 2013. Procalcitonin as a biomarker of infectious diseases. *Korean J Intern Med.* 28, 285. <https://doi.org/10.3904/kjim.2013.28.3.285>
- Li, X., Geng, M., Peng, Y., Meng, L., Lu, S., 2020. Molecular immune pathogenesis and diagnosis of COVID-19. *Journal of Pharmaceutical Analysis.* 10, 102–108. <https://doi.org/10.1016/j.jpha.2020.03.001>
- Lippi, G., Plebani, M., 2020. Procalcitonin in patients with severe coronavirus disease 2019 (COVID-19): A meta-analysis. *Clinica Chimica Acta.* 505, 190–191. <https://doi.org/10.1016/j.cca.2020.03.004>

- Martines, R.B., Ritter, J.M., Matkovic, E., Gary, J., Bollweg, B.C., Bullock, H., 2020. Pathology and Pathogenesis of SARS-CoV-2 Associated with Fatal Coronavirus Disease, United States. *Emerg. Infect. Dis.* 26, 2005–2015. <https://doi.org/10.3201/eid2609.202095>
- Mandrekar, J. (2010). Receiver Operating Characteristic Curve in Diagnostic Test Assesment. *Elsevier: Journal of Thoracic Oncology*. doi: 10.1097/JTO.0b013e3181ec173d
- Meisner, M., Lohs, T., Huettemann, E., Schmidt, J., 2001. The plasma elimination rate and urinary secretion of procalcitonin in patients with normal and impaired renal function. *European Journal of Anaesthesiology*. 3,67
- Nargis, W., Ahamed, B., Ibrahim, M., 2014. Procalcitonin versus C-reactive protein: Usefulness as biomarker of sepsis in ICU patient. *International Journal of Critical Illness and Injury Science*. 4, 195. <https://doi.org/10.4103/2229-5151.141356>
- Nguyen, N.T., Chinn, J., De Ferrante, M., Kirby, K.A., Hohmann, S.F., Amin, A., 2021. Male gender is a predictor of higher mortality in hospitalized adults with COVID-19. *PLoS ONE*. 16, e0254066. <https://doi.org/10.1371/journal.pone.0254066>
- Pérez-Belmonte L.M., Torres-Peña J.D., López-Carmona M.D., Ayala-Gutiérrez M.M., Fuentes-Jiménez F., Huerta L.J., Muñoz J.A., Rubio-Rivas M., Madrazo M., Garcia M.G., et al. Mortality and other adverse outcomes in patients with type 2 diabetes mellitus admitted for COVID-19 in association with glucose-lowering drugs: A nationwide cohort study. *BMC Med*. 2020;18:359. doi: 10.1186/s12916-020-01832-2.
- Petrilli, C.M., Jones, S.A., Yang, J., Rajagopalan, H., O'Donnell, L., Chernyak, Y., Tobin, K.A., Cerfolio, R.J., Francois, F., Horwitz, L.I., 2020. Factors associated with hospital admission and critical illness among 5279 people with coronavirus disease 2019 in New York City: prospective cohort study. *BMJ*. m1966. <https://doi.org/10.1136/bmj.m1966>
- Shen, Y., Cheng, C., Zheng, X., Jin, Y., Duan, G., Chen, M., Chen, S., 2021. Elevated Procalcitonin Is Positively Associated with the Severity of COVID-

19: A Meta-Analysis Based on 10 Cohort Studies. *Medicina*. 57, 594. <https://doi.org/10.3390/medicina57060594>

Shereen, M.A., Khan, S., Kazmi, A., Bashir, N., Siddique, R., 2020. COVID-19 infection: Emergence, transmission, and characteristics of human coronaviruses. *Journal of Advanced Research*. 24, 91–98. <https://doi.org/10.1016/j.jare.2020.03.005>

Sheppard JP, Nicholson BD, Lee J, McGagh D, Sherlock J, Koshiaris C, Oke J, Jones NR, Hinton W, Armitage L, Van Hecke O, Joy MP, de Lusignan S, Hobbs FDR. Association Between Blood Pressure Control and Coronavirus Disease 2019 Outcomes in 45 418 Symptomatic Patients With Hypertension: An Observational Cohort Study. *Hypertension*. 2021 Mar 3;77(3):846-855. doi: 10.1161/Hypertensionaha.120.16472. Epub 2020 Dec 16. PMID: 33325240; PMCID: PMC7884248.

Soetedjo, N.N.M., Iryaningrum, M.R., Damara, F.A., Permadhi, I., Sutanto, L.B., Hartono, H., Rasyid, H., 2021. Prognostic properties of hypoalbuminemia in COVID-19 patients: A systematic review and diagnostic meta-analysis. *Clinical Nutrition ESPEN*. 45, 120–126. <https://doi.org/10.1016/j.clnesp.2021.07.003>

Soeters, P.B., Wolfe, R.R., Shenkin, A., 2019. Hypoalbuminemia: Pathogenesis and Clinical Significance. *Journal of Parenteral and Enteral Nutrition*. 43, 181–193. <https://doi.org/10.1002/jpen.1451>

Schuetz, P., Albrich, W., Mueller, B. (2011). *Procalcitonin for diagnosis of infection and guide to antibiotic decisions: past, present and future*. *BMC medicine*; 9:107.

Surendra, H., Elyazar, I.R., Djaafara, B.A., Ekawati, L.L., Saraswati, K., Adrian, V., et al., 2021. Clinical characteristics and mortality associated with COVID - 19 in Jakarta, Indonesia: A hospital-based retrospective cohort study. *The Lancet Regional Health Western Pacific*. 9, 100108. <https://doi.org/10.1016/j.lanwpc.2021.100108>

Susilo, A., Rumende, C.M., Pitoyo, C.W., Santoso, W.D., Yulianti, M., Herikurniawan, H., et al., 2020. Coronavirus Disease 2019: Tinjauan Literatur Terkini. *JPDI*. 7, 45. <https://doi.org/10.7454/jpdi.v7i1.415>

- Tian, H., Liu, Y., Li, Y., Wu, C.-H., Chen, B., Kraemer, M.U.G., Li, B., Cai, J., Xu, B., Yang, Q., Wang, B., Yang, P., Cui, Y., Song, Y., Zheng, P., Wang, Q., Bjornstad, O.N., Yang, R., Grenfell, B.T., Pybus, O.G., Dye, C., 2020. An investigation of transmission control measures during the first 50 days of the COVID-19 epidemic in China. *Science*. 368, 638–642. <https://doi.org/10.1126/science.abb6105>
- Tong-Minh, K., van der Does, Y., Engelen, S., de Jong, E., Ramakers, C., Gommers, D., van Gorp, E., Endeman, H., 2022. High procalcitonin levels associated with increased intensive care unit admission and mortality in patients with a COVID-19 infection in the emergency department. *BMC Infectious Diseases* 22. <https://doi.org/10.1186/s12879-022-07144-5>
- Vekaria B, Overton C, Wiśniowski A, Ahmad S, Aparicio-Castro A, Curran-Sebastian J, Eddleston J, Hanley NA, House T, Kim J, Olsen W, Pampaka M, Pellis L, Ruiz DP, Schofield J, Shryane N, Elliot MJ. Hospital length of stay for COVID-19 patients: Data-driven methods for forward planning. *BMC Infect Dis*. 2021 Jul 22;21(1):700. doi: 10.1186/s12879-021-06371-6. PMID: 34294037; PMCID: PMC8295642.
- Viox EG, Bosinger SE, Douek DC, Schreiber G, Paiardini M. 2024. Harnessing the power of IFN for therapeutic approaches to COVID-19. *J Virol* 98:e01204-23. <https://doi.org/10.1128/jvi.01204-23>
- Wang, L., He, W., Yu, X., Hu, D., Bao, M., Liu, H., Zhou, J., & Jiang, H. (2020). *Coronavirus disease 2019 in elderly patients: Characteristics and prognostic factors based on 4-week follow-up*. *Journal of Infection*, pii: S0163-4453(20)30146-8. <https://doi.org/10.1016/j.jinf.2020.03.019>.
- Wang, R., Pan, M., Zhang, X., Han, M., Fan, X., Zhao, F., Miao, M., Xu, J., Guan, M., Deng, X., Chen, X., Shen, L., 2020. Epidemiological and clinical features of 125 Hospitalized Patients with COVID-19 in Fuyang, Anhui, China. *International Journal of Infectious Diseases*. 95, 421–428. <https://doi.org/10.1016/j.ijid.2020.03.070>

- Whicher, J., Bienvenu, J., Monneret, G. (2021). *Procalcitonin as an acute phase marker*. *Ann Clin Biochem* ;38(Pt 5):483-93.
- Wiersinga, W.J., Rhodes, A., Cheng, A.C., Peacock, S.J., Prescott, H.C., 2020. Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review. *JAMA*. 324, 782–793. <https://doi.org/10.1001/jama.2020.12839>
- Xia, J., Tong, J., Liu, M., Shen, Y., Guo, D., 2020. Evaluation of coronavirus in tears and conjunctival secretions of patients with SARS- CoV- 2 infection. *J Med Virol* . 92, 589–594. <https://doi.org/10.1002/jmv.25725>
- Xiong, T.-Y., Redwood, S., Prendergast, B., Chen, M., 2020. Coronaviruses and the cardiovascular system: acute and long-term implications. *European Heart Journal*. 41, 1798–1800. <https://doi.org/10.1093/eurheartj/ehaa231>
- Xu, M., Wang, D., Wang, H., Zhang, X., Liang, T., Dai, J., Li, M., Zhang, J., Zhang, K., Xu, D., Yu, X., 2020. COVID- 19 diagnostic testing: Technology perspective. *Clinical and Translational Medicine*. 10. <https://doi.org/10.1002/ctm2.158>
- Yan Y, Yang Y, Wang F, Ren H, Zhang S, Shi X, et al. Clinical characteristics and outcomes of patients with severe covid-19 with diabetes. *BMJ Open Diabetes Res Care*. 2020;8(1):e001343.<https://doi.org/10.1136/bmjdr-2020-001343>
- Zhang, J., Wang, X., Jia, X., Li, J., Hu, K., Chen, G., Wei, J., Gong, Z., Zhou, C., Yu, H., Yu, M., Lei, H., Cheng, F., Zhang, B., Xu, Y., Wang, G., Dong, W., 2020. Risk factors for disease severity, unimprovement, and mortality in COVID-19 patients in Wuhan, China. *Clinical Microbiology and Infection*. 26, 767–772. <https://doi.org/10.1016/j.cmi.2020.04.012>
- Zhou, M., Zhang, X., Qu, J., 2020. Coronavirus disease 2019 (COVID-19): a clinical update. *Front. Med*. 14, 126–135. <https://doi.org/10.1007/s11684-020-0767-8>
- Zhou, Ying., Zhen, Y., Guo, Y., Geng, S., Gao, S., Ye, S., et al. (2020). A New Predictor of Disease Severity in Patients with COVID-19 in Wuhan, China. Pre print from medRxiv doi: <https://doi.org/10.1101/2020.03.24.20042119>.