

Core Curriculum for the Dialysis Technician, 7th Edition

References (2024)

Module 1 The Dialysis Environment

- 1 Lin MY, Liu MF, Hsu LF, Tsai PS. Effects of self-management on chronic kidney disease: a meta-analysis. *Int J Nurs Stud.* 2017;74:128-137
- 2 Taylor DM, Fraser S, Dudley C, Oniscu GC, Tomson C, Ravanant R, Roderick P; ATOM investigators. Health literacy and patient outcomes in chronic kidney disease: a systematic review. *Nephrol Dial Transplant.* 2018 Sep 1;33(9):1545-1558
- 3 Gomez NJ (Ed). *Nephrology nursing scope and standards of practice*, 9th ed. American Nephrology Nurses Association. Pitman, NJ. 2022
- 4 United States Renal Data System. *2023 USRDS Annual Data Report: Epidemiology of kidney disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Volume 2, Table D1). Available at www.usrds.org/reference.aspx. Accessed May 2023
- 5 Mathew A, McLeggon JA, Mehta N, Leung S, Barta V, McGinn T, Nesrallah G. Mortality and hospitalizations in intensive dialysis: a systematic review and meta-analysis. *Can J Kidney Health Dis.* 2018 Jan 10;5:2054358117749531
- 6 United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of kidney disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Volume 2, Table D.11). Available at www.usrds.org/reference.aspx. Accessed May 2023
- 7 Centers for Medicare and Medicaid Services. *Conditions for Coverage for End-Stage Renal Disease Facilities: Final Rule*, 73 Federal Register 73 (15 April 2008), p. 20484. Available at www.cms.gov/Regulations-and-Guidance/Legislation/CFCsAndCoPs/downloads/esrdfinalrule0415.pdf. Accessed March 2024
- 8 Centers for Disease Control and Prevention. Using a health equity lens. Aug. 2, 2022. https://www.cdc.gov/healthcommunication/Health_Equity_Lens.html. Visited March 2024
- 9 Blagg CR. The early history of dialysis for chronic renal failure in the United States: a view from Seattle. *Am J Kidney Dis.* 2007;49(3):482-96
- 10 Quality Certification and Oversight Reports. Dialysis Facility (ESRD) Provider Reports. https://qcor.cms.gov/report_select.jsp?which=7. Visited May 2023
- 11 Alexander S. They decide who lives, who dies. *Life*. November 9, 1962. Reprinted by the NephJC blog, August 5. 2019. <http://www.nephjc.com/news/godpanel>. Visited May 2023
- 12 United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of kidney disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Volume 2, Table B.4). Available at www.usrds.org/reference.aspx. Accessed May 2023

- 13 Medicare Rights Medicare Interactive. How to enroll in Medicare if you have ALS. <https://www.medicareinteractive.org/get-answers/medicare-health-coverage-options/original-medicare-enrollment/how-to-enroll-in-medicare-if-you-have-als>. Visited May 2023
- 14 Lockridge RS Jr. The direction of end-stage renal disease reimbursement in the United States. *Semin Dial.* 2004 Mar-Apr;17(2):125-30
- 15 Centers for Medicare & Medicaid Services. End stage renal disease (ESRD) Prospective Payment System (PPS). <https://www.cms.gov/medicare/medicare-fee-for-service-payment/esrdpayment>. Visited May 2023
- 16 Centers for Medicare & Medicaid Services. ESRD Treatment Choices (ETC) Model. <https://innovation.cms.gov/innovation-models/esrd-treatment-choices-model>. Visited May 2023
- 17 Centers for Disease Control and Prevention. What is health equity? Dec. 16, 2022. <https://www.cdc.gov/nchhstp/healthequity/index.html#print>. Visited May 2023
- 18 Walker CS, Gadegbeku CA. Addressing kidney health disparities with new national policy: the time is now. *Cardiovasc Diagn Ther.* 2023 Feb 28;13(1):115-121
- 19 The White House. Executive order 13985: On advancing racial equity and support for underserved communities through the federal government. 2021. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/>. Visited May 2023
- 20 World Health Organization. Social determinants of health. https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1. Visited May 2023
- 21 Centers for Medicare & Medicaid Services. National health spending in 2020 increases due to impact of COVID-19 pandemic. Press release, Dec 15, 2021. <https://www.cms.gov/newsroom/press-releases/national-health-spending-2020-increases-due-impact-covid-19-pandemic#>. Visited May 2023
- 22 United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of kidney disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Volume 2, Table K.1). Available at www.usrds.org/reference.aspx. Accessed May 2023
- 23 Medicare.gov. Find & compare providers near you. https://www.medicare.gov/care-compare/?utm_source=google&utm_medium=paid_search&utm_campaign=pn-cmsccc2023-gm&utm_term=trafficdriving&utm_content=pn-021323_dialysis-45-rsa1&s_kwcid=AL!18036!3!649055196232!b!!g!!medicare%20and%20dialysis&gclid=CjwKCAjw04yjBhApEiwAJcvNoQx6UGsY--BTYZlKXkew2OKZg6htyrT_yqdEFlHH6C-NzfrshLvy7BoCCxUQAvD_BwE&providerType=DialysisFacility. Visited March 2024
- 24 ESRD National Coordinating Center. Fistula First Catheter Last. <https://esrdncc.org/en/professionals/change-packages/>. Visited March 2024
- 25 In-center Hemodialysis CAHPS Survey. <https://ichcahps.org>. Visited May 2023
- 26 End Stage Renal Disease Quality Reporting System (EQRS). <https://eqrs.cms.gov>. Visited May 2023
- 27 Centers for Medicare & Medicaid Services. ESRD Quality Incentive Program.

- <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/ESRDQIP>. Visited May 2023
- 28 Vlcek DS, Burrows-Hudson S, Pressly NA. *Quality assurance guidelines for hemodialysis devices*. HHS Publication FDA 91-4161. Washington, DC, Health and Human Services, 1991, pp. 1-3 and 13-4 – 13-6. U.S. Food and Drug Administration. <https://www.fda.gov/files/medical%20devices/published/Quality-Assurance-Guidelines-for-Hemodialysis-Devices.pdf>. Visited May 2023
- 29 Centers for Medicare & Medicaid Services. ESRD Surveyor Laminates: Measures Assessment Tool (MAT). Version 2.5 Available at: <https://www.cms.gov/medicare/health-safety-standards/guidance-for-laws-regulations/dialysis>. Visited March 2024
- 30 Centers for Disease Control and Prevention. *Health disparities*. Jan. 31, 2017. <https://www.cdc.gov/aging/disparities/index.htm#:~:text=Health%20disparities%20are%20preventable%20differences,age%20groups%2C%20including%20older%20adults>. Visited March 2024
- 31 U.S. Department of Health and Human Services. *Summary of the HIPAA privacy rule*. <https://www.hhs.gov/hipaa/for-professionals/privacy/laws-regulations/index.html>. Visited May 2023

Module 2 Kidneys & Kidney Failure

1. Bertram JF, Douglas-Denton RN, Diouf B, Hughson MD, Hay WE. Human nephron number: implications for health and disease. *Pediatr Nephrol*. 2011 Sep;26(9):1529-33
2. Red Cross. How much blood is in the human body?
<https://www.redcrossblood.org/donate-blood/dlp/whole-blood.html#:~:text=adult%20will%20have%20approximately%201.2,10%25%20of%20an%20adult%27s%20weight>. Visited June 2023
3. Inker LA, Eneanya ND, Coresh J, Tighiouart H, Wang D, Sang Y, Crews DC, Doria A, Estrella MM, Froissart M, Grams ME, Greene T, Grubb A, Gudnason V, Gutiérrez OM, Kalil R, Karger AB, Mauer M, Navis G, Nelson RG, Poggio ED, Rodby R, Rossing P, Rule AD, Selvin E, Seegmiller JC, Shlipak MG, Torres VE, Yang W, Ballew SH, Couture SJ, Powe NR, Levey AS; Chronic Kidney Disease Epidemiology Collaboration. New creatinine- and cystatin c-based equations to estimate GFR without race. *N Engl J Med*. 2021 Nov 4;385(19):1737-1749
4. Schoener B, Borger J. Erythropoietin Stimulating Agents. [Updated 2023 Mar 11]. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK536997/>. Visited July 2023
5. Shrimanker I, Bhattacharai S. Electrolytes. [Updated 2023 Jul 24]. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK541123/#>. Visited June 2023
6. American Heart Association. Understanding blood pressure readings.
<https://www.heart.org/en/health-topics/high-blood-pressure/understanding-blood-pressure-readings>. Visited May 2024
7. Goyal A, Daneshpajouhnejad P, Hashmi MF, Bashir K. Acute kidney injury. [Updated 2023 Nov 25]. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK441896/>. Visited June 2023
8. Głowacka M, Lipka S, Młynarska E, Franczyk B, Rysz J. Acute kidney injury in COVID-19. *Int J Mol Sci*. 2021 Jul 28;22(15):8081
9. Singh M, Karakala N, Shah SV. Long-term adverse events associated with acute kidney injury. *J Ren Nutr*. 2017 Nov;27(6):462-464
10. Tattersall J, Dekker F, Heimbürger O, Jager KJ, Lameire N, Lindley E, Van Biesen W, Vanholder R, Zoccali C; ERBP Advisory Board. When to start dialysis: updated guidance following publication of the Initiating Dialysis Early and Late (IDEAL) study. *Nephrol Dial Transplant*. 2011 Jul;26(7):2082-6
11. Vassalotti JA, Centor R, Turner BJ, Greer RC, Choi M, Sequist TD; National Kidney Foundation Kidney Disease Outcomes Quality Initiative. Practical approach to detection and management of chronic kidney disease for the primary care clinician. *Am J Med*. 2016 Feb;129(2):153-162.e7
12. Centers for Disease Control and Prevention. Chronic kidney disease basics. Feb.

2022. <https://www.cdc.gov/kidneydisease/basics.html>. Visited June 2023
13. Centers for Disease Control and Prevention. What is diabetes? April 2023. <https://www.cdc.gov/diabetes/basics/diabetes.html>. Visited June 2023
14. SingleCare. Diabetes statistics 2023. Feb. 3, 2023. <https://www.singlecare.com/blog/news/diabetes-statistics/>. Visited June 2023
15. American Diabetes Association. Statistics about diabetes. April 2018. <https://diabetes.org/about-us/statistics/about-diabetes>. Visited June 2023
16. Bancks MP, Kershaw K, Carson AP, Gordon-Larsen P, Schreiner PJ, Carnethon MR. Association of modifiable risk factors in young adulthood with racial disparity in incident type 2 diabetes during middle adulthood. *JAMA*. 2017 Dec 26;318(24):2457-2465
17. Khan TA, Field D, Chen V, Ahmad S, Mejia SB, Kahleová H, Rahelić D, Salas-Salvadó J, Leiter LA, Uusitupa M, Kendall CWC, Sievenpiper JL. Combination of multiple low-risk lifestyle behaviors and incident type 2 diabetes: a systematic review and dose-response meta-analysis of prospective cohort studies. *Diabetes Care*. 2023 Mar 1;46(3):643-656
18. Burrows NR, Koyama A, Pavkov ME. Reported cases of end-stage kidney disease—United States, 2000-2019. *MMWR Morb Mortal Wkly Rep*. 2022 Mar 18;71(11):412-415
19. Alexander MR. Hypertension. *Medscape*. Nov 9, 2022. <https://emedicine.medscape.com/article/241381-overview>. Visited June 2023
20. Brown AGM, Houser RF, Mattei J, Mozaffarian D, Lichtenstein AH, Folta SC. Hypertension among US-born and foreign-born non-Hispanic Blacks: national health and nutrition examination survey 2003-2014 data. *J Hypertens*. 2017 Dec;35(12):2380-2387
21. Fuchs FD. Why do black Americans have higher prevalence of hypertension?: an enigma still unsolved. *Hypertension*. 2011 Mar;57(3):379-80
22. United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of Kidney Disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Reference Tables, Volume 2, Table A.7). Available at <https://www.usrds.org/reference.aspx>. Accessed February 2023
23. Tyagi A, Aeddula NR. Azotemia. *StatPearls*. National Institutes of Health. May 2023. <https://www.ncbi.nlm.nih.gov/books/NBK538145/>. Visited June 2023
24. Lynch F, Masani N. The kidney in health and disease: Assessment of kidney structure and function. In C.S. Counts (Ed.), *Core Curriculum for Nephrology Nursing: Module 2. Physiologic and psychosocial basis for nephrology nursing practice* (7th ed., 2020. pp. 151-286). Pitman, NJ: American Nephrology Nurses' Association
25. Stevens LA, Coresh J, Greene T, Levey AS. Assessing kidney function—measured and estimated glomerular filtration rate. *N Engl J Med*. 2006 Jun 8;354(23):2473-83
26. Agar John. Personal email received by Dori Schatell, September 16, 2016
27. Rostoker G, Vaziri ND. Risk of iron overload with chronic indiscriminate use of intravenous iron products in ESRD and IBD populations. *Heliyon*. 2019 Jul

12;5(7):e02045

28. Lo JO, Bensen AE, Martens KL, Hedges MA, McMurry HS, DeLoughery T, Aslan JE, Shatzel JJ. The role of oral iron in the treatment of adults with iron deficiency. *Eur J Haematol.* 2023 Feb;110(2):123-130
29. Zhang S, Ouyang M, Liu L. The treatment effects and cardiovascular events of high-dose intravenous iron for hemodialysis patients with renal anemia: a systematic review and meta-analysis. *Chronic Illn.* 2023 Jun 7;17423953231180453
30. Salim SA, Cheungpasitporn W, Elmaraezy A, Jawafi O, Rahman M, Aeddula NR, Tirupathi R, Fülöp T. Infectious complications and mortality associated with the use of IV iron therapy: a systematic review and meta-analysis. *Int Urol Nephrol.* 2019 Oct;51(10):1855-1865
31. Chait Y, Nathanson BH, Germain MJ. Individualized anemia management enhanced by ferric pyrophosphate citrate protocol. *Sci Rep.* 2022 Nov 22;12(1):20122
32. Shaikh H, Hashmi MF, Aeddula NR. Anemia of chronic renal disease. *Statpearls.* National Institutes of Health. <https://www.ncbi.nlm.nih.gov/books/NBK539871/> visited June 2023
33. Hirota K. HIF- α Prolyl Hydroxylase inhibitors and their implications for biomedicine: a comprehensive review. *Biomedicines.* 2021 Apr 24;9(5):468
34. FDA news release. FDA approves first oral treatment for anemia caused by chronic kidney disease for adults on dialysis. Feb 1, 2023. <https://www.fda.gov/news-events/press-announcements/fda-approves-first-oral-treatment-anemia-caused-chronic-kidney-disease-adults-dialysis>. Visited June 2023
35. Borawski B, Malyszko JS, Kwiatkowska M, Malyszko J. Current Status of Renal Anemia Pharmacotherapy-What Can We Offer Today. *J Clin Med.* 2021 Sep 15;10(18):4149
36. Pavlikova B, van Dijk JP. Jehovah's Witnesses and Their Compliance with Regulations on Smoking and Blood Treatment. *Int J Environ Res Public Health.* 2021 Dec 30;19(1):387
37. Goltzman D. Clinical manifestations of hypocalcemia. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/clinical-manifestations-of-hypocalcemia>. Visited July 2023
38. Shane E. Clinical manifestations of hypercalcemia. *UpToDate.* May 2023. <https://www.uptodate.com/contents/clinical-manifestations-of-hypercalcemia>. Visited July 2023
39. Xiong J, He T, Wang M, Nie L, Zhang Y, Wang Y, Huang Y, Feng B, Zhang J, Zhao J. Serum magnesium, mortality, and cardiovascular disease in chronic kidney disease and end-stage renal disease patients: a systematic review and meta-analysis. *J Nephrol.* 2019 Oct;32(5):791-802
40. Sakaguchi Y. The emerging role of magnesium in CKD. *Clin Exp Nephrol.* 2022 May;26(5):379-384
41. Yu ASL, Stubbs JR. Hypophosphatemia: clinical manifestations of phosphate depletion. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/hypophosphatemia-clinical-manifestations-of-phosphate-depletion>. Visited July 2023

42. Qunibi WY. Overview of chronic kidney disease-mineral and bone disorder (CKD-MBD). In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/overview-of-chronic-kidney-disease-mineral-and-bone-disorder-ckd-mbd>. Visited July 2023
43. Bansal S, Pergola PE. Current management of hyperkalemia in patients on dialysis. *Kidney Int Rep.* 2020 Feb 26;5(6):779-789
44. Berend K, van Hulsteijn LH, Gans RO. Chloride: the queen of electrolytes? *Eur J Intern Med.* 2012 Apr;23(3):203-11
45. Sharma S, Hashmi MF, Aggarwal S. Hyperchlloremic acidosis. *StatPearls.* National Institutes of Health. May, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK482340/>. Visited June 2023
46. Burger M, Schaller DJ. Metabolic acidosis. *Statpearls.* National Institutes of Health. July 19,2022. <https://www.ncbi.nlm.nih.gov/books/NBK482146/>. Visited June 2023
47. Cleveland Clinic. Metabolic acidosis. <https://my.clevelandclinic.org/health/diseases/24492-metabolic-acidosis>. Visited June 2023
48. Hu L, Napoletano A, Provenzano M, Garofalo C, Bini C, Comai G, La Manna G. Mineral Bone Disorders in Kidney Disease Patients: The Ever-Current Topic. *Int J Mol Sci.* 2022 Oct 13;23(20):12223
49. Shah H, Aeddula NR. Renal osteodystrophy. *Statpearls.* National Institutes of Health. Aug 10,2022. <https://www.ncbi.nlm.nih.gov/books/NBK560742/>. Visited June 2023
50. Duarte MP, Ribeiro HS, Neri SGR, Almeida LS, Oliveira JS, Viana JL, Lima RM. Prevalence of low bone mineral density (T-score ≤ -2.5) in the whole spectrum of chronic kidney disease: a systematic review and meta-analysis. *Osteoporos Int.* 2023 Mar;34(3):467-477
51. Wang Z, Jiang A, Wei F, Chen H. Cardiac valve calcification and risk of cardiovascular or all-cause mortality in dialysis patients: a meta-analysis. *BMC Cardiovasc Disord.* 2018 Jan 25;18(1):12
52. Bellasi A, Di Lullo L, Russo D, Ciarcia R, Magnocavallo M, Lavalle C, Ratti C, Fusaro M, Cozzolino M, Di Iorio BR. Predictive Value of Measures of Vascular Calcification Burden and Progression for Risk of Death in Incident to Dialysis Patients. *J Clin Med.* 2021 Jan 20;10(3):376
53. Zhang H, Li G, Yu X, Yang J, Jiang A, Cheng H, Fu J, Liang X, Liu J, Lou J, Wang M, Xing C, Zhang A, Zhang M, Xiao X, Yu C, Wang R, Wang L, Chen Y, Guan T, Peng A, Chen N, Hao C, Liu B, Wang S, Shen D, Jia Z, Liu Z; China Dialysis Calcification Study Group. Progression of Vascular Calcification and Clinical Outcomes in Patients Receiving Maintenance Dialysis. *JAMA Netw Open.* 2023 May 1;6(5):e2310909
54. Wen W, Krinsky S, Kroshinsky D, Durant O, He J, Seethapathy R, Hillien SAS, Mengesha B, Malhotra R, Chitalia V, Nazarian RM, Goverman J, Lyons KS, Nigwekar SU. Patient-Reported and Clinical Outcomes Among Patients With Calciphylaxis. *Mayo Clin Proc Innov Qual Outcomes.* 2023 Jan 24;7(1):81-92
55. Bonilla LA, Dickson-Witmer D, Witmer DR, Kirby W. Calciphylaxis mimicking

- inflammatory breast cancer. *Breast J.* 2007 Sep-Oct;13(5):514-6
56. Jarrett O, Heydari H, Elder Z, Casadesus D. Penile calciphylaxis in a patient with concurrent haemodialysis and Coumadin treatment. *BMJ Case Rep.* 2023 May 2;16(5):e254925
57. Helmeczi W, Pitre T, Hudson E, Mondhe S, Burns K. Isolated Penile Calciphylaxis Diagnosed by Ultrasound Imaging in a New Dialysis Patient: A Case Report. *Can J Kidney Health Dis.* 2021 Jul 26;8:20543581211025846
58. Issar R, Patwa J, Wang Y. Painless Scrotal Ulcers Become Something Unexpected: A Rare Case of Scrotal Calciphylaxis. *Cureus.* 2022 Sep 8;14(9):e28958
59. Zhao SJ, Wang ZX, Chen L, Wang FX, Kong LD. Effect of different phosphate binders on fibroblast growth factor 23 levels in patients with chronic kidney disease: a systematic review and meta-analysis of randomized controlled trials. *Ann Palliat Med.* 2022 Apr;11(4):1264-1277
60. Memon N. How do calcimimetics work? RxList.
<https://www.rxlist.com/calcimimetics/drug-class.htm>. Visited July 2023
61. Wang Y, Ladie DE. Parathyroidectomy. *Statpearls.* National Institutes of Health. Sep 26, 2022. <https://www.ncbi.nlm.nih.gov/books/NBK563274/?report=printable>. Visited July 2023
62. Loureiro RJS, Faísca PFN. The Early Phase of β 2-Microglobulin Aggregation: Perspectives From Molecular Simulations. *Front Mol Biosci.* 2020 Sep 29;7:578433
63. Portales-Castillo I, Yee J, Tanaka H, Fenves AZ. Beta-2 Microglobulin Amyloidosis: Past, Present, and Future. *Kidney360.* 2020 Oct 21;1(12):1447-1455
64. Bornstein AB, Rao SS, Marwaha K. Left ventricular hypertrophy. *Statpearls.* National Institutes of Health. April 30, 2023.
[https://www.ncbi.nlm.nih.gov/books/NBK557534/#:~:text=Left%20ventricular%20hypertrophy%20\(LVH\)%20is,ventricular%20cavity%20enlargement%2C%20or%20both](https://www.ncbi.nlm.nih.gov/books/NBK557534/#:~:text=Left%20ventricular%20hypertrophy%20(LVH)%20is,ventricular%20cavity%20enlargement%2C%20or%20both). Visited July 2023
65. Minciunescu A, Genovese L, deFilippi C. Cardiovascular Alterations and Structural Changes in the Setting of Chronic Kidney Disease: a Review of Cardiorenal Syndrome Type 4. *SN Compr Clin Med.* 2023;5(1):15
66. Chirakarnjanakorn S, Navaneethan SD, Francis GS, Tang WH. Cardiovascular impact in patients undergoing maintenance hemodialysis: Clinical management considerations. *Int J Cardiol.* 2017 Apr 1;232:12-23
67. Guler HS, Tulunay Kaya C, Kumru G, Kosku H, Ozyuncu N, Sengul S, Kutlay S. Acute stunning effect of hemodialysis on myocardial performance: A three-dimensional speckle tracking echocardiographic study. *Artif Organs.* 2020 Oct;44(10):1081-1089
68. American Heart Association. What is “ejection fraction”? June 2023.
<https://www.heart.org/en/health-topics/heart-failure/diagnosing-heart-failure/ejection-fraction-heart-failure-measurement>. Visited June 2023
69. Roehm B, Gulati G, Weiner DE. Heart failure management in dialysis patients: many treatment options with no clear evidence. *Sem Dial.* 2020 May;33(3):198-208
70. Antlanger M, Aschauer S, Kopecky C, Hecking M, Kovarik JJ, Werzowa J, Mascherbauer J, Genser B, Säemann MD, Bonderman D. Heart Failure with Preserved and Reduced Ejection Fraction in Hemodialysis Patients: Prevalence,

- Disease Prediction and Prognosis. *Kidney Blood Press Res.* 2017;42(1):165-176
71. Malik J, Valeranova A, Pesickova SS, Michalickova K, Hladinova Z, Hruskova Z, Bednarova V, Rocinova K, Tothova M, Kratochvilova M, Kaiserova L, Buryskova Salajova K, Lejsek V, Sevcik M, Tesar V. Heart failure with preserved ejection fraction is the most frequent but commonly overlooked phenotype in patients on chronic hemodialysis. *Front Cardiovasc Med.* 2023 Jun 1;10:1130618
72. Imazio M. Acute pericarditis: clinical presentation and diagnosis. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/acute-pericarditis-clinical-presentation-and-diagnosis>. Visited June 2023
73. Camargo CRS, Schoueri JHM, Alves BDCA, Veiga GRLD, Fonseca FLA, Bacci MR. Uremic neuropathy: an overview of the current literature. *Rev Assoc Med Bras (1992)*. 2019 Mar;65(3):469-474
74. Kaminski MR, Raspovic A, McMahon LP, Strippoli GF, Palmer SC, Ruospo M, Dallimore S, Landorf KB. Risk factors for foot ulceration and lower extremity amputation in adults with end-stage renal disease on dialysis: a systematic review and meta-analysis. *Nephrol Dial Transplant.* 2015 Oct;30(10):1747-66
75. Schricker S, Kimmel M. Unravelling the pathophysiology of chronic kidney disease-associated pruritus. *Clin Kidney J.* 2021 Dec 24;14(Suppl 3):i23-i31
76. Sircu V, Colesnic SI, Covantsev S, Corlateanu O, Sukhotko A, Popovici C, Corlateanu A. The Burden of Comorbidities in Obstructive Sleep Apnea and the Pathophysiologic Mechanisms and Effects of CPAP. *Clocks Sleep.* 2023 Jun 19;5(2):333-349
77. Safarpour Y, Vaziri ND, Jabbari B. Restless legs syndrome in chronic kidney disease – a systematic review. *Tremor Other Hyperkinet Mov (N Y).* 2023 Mar 29;13:10
78. Chidiac C, Chelala D, Nassar D, Beaini C, Azar H, Finianos S, Boueri C, Hawi J, Abdo I, Aoun M. Routine laboratory testing in hemodialysis: how frequently is it needed? *BMC Nephrol.* 2022 Oct 27;23(1):344
79. American Board of Internal Medicine, ABIM Laboratory Test Reference Ranges—July 2023. <https://www.abim.org/Media/bfijryql/laboratory-reference-ranges.pdf>
80. KDOQI. KDOQI Clinical Practice Guideline and Clinical Practice Recommendations for anemia in chronic kidney disease: 2007 update of hemoglobin target. *Am J Kidney Dis.* 2007 Sep;50(3):471-530
81. Centers for Medicare & Medicaid Services. ESRD Surveyor Laminates: Dialysis Lab Tests At a Glance. Available at: <https://www.cms.gov/medicare/health-safety-standards/guidance-for-laws-regulations/dialysis>. Visited March 2024
82. Centers for Medicare & Medicaid Services. ESRD Core Survey Field Manual Version 1.9. (2016) Available at <https://www.cms.gov/medicare/health-safety-standards/guidance-for-laws-regulations/dialysis> Visited March 2024
83. Ikizler TA, Burrowes JD, Byham-Gray LD, Campbell KL, Carrero JJ, Chan W, Fouque D, Friedman AN, Ghaddar S, Goldstein-Fuchs DJ, Kaysen GA, Kopple JD, Teta D, Yee-Moon Wang A, Cuppari L. KDOQI Clinical Practice Guideline for Nutrition in CKD: 2020 Update. *Am J Kidney Dis.* 2020 Sep;76(3 Suppl 1):S1-S107
84. National Kidney Foundation. KDOQI clinical practice guideline for hemodialysis adequacy: 2015 update. *Am J Kidney Dis.* 2015 Nov;66(5):884-930

85. Cozzolino M. CKD-MBD KDIGO guidelines: how difficult is reaching the 'target'? *Clin Kidney J.* 2018 Feb;11(1):70-72

Module 3 Treatment Options for Kidney Failure

1. Poggio ED, Augustine JJ, Arrigain S, Brennan DC, Schold JD. Long-term kidney transplant graft survival—making progress when most needed. *Am J Transplant.* 2021 Aug;21(8):2824-2832
2. United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of Kidney Disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Reference Tables, Volume 2, Table A.1). Available at <https://www.usrds.org/reference.aspx>. Accessed February 2023
3. United Network for Organ Sharing. Organ donation from deceased donors continues 12-year record-setting trend. <https://unos.org/news/2022-organ-transplants-again-set-annual-records/#:~:text=More%20than%2042%2C800%20organ%20transplants,continues%2012%2Dyear%20record%20trend>. Visited February 2024.
4. Thomas B. Kidney-pancreas transplantation. *Medscape.* February 9, 2022. Available at https://emedicine.medscape.com/article/1830202-overview?_ga=2.147438391.1635785224.1689714369-1508122144.1689714366#showall. Accessed July 2023
5. United Network for Organ Sharing. The new kidney allocation system (KAS) frequently asked questions. Available at: <https://optn.transplant.hrsa.gov/professionals/by-topic/guidance/the-new-kidney-allocation-system-kas-frequently-asked-questions/>. Accessed July 2023
6. Xu P, Zhai N, Wang J. Success rate and safety of living donor kidney transplantation in ABO group incompatible relatives: a systematic review and meta-analysis. *Transpl Immunol.* 2023 Dec;81:101921
7. Chipman V, Cooper M, Thomas AG, Ronin M, Lee B, Flechner S, Leeser D, Segev DL, Mandelbrot DA, Lunow-Luke T, Syed S, Hil G, Freise CE, Waterman AD, Roll GR. Motivations and outcomes of compatible living donor-recipient pairs in paired exchange. *Am J Transplant.* 2022 Jan;22(1):266-273
8. United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of Kidney Disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Reference Tables, Volume 2, Table D.6). Available at <https://www.usrds.org/reference.aspx>. Accessed October 2023
9. United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of Kidney Disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Reference Tables, Volume 2, Table J.5). Available at <https://www.usrds.org/reference.aspx>. Accessed October 2023
10. Curtin RB, Johnson HK, Schatell D. The peritoneal dialysis experience: insights from long-term patients. *Nephrol Nurs J.* 2004 Nov-Dec;31(6):615-24

11. "Conditions for Coverage for End-Stage Renal Disease Facilities: Final Rule," 73 *Federal Register* 73 (15 April 2008), pp. 20387, 20478-9
12. Khan SF, Rosner MH. Optimizing peritoneal dialysis catheter placement. *Front Nephrol.* 2023 Apr 11;3:1056574
13. National Kidney Foundation. KDOQI clinical practice guidelines and clinical practice recommendations for 2006 updates: hemodialysis adequacy, peritoneal dialysis adequacy and vascular access. *Am J Kidney Dis.* 2006;48(1) Suppl:S96-146
14. United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of Kidney Disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Reference Tables, Volume 2, Table I.23). Available at <https://www.usrds.org/reference.aspx>. Accessed July 2023
15. Home Dialysis Central database. Available at locater.homedialysis.org. Accessed August 2023
16. United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of Kidney Disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Reference Tables, Volume 2, Table D.1). Available at <https://www.usrds.org/reference.aspx>. Accessed February 2023.
17. Vanholder R. Single needle hemodialysis: is the past the future? *J Nephrol.* 2020 Feb;33(1):49-58.
18. Tentori F, Zhang J, Li Y, Karaboyas A, Kerr P, Saran R, Bommer J, Port F, Akiba T, Pisoni R, Robinson B. Longer dialysis session length is associated with better intermediate outcomes and survival among patients on in-center three times per week hemodialysis: results from the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Nephrol Dial Transplant.* 2012 Nov;27(11):4180-8
19. Saran R, Bragg-Gresham JL, Levin NW, Twardowski ZJ, Wizemann V, Saito A, Kimata N, Gillespie BW, Combe C, Bommer J, Akiba T, Mapes DL, Young EW, Port FK. Longer treatment time and slower ultrafiltration in hemodialysis: associations with reduced mortality in the DOPPS. *Kidney Int.* 2006 Apr;69(7):1222-8
20. Zhang H, Schaubel DE, Kalbfleisch JD, Bragg-Gresham JL, Robinson BM, Pisoni RL, Canaud B, Jadoul M, Akiba T, Saito A, Port FK, Saran R. Dialysis outcomes and analysis of practice patterns suggests the dialysis schedule affects day-of-week mortality. *Kidney Int.* 2012 Jun;81(11):1108-15
21. United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of Kidney Disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Reference Tables, Volume 2, Table I.17). Available at <https://www.usrds.org/reference.aspx>. Accessed July 2023
22. American Cancer Society. *Cancer Facts & Figures 2023.* Atlanta: American Cancer Society; 2023
23. Vélez-Bermúdez M, Adamowicz JL, Askelson NM, Lutgendorf SK, Fraer M, Christensen AJ. Disparities in dialysis modality decision-making using a social-ecological lens: a qualitative approach. *BMC Nephrol.* 2022 Aug 5;23(1):276

24. Schatell DR, Bragg-Gresham JL, Mehrotra R, Merighi JR, Witten B. *A description of nephrologist training, beliefs, and practices from the National Nephrologist Dialysis Practice Survey (2010)*. Abstract F-FC209 presented at the American Society of Nephrology meeting, Denver, CO, November 19, 2010. Available at <http://www ASN-online.org/education/kidneyweek/archives/>. Accessed March 2024
25. Robinson BM, Zhang J, Morgenstern H, Bradbury BD, Ng LJ, McCullough KP, Gillespie BW, Hakim R, Rayner H, Fort J, Akizawa T, Tentori F, Pisoni RL. Worldwide, mortality risk is high soon after initiation of hemodialysis. *Kidney Int*. 2014 Jan;85(1):158-65
26. Edutopia. The science of fear. <https://www.edutopia.org/blog/the-science-of-fear-ainissa-ramirez#:~:text=However%2C%20an%20environment%20full%20of,fight%2Dor%2Dflight%20chemistries>. Visited in February 2024
27. Arbor Research Collaborative for Health and the University of Michigan Kidney Epidemiology and Cost Center. *End stage renal disease (ESRD) quality measure development and maintenance hemodialysis adequacy clinical technical expert panel summary report*. Contract No. 500-2008-00022I, Task Order No. HHSN-500-T0001. Baltimore MD, 2013
28. Diaz C, Quintero JA, Zarama V, Bustamante-Cristancho LA. Bleeding complications in uremic patients after ultrasound-guided central venous catheter placement. *Open Access Emerg Med*. 2023 Jan 12;15:21-28
29. Kang M, Chen J, Liu L, Xue C, Tang X, Lv J, Fu L, Mei C, Mao Z, Liu Y, Dai B. In-center nocturnal hemodialysis reduced the circulating fgf23, left ventricular hypertrophy, and all-cause mortality: a retrospective cohort study. *Front Med (Lausanne)*. 2022 Jun 21;9:912764
30. Soohoo M, Obi Y, Rivara MB, Adams SV, Lau WL, Rhee CM, Kovesdy CP, Kalantar-Zadeh K, Arah OA, Mehrotra R, Streja E. Comparative effectiveness of dialysis modality on laboratory parameters of mineral metabolism. *Am J Nephrol*. 2022;53(2-3):157-168
31. Lacson E Jr, Xu J, Suri RS, Nesrallah G, Lindsay R, Garg AX, Lester K, Ofsthun N, Lazarus M, Hakim RM. Survival with three-times weekly in-center nocturnal versus conventional hemodialysis. *J Am Soc Nephrol*. 2012 Apr;23(4):687-95
32. Ok E, Duman S, Asci G, Tumuklu M, Onen Sertoz O, Kayikcioglu M, Toz H, Adam SM, Yilmaz M, Tonbul HZ, Ozkahya M; Long Dialysis Study Group. Comparison of 4- and 8-h dialysis sessions in thrice-weekly in-centre haemodialysis: a prospective, case-controlled study. *Nephrol Dial Transplant*. 2011 Apr;26(4):1287-96
33. Blagg CR. A brief history of home hemodialysis. *Adv Ren Replace Ther*. 1996 Apr;3(2):99-105
34. NxStage Medical Inc. *NxStage Medical announces FDA clearance for solo home hemodialysis using NxStage® System One™ [press release]*. (Aug 28, 2017) Available at <https://www.prnewswire.com/news-releases/nxstage-medical-announces-fda->

[clearance-for-solo-home-hemodialysis-using-nxstage-system-one-300509804.html](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC300509804/). Accessed August 2023

35. Jaber BL, Schiller B, Burkart JM, Daoui R, Kraus MA, Lee Y, Miller BW, Teitelbaum I, Williams AW, Finkelstein FO; FREEDOM Study Group. Impact of short daily hemodialysis on restless legs symptoms and sleep disturbances. *Clin J Am Soc Nephrol.* 2011 May;6(5):1049-56
36. Schorr M, Manns BJ, Culleton B, Walsh M, Klarenbach S, Tonelli M, Sauve L, Chin R, Barnieh L, Hemmelgarn BR; Alberta Kidney Disease Network. The effect of nocturnal and conventional hemodialysis on markers of nutritional status: results from a randomized trial. *J Ren Nutr.* 2011 May;21(3):271-6
37. Ipema KJ, Struijk S, van der Velden A, Westerhuis R, van der Schans CP, Gaillard CA, Krijnen WP, Franssen CF. Nutritional status in nocturnal hemodialysis patients—a systematic review with meta-analysis. *PLoS One.* 2016 Jun 20;11(6):e0157621
38. Van Eps CL, Jeffries JK, Johnson DW, Campbell SB, Isbel NM, Mudge DW, Hawley CM. Quality of life and alternate nightly nocturnal home hemodialysis. *Hemodial Int.* 2010 Jan;14(1):29-38
39. Chan CT, Li GH, Valaperti A, Liu P. Intensive hemodialysis preserved cardiac injury. *ASAIO J.* 2015 Sep-Oct;61(5):613-9
40. Nishio-Lucar AG, Bose S, Lyons G, Awuah KT, Ma JZ, Lockridge RS Jr. Intensive home hemodialysis survival comparable to deceased donor kidney transplantation. *Kidney Int Rep.* 2020 Jan 9;5(3):296-306
41. Hussain JA, Mooney A, Russon L. Comparison of survival analysis and palliative care involvement in patients aged over 70 years choosing conservative management or renal replacement therapy in advanced chronic kidney disease. *Palliat Med.* 2013 Oct;27(9):829-39

Module 4 The Person with End-Stage Kidney Disease

1. Marin JG, Beresford L, Lo C, Pai A, Espino-Hernandez G, Beaulieu M. Prescription patterns in dialysis patients: differences between hemodialysis and peritoneal dialysis patients and opportunities for deprescription. *Can J Kidney Health Dis.* 2020 May 1;7:2054358120912652
2. Social Security Administration. *Fact sheet—2024 social security changes.* <https://www.ssa.gov/news/press/factsheets/colafacts2024.pdf>. Visited May 2024
3. Banerjee T, Crews DC, Wesson DE, Dharmarajan S, Saran R, Ríos Burrows N, Saydah S, Powe NR; CDC CKD Surveillance Team. Food insecurity, CKD, and subsequent ESRD in US adults. *Am J Kidney Dis.* 2017 Jul;70(1):38-47
4. Luo J, Lee A, Cohen DE, Colson C, Brunelli SM. Vocational activity and health insurance type among patients with end-stage renal disease: association with outcomes. *J Nephrol.* 2018 Aug;31(4):577-584
5. Polikandrioti M, Koutelkos I, Gerogianni G, Stefanidou S, Kyriakopoulos V, Floraki E, Babatsikou F. Factors associated with hemodialysis machine dependency. *Med Arch.* 2017 Apr;71(2):122-127
6. Silva DMD, Silva RMCRA, Pereira ER, Ferreira HC, Alcantara VCG, Oliveira FDS. The body marked by the arteriovenous fistula: a phenomenological point of view. *Rev Bras Enferm.* 2018 Nov-Dec;71(6):2869-2875
7. Álvarez-Villarreal M, Velarde-García JF, Chocarro-Gonzalez L, Pérez-Corrales J, Gueita-Rodríguez J, Palacios-Ceña D. Body changes and decreased sexual drive after dialysis: a qualitative study on the experiences of women at an ambulatory dialysis unit in Spain. *Int J Environ Res Public Health.* 2019 Aug 25;16(17):3086
8. Lev-Wiesel R, Sasson L, Scharf N, Abu Saleh Y, Glikman A, Hazan D, Shacham Y, Barak-Doenya K. "Losing faith in my body": body image in individuals diagnosed with end-stage renal disease as reflected in drawings and narratives. *Int J Environ Res Public Health.* 2022 Aug 30;19(17):10777
9. Rojas R, Clegg DJ, Palmer BF. Amenorrhea and estrogen disorders in kidney disease. *Semin Nephrol.* 2021 Mar;41(2):126-132
10. Garibotto G, Esposito P, Picciotto D, Verzola D. Testosterone disorders and male hypogonadism in kidney disease. *Semin Nephrol.* 2021 Mar;41(2):114-125
11. Abdelaal MA, Abouelgreed TA, Ibrahim AH, Elshater AI, Sabry KM. Erectile dysfunction pattern in patients with end stage renal disease on regular dialysis. *Urologia.* 2021 Nov;88(4):321-325
12. Ghoreishi A, Dashtaki L, Hajisalimi B. Bupropion as a treatment for sexual dysfunction among chronic kidney disease patients. *Acta Med Iran.* 2019;57(5):320-7
13. Pyrgidis N, Mykoniatis I, Tishukov M, Sokolakis I, Nigdelis MP, Sountoulides P, Hatzichristodoulou G, Hatzichristou D. Sexual dysfunction in women with end-stage renal disease: a systematic review and meta-analysis. *J Sex Med.* 2021 May;18(5):936-945
14. Reinhardt W, Küpper H, Dolff S, Benson S, Führer D, Tan S. Rapid recovery of

- hypogonadism in male patients with end stage renal disease after renal transplantation. *Endocrine*. 2018 Apr;60(1):159-166
15. Kutner NG. Quality of life and daily hemodialysis. *Semin Dial*. 2004 Mar-Apr;17(2):92-8
 16. Bass A, Ahmed SB, Klarenbach S, Culleton B, Hemmelgarn BR, Manns B. The impact of nocturnal hemodialysis on sexual function. *BMC Nephrol*. 2012 Jul 26;13:67
 17. Matuszkiewicz-Rowinska J, Skórzewska K, Radowicki S, Niemczyk S, Sokalski A, Przedlacki J, Puka J, Switalski M, Wardyn K, Grochowski J, Ostrowski K. Endometrial morphology and pituitary-gonadal axis dysfunction in women of reproductive age undergoing chronic haemodialysis—a multicentre study. *Nephrol Dial Transplant*. 2004 Aug;19(8):2074-7
 18. Lavie A, Czuzoj-Shulman N, Spence AR, Abenhaim HA. Characteristics and outcomes among pregnant women with end-stage renal disease on hemodialysis. *J Matern Fetal Neonatal Med*. 2022 Dec;35(25):5897-5903
 19. Hladunewich MA, Hou S, Odutayo A, Cornelis T, Pierratos A, Goldstein M, Tennankore K, Keunen J, Hui D, Chan CT. Intensive hemodialysis associates with improved pregnancy outcomes: a Canadian and United States cohort comparison. *J Am Soc Nephrol*. 2014 May;25(5):1103-9
 20. Chou J, Kiebalo T, Jagiello P, Pawlaczyk K. Multifaceted sexual dysfunction in dialyzing men and women: pathophysiology, diagnostics, and therapeutics. *Life (Basel)*. 2021 Apr 2;11(4):311
 21. Dos Santos PR, Mendonça CR, Hernandes JC, Borges CC, Barbosa MA, Romeiro AMS, Alves PM, Dias NT, Porto CC. Pain in patients with chronic kidney disease undergoing hemodialysis: a systematic review. *Pain Manag Nurs*. 2021 Oct;22(5):605-615
 22. Fletcher BR, Damery S, Aiyegbusi OL, Anderson N, Calvert M, Cockwell P, Ferguson J, Horton M, Paap MCS, Sidey-Gibbons C, Slade A, Turner N, Kyte D. Symptom burden and health-related quality of life in chronic kidney disease: a global systematic review and meta-analysis. *PLoS Med*. 2022 Apr 6;19(4):e1003954
 23. Gebrie MH, Ford J. Depressive symptoms and dietary non-adherence among end stage renal disease patients undergoing hemodialysis therapy: systematic review. *BMC Nephrol*. 2019 Nov 21;20(1):429
 24. Huang CW, Wee PH, Low LL, Koong YLA, Htay H, Fan Q, Foo WYM, Seng JJB. Prevalence and risk factors for elevated anxiety symptoms and anxiety disorders in chronic kidney disease: a systematic review and meta-analysis. *Gen Hosp Psychiatry*. 2021 Mar-Apr;69:27-40
 25. Centers for Medicare and Medicaid Services. Conditions for Coverage for End-stage Renal Disease Facilities; Final Rule, 73 Federal Register 73 (15 April 2008), p. 20478-20479. Available at <https://www.cms.gov/Regulations-and-Guidance/Legislation/CFCsAndCoPs/downloads/esrdfinalrule0415.pdf>. Visted March 2024
 26. Stack AG, Martin DR. Association of patient autonomy with increased transplantation and survival among new dialysis patients in the United States. *Am J*

- Kidney Dis.* 2005 Apr;45(4):730-42
- 27. Gamble VN. Under the shadow of Tuskegee: African Americans and health care. *Am J Public Health.* 1997 Nov;87(11):1773-8
 - 28. Billington E, Simpson J, Unwin J, Bray D, Giles D. Does hope predict adjustment to end-stage renal failure and consequent dialysis? *Br J Health Psychol.* 2008 Nov;13(Pt 4):683-99
 - 29. Perry BD. Fear and learning: trauma-related factors in the adult education process. *New Dir Adult Contin Educ.* 2006;110:21-7
 - 30. Brown EA, Zhao J, McCullough K, Fuller DS, Figueiredo AE, Bieber B, Finkelstein FO, Shen J, Kanjanabuch T, Kawanishi H, Pisoni RL, Perl J; PDOPPS Patient Support Working Group. Burden of kidney disease, health-related quality of life, and employment among patients receiving peritoneal dialysis and in-center hemodialysis: findings from the DOPPS program. *Am J Kidney Dis.* 2021 Oct;78(4):489-500.e1
 - 31. Huang M, Lv A, Wang J, Xu N, Ma G, Zhai Z, Zhang B, Gao J, Ni C. Exercise training and outcomes in hemodialysis patients: systematic review and meta-analysis. *Am J Nephrol.* 2019;50(4):240-254
 - 32. Tentori F, Elder SJ, Thumma J, Pisoni RL, Bommer J, Fissell RB, Fukuhara S, Jadoul M, Keen ML, Saran R, Ramirez SP, Robinson BM. Physical exercise among participants in the Dialysis Outcomes and Practice Patterns Study (DOPPS): correlates and associated outcomes. *Nephrol Dial Transplant.* 2010 Sep;25(9):3050-62
 - 33. Quality Insights Renal Network 5. *Bugs & infestations.* Available at: <https://www.qualityinsights.org/qirn5/dialysis-providers/bugs-and-infestations>. Visited August 2023
 - 34. Pun PH, Svetkey LP, McNally B, Dupre ME; CARES Surveillance Group. Facility-level factors and racial disparities in cardiopulmonary resuscitation within US dialysis clinics. *Kidney360.* 2022 Mar 11;3(6):1021-1030
 - 35. Centers for Medicare and Medicaid Services. Conditions for Coverage for End-stage Renal Disease Facilities; Final Rule, 73 Federal Register 73 (15 April 2008), p. 20462. Available at <https://www.cms.gov/Regulations-and-Guidance/Legislation/CFCsAndCoPs/downloads/esrdfinalrule0415.pdf>. Visted March 2024
 - 36. Pun PH, Dupre ME, Starks MA, Tyson C, Vellano K, Svetkey LP, Hansen S, Frizzelle BG, McNally B, Jollis JG, Al-Khatib SM, Granger CB; CARES Surveillance Group. Outcomes for hemodialysis patients given cardiopulmonary resuscitation for cardiac arrest at outpatient dialysis clinics. *J Am Soc Nephrol.* 2019 Mar;30(3):461-470
 - 37. Saeed F, Murad HF, Wing RE, Li J, Schold JD, Fiscella KA. Outcomes Following In-Hospital Cardiopulmonary Resuscitation in People Receiving Maintenance Dialysis. *Kidney Med.* 2021 Oct 23;4(1):100380
 - 38. de Oliveira ES, de Aguiar AS. Why eating star fruit is prohibited for patients with chronic kidney disease? *J Bras Nefrol.* 2015 Apr-Jun;37(2):241-7
 - 39. Hendriks FK, Smeets JSJ, Broers NJH, van Kranenburg JMX, van der Sande FM,

- Kooman JP, van Loon LJC. End-stage renal disease patients lose a substantial amount of amino acids during hemodialysis. *J Nutr.* 2020 May 1;150(5):1160-1166
40. Ikizler TA, Burrowes JD, Byham-Gray LD, Campbell KL, Carrero JJ, Chan W, Fouque D, Friedman AN, Ghaddar S, Goldstein-Fuchs DJ, Kaysen GA, Kopple JD, Teta D, Yee-Moon Wang A, Cuppari L. KDOQI clinical practice guideline for nutrition in CKD: 2020 update. *Am J Kidney Dis.* 2020 Sep;76(3 Suppl 1):S1-S107
41. Herselman M, Esau N, Kruger JM, Labadarios D, Moosa MR. Relationship between serum protein and mortality in adults on long-term hemodialysis: exhaustive review and meta-analysis. *Nutrition.* 2010 Jan;26(1):10-32
42. Matsuo M, Kojima S, Arisato T, Matsubara M, Koezuka R, Kishida M, Ogawa K, Inoue H, Yoshihara F. Hypocholesterolemia is a risk factor for reduced systemic vascular resistance reactivity during hemodialysis. *Hypertens Res.* 2021 Aug;44(8):988-995
43. Centers for Disease Control and Prevention. *Adult obesity facts.* Available at: <https://www.cdc.gov/obesity/data/adult.html>. Visited August 2023
44. Jialin W, Yi Z, Weijie Y. Relationship between body mass index and mortality in hemodialysis patients: a meta-analysis. *Nephron Clin Pract.* 2012;121(3-4):c102-11
45. Ahmadi SF, Zahmatkesh G, Streja E, Mehrotra R, Rhee CM, Kovesdy CP, Gillen DL, Ahmadi E, Fonarow GC, Kalantar-Zadeh K. Association of body mass index with mortality in peritoneal dialysis patients: a systematic review and meta-analysis. *Perit Dial Int.* 2016 May-Jun;36(3):315-25
46. Yin S, Wu L, Huang Z, Fan Y, Lin T, Song T. Nonlinear relationship between body mass index and clinical outcomes after kidney transplantation: a dose-response meta-analysis of 50 observational studies. *Surgery.* 2022 May;171(5):1396-1405
47. Sars B, van der Sande FM, Kooman JP. Intradialytic hypotension: mechanisms and outcome. *Blood Purif.* 2020;49(1-2):158-167
48. Bhojaraja MV, Singhai P, Sunil Kumar MM, Sreelatha M. Withdrawal from dialysis: why and when? *Indian J Palliat Care.* 2021 May;27(Suppl 1):S30-S32
49. Hamrahan SM, Vilayet S, Herberth J, Fülop T. Prevention of intradialytic hypotension in hemodialysis patients: current challenges and future prospects. *Int J Nephrol Renovasc Dis.* 2023 Aug 1;16:173-181
50. Navarrete JE, Rajabalan A, Cobb J, Lea JP. Proportion of hemodialysis treatments with high ultrafiltration rate and the association with mortality. *Kidney360.* 2022 May 5;3(8):1359-1366
51. Centers for Disease Control and Prevention. *Sodium.* Available at: <https://www.cdc.gov/heartdisease/sodium.htm#:~:text=High%20sodium%20consumption%20can%20raise,for%20heart%20disease%20and%20stroke.&text=Most%20of%20the%20sodium%20we%20consume%20is%20in%20the%20form%20of%20salt>. Visited August 2023
52. Wu PY, Yang SH, Wong TC, Chen TW, Chen HH, Chen TH, Chen YT. Association of processed meat intake with hypertension risk in hemodialysis patients: a cross-sectional study. *PLoS One.* 2015 Oct 30;10(10):e0141917
53. U.S. Food & Drug Administration. *The new and improved nutrition facts label – key changes.* Available at: <https://www.fda.gov/media/99331/download#:~:text=The%20lists%20of%20nutrient>

[s%20that,these%20vitamins%20are%20rare%20today](#). Visited August 2023

54. Centers for Medicare and Medicaid Services. Medicare program; end-stage renal disease prospective payment system, payment for renal dialysis services furnished to individuals with acute kidney injury, and end-stage renal disease quality incentive program; Final Rule. *Federal Register* 81:210 (1 Nov 2017) p.50779, Available at: <https://www.federalregister.gov/documents/2017/11/01/2017-26380/final-rule-medicare-program-end-stage-renal-disease-prospective-payment-system>. Visited March 2024
55. Kalantar-Zadeh K, Gutekunst L, Mehrotra R, Kovesdy CP, Bross R, Shinaberger CS, Noori N, Hirschberg R, Benner D, Nissenson AR, Kopple JD. Understanding sources of dietary phosphorus in the treatment of patients with chronic kidney disease. *Clin J Am Soc Nephrol.* 2010 Mar;5(3):519-30

Module 5 Principles of Dialysis

1. Binod GC. Osmosis and diffusion: differences and factors affecting them.
<https://thescienconotes.com/osmosis-and-diffusion-differences-and-factors-that-affect-them/>. Visited September 2023
2. Bhave G, Neilson EG. Body fluid dynamics: back to the future. *J Am Soc Nephrol.* 2011 Dec;22(12):2166-81
3. Chen CH, Teitelbaum I. Physiology of Peritoneal Dialysis, in Rastogi A, Lerma EV, Bargman JM (eds): *Applied Peritoneal Dialysis*. Springer, Cham, 2021
4. Kotla SK, Saxena A, Saxena R. A model to estimate glucose absorption in peritoneal dialysis: a pilot study. *Kidney 360.* 2020 Sep 29;1(12):1373-1379
5. Canadian Sugar Institute. How many calories and what nutrients are in sugar?
<https://sugar.ca/sugar-basics/frequently-asked-questions-about-sugar/nutritional-value#:~:text=Whether%20it%20is%20naturally%20occurring>. Visited August 2023
6. Nakano T, Kumiko T, Mizumasa T, Kuroki Y, Tsuruya K, Kitazono T. The glucose degradation product methylglyoxal induces immature angiogenesis in patients undergoing peritoneal dialysis. *Biochem Biophys Res Commun.* 2020 May 7;525(3):767-772
7. Yohanna S, Alkatheeri AM, Brimble SK, McCormick B, Lansavitchous A, Blake PG, Jain AK. Effect of neutral-pH, low-glucose degradation product peritoneal dialysis solutions on residual renal function, urine volume, and ultrafiltration: a systematic review and meta-analysis. *Clin J Am Soc Nephrol.* 2015 Aug 7;10(8):1380-8
8. Htay H, Johnson DW, Wiggins KJ, Badve SV, Craig JC, Strippoli GF, Cho Y. Biocompatible dialysis fluids for peritoneal dialysis. *Cochrane Database Syst Rev.* 2018 Oct 26;10(10):CD007554
9. Baxter. Warning: Potential for incorrect blood glucose reading.
<https://www.glucoesafety.com/mp/index.html>. Visited August 2023
10. Jacques DA, Davenport A. Characterization of sodium removal to ultrafiltration volume in a peritoneal dialysis outpatient cohort. *Clin Kidney J.* 2020 Apr;14(3):917-924
11. Salame C, Eaton S, Grimble G, Davenport A. Protein losses and urea nitrogen underestimate total nitrogen losses in peritoneal dialysis and hemodialysis patients. *J Ren Nutr.* 2018 Sep;28(5):317-323
12. Misra M, Khanna R. Mechanisms of solute clearance and ultrafiltration in peritoneal dialysis. In: UpToDate, Connor RF (Ed), Wolters Kluwer.
<https://www.uptodate.com/contents/mechanisms-of-solute-clearance-and-ultrafiltration-in-peritoneal-dialysis/print#:~:text=The%20average%20surface%20area%20of,adults%20%5B2%2C3%5D>. Visited September 2023
13. Abe M, Masakane I, Wada A, Nakai S, Nitta K, Nakamoto H. Dialyzer surface area is a significant predictor of mortality in patients on hemodialysis: a 3-year nationwide cohort study. *Sci Rep.* 2021 Oct 18;11(1):20616
14. Yartsev A. Diffusion in the counter-current dialysis circuit.

<https://derangedphysiology.com/main/cicm-primary-exam/required-reading/renal-system/dialysis-and-plasmapheresis/Chapter%20112/diffusion-counter-current-dialysis-circuit>. Visited September 2023

15. Mustafa RA, Bdair F, Akl EA, Garg AX, Thiessen-Philbrook H, Salameh H, Kisra S, Nesrallah G, Al-Jaishi A, Patel P, Patel P, Mustafa AA, Schünemann HJ. Effect of lowering the dialysate temperature in chronic hemodialysis: a systematic review and meta-analysis. *Clin J Am Soc Nephrol.* 2016 Mar 7;11(3):442-57
16. Tharmaraj D, Kerr PG. Haemolysis in haemodialysis. *Nephrology (Carlton).* 2017 Nov;22(11):838-847
17. Rosenberg JL, Epstein LM, Krieger PJ. Table of atomic masses. Chap. in Schaum's *Outline of College Chemistry.* 10th ed. New York: McGraw-Hill Education. 2013. <https://www.accessengineeringlibrary.com/content/book/9780071810821/back-matter/appendix3> Visited March 2024
18. Meijers B, Lowenstein J. The evolving view of uremic toxicity. *Toxins (Basel).* 2022 Apr 12;14(4):274
19. Vanholder R. Uremic toxins. In: UpToDate, Connor RF (Ed), Wolters Kluwer. https://www.uptodate.com/contents/uremic-toxins?search=uremic%20toxins&source=search_result&selectedTitle=1~59&use_type=default&display_rank=1. Visited September 2023
20. Mistry K. Dialysis disequilibrium syndrome prevention and management. *Int J Nephrol Renovasc Dis.* 2019 Apr 30;12:69-77
21. Wang CH, Negoianu D, Zhang H, Casper S, Hsu JY, Kotanko P, Raimann J, Dember LM. Dynamics of plasma refill rate and intradialytic hypotension during hemodialysis: retrospective cohort study with causal methodology. *Kidney360.* 2023 Apr 1;4(4):e505-e514
22. Chewcharat A, Chewcharat P, Liu W, Cellini J, Phipps EA, Melendez Young JA, Nigwekar SU. The effect of levocarnitine supplementation on dialysis-related hypotension: a systematic review, meta-analysis, and trial sequential analysis. *PLoS One.* 2022 Jul 14;17(7):e0271307
23. Mc Causland FR, Tumlin JA, Roy-Chaudhury P, Koplan BA, Costea AI, Kher V, Williamson D, Pokhriyal S, Charytan DM; MiD Investigators and Committees*. Intradialytic hypotension and cardiac arrhythmias in patients undergoing maintenance hemodialysis: results from the monitoring in dialysis study. *Clin J Am Soc Nephrol.* 2020 Jun 8;15(6):805-812
24. Keane DF, Raimann JG, Zhang H, Willetts J, Thijssen S, Kotanko P. The time of onset of intradialytic hypotension during a hemodialysis session associates with clinical parameters and mortality. *Kidney Int.* 2021 Jun;99(6):1408-1417
25. Kuo PY, Saran R, Argentina M, Heung M, Bragg-Gresham J, Krein S, Gillespie BW, Zheng K, Veinot TC. Cramping, crashing, cannulating, and clotting: a qualitative study of patients' definitions of a "bad run" on hemodialysis. *BMC Nephrol.* 2020 Feb 27;21(1):67
26. Hamrahan SM, Vilayet S, Herberth J, Fülöp T. Prevention of intradialytic hypotension in hemodialysis patients: current challenges and future prospects. *Int J Nephrol Renovasc Dis.* 2023 Aug 1;16:173-181

27. Tentori F, Zhang J, Li Y, Karaboyas A, Kerr P, Saran R, Bommer J, Port F, Akiba T, Pisoni R, Robinson B. Longer dialysis session length is associated with better intermediate outcomes and survival among patients on in-center three times per week hemodialysis: results from the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Nephrol Dial Transplant*. 2012 Nov;27(11):4180-8
28. Fotheringham J, Sajjad A, Stel VS, McCullough K, Karaboyas A, Wilkie M, Bieber B, Robinson BM, Massy ZA, Jager KJ. The association between longer haemodialysis treatment times and hospitalization and mortality after the two-day break in individuals receiving three times a week haemodialysis. *Nephrol Dial Transplant*. 2019 Sep 1;34(9):1577-1584
29. Kanbay M, Ertuglu LA, Afsar B, Ozdogan E, Siriopol D, Covic A, Basile C, Ortiz A. An update review of intradialytic hypotension: concept, risk factors, clinical implications and management. *Clin Kidney J*. 2020 Jul 8;13(6):981-993
30. Kooman JP, Stenvinkel P, Shiels PG, Feelisch M, Canaud B, Kotanko P. The oxygen cascade in patients treated with hemodialysis and native high-altitude dwellers: lessons from extreme physiology to benefit patients with end-stage renal disease. *Am J Physiol Renal Physiol*. 2021 Mar 1;320(3):F249-F261
31. Diroll D. Oxygen as an adjunct to treat intradialytic hypotension during hemodialysis. *Nephrol Nurs J*. 2014 Jul-Aug;41(4):420-3
32. Chen YA, Ou SM, Lin CC. Influence of dialysis membranes on clinical outcomes: from history to innovation. *Membranes (Basel)*. 2022 Jan 26;12(2):152
33. Ji H, Li Y, Su B, Zhao W, Kizhakkedathu JN, Zhao C. Advances in enhancing hemocompatibility of hemodialysis hollow-fiber membranes. *Adv Fiber Mater*. 2023 Apr 3: 1-43
34. Deziel S, Arslanian J. *Principles of hemodialysis*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 964-987
35. Lang T, Zawada AM, Theis L, Braun J, Ottillinger B, Kopperschmidt P, Gagel A, Kotanko P, Stauss-Grabo M, Kennedy JP, Canaud B. Hemodiafiltration: technical and medical insights. *Bioengineering (Basel)*. 2023 Jan 21;10(2):145

Module 6 Hemodialysis Devices and Equipment

1. Yu J, Chitalia VC, Akintewe OO, Edwards A, Wong JY. Determinants of hemodialysis performance: modeling fluid and solute transport in hollow-fiber dialyzers. *Regen Eng Transl Med.* 2021 Sep;7(3):291-300
2. Said N, Lau WJ, Ho YC, Lim SK, Zainol Abidin MN, Ismail AF. A review of commercial developments and recent laboratory research of dialyzers and membranes for hemodialysis application. *Membranes (Basel).* 2021 Oct 7;11(10):767
3. Golper TA. Kidney replacement therapy (dialysis) in acute kidney injury: Metabolic and hemodynamic considerations . In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/kidney-replacement-therapy-dialysis-in-acute-kidney-injury-metabolic-and-hemodynamic-considerations>. Visited September 2023
4. Hulkó M, Haug U, Gauss J, Boschetti-de-Fierro A, Beck W, Krause B. Requirements and pitfalls of dialyzer sieving coefficients comparisons. *Artif Organs.* 2018 Dec;42(12):1164-1173
5. Santoro A, Guadagni G. Dialysis membrane: from convection to adsorption. *NDT Plus.* 2010 May;3(Suppl 1):i36-i39
6. Berns JS. Clinical consequences of hemodialysis membrane biocompatibility. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/clinical-consequences-of-hemodialysis-membrane-biocompatibility>. Visited September 2023
7. Bellucci A. Reactions to the hemodialysis membrane. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/reactions-to-the-hemodialysis-membrane#H10>. Visited August 2023
8. Schmidt RJ. Overview of the hemodialysis apparatus. In: UpToDate, Connor RF (Ed), Wolters Kluwer. https://www.uptodate.com/contents/overview-of-the-hemodialysis-apparatus?search=dialyzer%20membranes&source=search_result&selectedTitle=1~106&usage_type=default&display_rank=1. Visited September 2023
9. Kobayashi S, Otake T. The Characteristics of Dialysis Membranes: Benefits of the AN69 Membrane in Hemodialysis Patients. *J Clin Med.* 2023 Jan 31;12(3):1123
10. Olczyk P, Małyszczak A, Kusztal M. Dialysis membranes: a 2018 update. *Polim Med.* 2018 Jan-Jun;48(1):57-63
11. Roumelioti ME, Trietley G, Nolin TD, Ng YH, Xu Z, Alaini A, Figueroa R, Unruh ML, Argyropoulos CP. Beta-2 microglobulin clearance in high-flux dialysis and convective dialysis modalities: a meta-analysis of published studies. *Nephrol Dial Transplant.* 2018 Jun 1;33(6):1025-1039
12. Cambien G, Dupuis A, Guienneuc J, Bauwens M, Belmouaz M, Ayraud-Thevenot S. Endocrine disruptors in dialysis therapies: a literature review. *Environ Int.* 2023 Aug;178:108100
13. Athavale A, Wyburn KR, Snelling PL, Chadban SJ. Dialysis disequilibrium: is acidosis more important than urea? *Case Rep Nephrol.* 2022 Feb 22;2022:4964033

14. Daugirdas JT. Physiological principles and urea kinetic modeling. In Daugirdas JT, Blake PG & Ing TS, *Handbook of Dialysis* (5th ed). Philadelphia, Wolters Kluwer Health, 2015
15. Asano M, Thumma J, Oguchi K, Pisoni RL, Akizawa T, Akiba T, Fukuhara S, Kurokawa K, Ethier J, Saran R, Saito A; J-DOPPS Research Group. Vascular access care and treatment practices associated with outcomes of arteriovenous fistula: international comparisons from the Dialysis Outcomes and Practice Patterns Study. *Nephron Clin Pract.* 2013;124(1-2):23-30
16. Agar J. Don't flog the fistulas: slow hemodialysis blood flow! *Home Dialysis Central* blog Mar 14, 2014. <https://homodialysis.org/news-and-research/blog/535-dont-flog-fistulas-slow-hemodialysis-blood-flow>. Visited September 2023
17. Albalate M, Pérez-García R, de Sequera P, Corchete E, Alcazar R, Ortega M, Puerta M. Is it useful to increase dialysate flow rate to improve the delivered Kt? *BMC Nephrol.* 2015 Feb 14;16:20
18. Saran R, Bragg-Gresham JL, Levin NW, Twardowski ZJ, Wizemann V, Saito A, Kimata N, Gillespie BW, Combe C, Bommer J, Akiba T, Mapes DL, Young EW, Port FK. Longer treatment time and slower ultrafiltration in hemodialysis: associations with reduced mortality in the DOPPS. *Kidney Int.* 2006 Apr;69(7):1222-8
19. Ahmad S, Misra M, Hoenich N, Daugirdas JT. Hemodialysis apparatus. In Daugirdas JT, Blake PG & Ing TS, *Handbook of Dialysis* (5th ed). Philadelphia, Wolters Kluwer Health, 2015
20. Baxter. TMP and filter pressure drop: monitoring circuit pressure trends. https://renalcareus.baxter.com/sites/g/files/eby sai3581/files/2020-06/TMP_and_Filter_Pressure_Drop_2019_5.pdf. Visited September 2023
21. Abe M, Masakane I, Wada A, Nakai S, Nitta K, Nakamoto H. Dialyzer Classification and Mortality in Hemodialysis Patients: A 3-Year Nationwide Cohort Study. *Front Med (Lausanne).* 2021 Aug 27;8:740461
22. Weiner DE, Falzon L, Skoufos L, Bernardo A, Beck W, Xiao M, Tran H. Efficacy and safety of expanded hemodialysis with the theranova 400 dialyzer: a randomized controlled trial. *Clin J Am Soc Nephrol.* 2020 Sep 7;15(9):1310-1319
23. Fresenius Medical Care. 2008T hemodialysis machine operator's manual. [https://fmcna.com/content/dam/fmcna/live/support/documents/operator%27s-manuals---hemodialysis-\(hd\)/2008t-operator%27s-manuals/490122_Rev_AA.pdf](https://fmcna.com/content/dam/fmcna/live/support/documents/operator%27s-manuals---hemodialysis-(hd)/2008t-operator%27s-manuals/490122_Rev_AA.pdf). Visited June 2024
24. Baxter. DIASCAN monitoring system: a quality assurance tool. https://www.baxter.com/sites/g/files/eby sai3896/files/2018-08/USMP%20MG115%202014-0046%285%29_Diascan%20Brochure_Single%20Page%20FINAL.pdf. Visited September 2023
25. B Braun. Adimea™ dialysis management system (Kt/V) for Dialog+. <https://www.bbraunusa.com/en/products/b2/dialog-adimea-dialysismeasurementsystemktv.html>. Visited September 2023
26. Deziel S, Arslanian J. Principles of hemodialysis. In C.S. Counts (Ed.), *Core Curriculum for Nephrology Nursing: Module 2. Part 5: Treatment options for patients*

- with chronic kidney failure and the vascular access.* (7th ed., 2020. pp. 964-987). Pitman, NJ: American Nephrology Nurses' Association
27. Centers for Medicare & Medicaid Services. ESRD Surveyor Laminates: Dialysis Lab Tests At a Glance. Available at: <https://www.cms.gov/medicare/health-safety-standards/guidance-for-laws-regulations/dialysis>. Visited March 2024
 28. Ikizler TA, Burrowes JD, Byham-Gray LD, Campbell KL, Carrero JJ, Chan W, Fouque D, Friedman AN, Ghaddar S, Goldstein-Fuchs DJ, Kaysen GA, Kopple JD, Teta D, Yee-Moon Wang A, Cuppari L. KDOQI Clinical Practice Guideline for Nutrition in CKD: 2020 Update. *Am J Kidney Dis.* 2020 Sep;76(3 Suppl 1):S1-S107
 29. MedlinePlus. Chloride test—blood. Bethesda, MD: National Library of Medicine (U.S.) <https://medlineplus.gov/ency/article/003485.htm>. Visited April 2024
 30. Centers for Disease Control and Prevention. Diabetes tests. <https://www.cdc.gov/diabetes/basics/getting-tested.html>. Visited April 2024
 31. van de Wal-Visscher ER, Kooman JP, van der Sande FM. Magnesium in Chronic Kidney Disease: Should We Care? *Blood Purif.* 2018;45(1-3):173-178
 32. NxStage® Home Therapies. Therapy handbook—NxStage® hemodialysis treatment. 2019. <https://www.nxstage.com/wp-content/uploads/2019/08/NxStage-Hemodialysis-Treatment-Therapy-Handbook.pdf>. Visited April 2024
 33. Association for the Advancement of Medical Instrumentation. *Complete dialysis collection.* 2022. AAMI:Arlington, VA.
 34. Mitra S, Mitsides N. Technical aspects of hemodialysis, in Magee CC, Tucker JK, Singh AK (eds.) *Core Concepts in Dialysis and Continuous Therapies.* New York, Springer, 2016.
 35. Fresenius Medical Care. bibag on-line dry bicarbonate concentrate. <https://fmcna.com/products/disposables/concentrates/bibag-online-dry-bicarbonate/>. Visited September 2023
 36. Baxter. BiCart 720G and 1250G cartridge. https://www.baxter.com/sites/g/files/eby sai3896/files/2018-08/USMP%20MG137%202014-0001%282%29_BiCart%20720-1250%20Sell%20Sheet_FINAL.pdf. Visited September 2023
 37. Golper TA, El Shamy O. Acute hemodialysis prescription. In: UpToDate, Connor RF (Ed), Wolters Kluwer. https://www.uptodate.com/contents/acute-hemodialysis-prescription?...earch_result&selectedTitle=1~150&usage_type=default&display_rank=1. Visited September 2023
 38. Saha M, Allon M. Diagnosis, treatment, and prevention of hemodialysis emergencies. *Clin J Am Soc Nephrol.* 2017 Feb 7;12(2):357-369
 39. RPC. <https://rpc-rabrenco.com/products/reprocessing-accessory-products/test-strips/k100-0114>. Visited October 2023
 40. Hobby G. Scaled ultrafiltration rate in hemodialysis-time for a change? *Kidney Int Rep.* 2022 Jun 6;7(7):1456-1457
 41. Bosch-Panadero E, Mas S, Sanchez-Ospina D, Camarero V, Pérez-Gómez MV, Saez-Calero I, Abaigar P, Ortiz A, Egido J, González-Parra E. The choice of hemodialysis membrane affects bisphenol a levels in blood. *J Am Soc Nephrol.* 2016 May;27(5):1566-74

42. Centers for Disease Control and Prevention. *Recommendations for preventing transmission of infections among chronic hemodialysis patients*. April 27, 2001 / 50(RR05);1-43. <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5005a1.htm>. Visited October 2023
43. Fresenius USA, Inc. *2008K Hemodialysis machine operator's manual*. 2009. <https://www.manualslib.com/manual/439583/Fresenius-Medical-Care-2008k.html>. Visited October 2023
44. Bieber SD, Young BA. Home Hemodialysis: Core Curriculum 2021. *Am J Kidney Dis.* 2021 Dec;78(6):876-885
45. Wieliczko M, Zawierucha J, Covic A, Prystacki T, Marcinkowski W, Matyszko J. Eco-dialysis: fashion or necessity. *Int Urol Nephrol.* 2020 Mar;52(3):519-523
46. Gault A, Fleck N, Kircelli F. Advanced hemodialysis equipment for more eco-friendly dialysis. *Int Urol Nephrol.* 2022 May;54(5):1059-1065
47. Piccoli GB, Cupisti A, Aucella F, Regolisti G, Lomonte C, Ferraresi M, Claudia D, Ferraresi C, Russo R, La Milia V, Covella B, Rossi L, Chatrenet A, Cabiddu G, Brunori G; On the Behalf of Conservative treatment, Physical activity and Peritoneal dialysis project groups of the Italian Society of Nephrology. Green nephrology and eco-dialysis: a position statement by the Italian Society of Nephrology. *J Nephrol.* 2020 Aug;33(4):681-698
48. Agar JW. Green dialysis: the environmental challenges ahead. *Semin Dial.* 2015 Mar-Apr;28(2):186-92
49. Ravichandran P. A model for plastic neutrality in dialysis: converting surrogate plastic waste to sinkable pebbles. Medical Research Archives. 2023. <https://esmed.org/MRA/mra/article/view/4380>. Visited October 2023

Module 7 Vascular Access

1. Lok CE. Fistula Interventions: Less Is More. *J Am Soc Nephrol*. 2019 Nov;30(11):2040-2042
2. Bhuiyan I, Misskey JD, Hsiang YN. The arteriovenous fistula and the history of a forgotten pioneer. *J Vasc Surg Cases Innov Tech*. 2022 Jul 30;8(4):688-692
3. Lok CE, Rajan DK. KDOQI 2019 Vascular Access Guidelines: What Is New. *Semin Intervent Radiol*. 2022 Feb 18;39(1):3-8
4. Lok CE, Huber TS, Lee T, Shenoy S, Yevzlin AS, Abreo K, Allon M, Asif A, Astor BC, Glickman MH, Graham J, Moisit LM, Rajan DK, Roberts C, Vachharajani TJ, Valentini RP; National Kidney Foundation. KDOQI Clinical Practice Guideline for Vascular Access: 2019 Update. *Am J Kidney Dis*. 2020 Apr;75(4 Suppl 2):S1-S164
5. ESRD National Coordinating Center. Fistula first catheter last (FFCL) change package. Change concept 1: routine CQI review of vascular access. <https://esrdncc.org/en/professionals/change-packages/fistula-first-catheter-last-ffcl-change-package/>. Visited December 2023
6. Yuo TH, Oliver MJ. Central venous catheters for acute and chronic hemodialysis access and their management. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/central-venous-catheters-for-acute-and-chronic-hemodialysis-access-and-their-management>. Visited September 2023
7. El Khudari H, Ozen M, Kowalczyk B, Bassuner J, Almehmi A. Hemodialysis Catheters: Update on Types, Outcomes, Designs and Complications. *Semin Intervent Radiol*. 2022 Feb 18;39(1):90-102
8. McPheeers RA, Catoera IH. Central venous access via external jugular vein. *Medscape* (Lopez Rowe V. ed). Mar 09, 2023. <https://emedicine.medscape.com/article/2116323-print>. Visited October 2023
9. Sharma M, Tong WL, Thompson D, Vachharajani TJ. Placing an appropriate tunneled dialysis catheter in an appropriate patient including the nonconventional sites. *Cardiovasc Diagn Ther*. 2023 Feb 28;13(1):281-290
10. Achinger SG, Ayus JC. When the source of inflammation is hiding in plain sight: Failed kidney transplants, clotted arteriovenous grafts, and central venous catheters. *Semin Dial*. 2019 Jan;32(1):15-21
11. Poonawalla I, Barve K, Cockrell M, Agarwal A, Casebeer AW, Dixon SW, Li Y. Transition-to-dialysis planning, health care use, and mortality in end-stage renal disease. *Am J Manag Care*. 2023 Feb;29(2):81-87
12. Sohail MA, Vachharajani TJ, Anvari E. Central Venous Catheters for Hemodialysis- the Myth and the Evidence. *Kidney Int Rep*. 2021 Oct 11;6(12):2958-2968
13. Murea M, Grey CR, Lok CE. Shared decision-making in hemodialysis vascular access practice. *Kidney Int*. 2021 Oct;100(4):799-808
14. Centers for Disease Control and Prevention. Hemodialysis central venous catheter scrub-the-hub protocol. <https://www.cdc.gov/dialysis/PDFs/collaborative/Hemodialysis-Central-Venous-Catheter-STH-Protocol.pdf>. Visited February 2024

15. ICU Medical. Tego™ needlefree hemodialysis connector.
<https://www.icumed.com/products/renal-care/tego-connector/>. Visted October 2023
16. 3M™ Curos™ for Tego®. Application guide.
<https://multimedia.3m.com/mws/media/1963491O/3m-curos-how-to-use-for-tego-hemodialysis-connectors.pdf?&fn=Curos%20how%20to%20use%20for%20Tego%20hemodialysis%20connectors.pdf>. Visited April 2024
17. Porazko T, Hobot J, Klinger M. Non-invasive tunneled catheter reposition (NTCR): A simple and safe method to restore central tunneled catheter function for haemodialysis. *Sci Rep.* 2020 May 18;10(1):8162
18. Mrozek N, Lautrette A, Timsit JF, Souweine B. How to deal with dialysis catheters in the ICU setting. *Ann Intensive Care.* 2012 Nov 23;2(1):48
19. Beathard GA. Early evaluation of the newly created hemodialysis arteriovenous fistula. In: UpToDate, Connor RF (Ed), Wolters Kluwer.
<https://www.uptodate.com/contents/early-evaluation-of-the-newly-created-hemodialysis-arteriovenous-fistula>. Visited September 2023
20. Arasu R, Jegatheesan D, Sivakumaran Y. Overview of hemodialysis access and assessment. *Can Fam Physician.* 2022 Aug;68(8):577-582
21. Wilmink T, Powers S, Hollingworth L, Stevenson T. Effect of first cannulation time and dialysis machine blood flows on survival of arteriovenous fistulas. *Nephrol Dial Transplant.* 2018 May 1;33(5):841-846
22. Sułkowski L, Matyja M, Pasternak A. Lipectomy technique as a second-stage procedure for primarily matured, deep outflow vein in obese individuals. *Indian J Nephrol.* 2018 Jul-Aug;28(4):320-322
23. Pisoni RL, Zepel L, Zhao J, Burke S, Lok CE, Woodside KJ, Wasse H, Kawanishi H, Schaubel DE, Zee J, Robinson BM. International comparisons of native arteriovenous fistula patency and time to becoming catheter-free: findings from the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Am J Kidney Dis.* 2021 Feb;77(2):245-254
24. Nantakool S, Reanpang T, Prasannarong M, Pongtam S, Rerkasem K. Upper limb exercise for arteriovenous fistula maturation in people requiring permanent haemodialysis access. *Cochrane Database of Systematic Reviews.* 2022 Issue 10. Art. No.: CD013327
25. Chen JW, Fu HY, Hii IH, Tseng HW, Chang PY, Chang CH, Chen YS, Hsu RB, Wu IH, Chen YM, Chu TS, Hung KY, Lin SL, Wu KD, Chan CY. A randomized trial of postoperative handgrip exercises for fistula maturation in patients with newly created wrist radiocephalic arteriovenous fistulas. *Kidney Int Rep.* 2022 Dec 24;8(3):566-574
26. Huang J, Zheng P, Chen X, Zheng F, He B. Effect of far-infrared therapy device on arteriovenous fistula maturation and lifespan in hemodialysis patients: a randomized controlled clinical trial. *Front Surg.* 2023 Sep 11;10:1260979
27. Sullivan B, Desai S, Singh TM, Mitra A. Early application of an intermittent pneumatic compression device assists dilation of radiocephalic fistulas. *J Vasc*

- Access. 2019 Mar;20(2):146-152
28. Vascular News. *Fist Assist receives FDA breakthrough device designation for wearable vein dilation device.* December 20 2021. <https://vascularnews.com/fist-assist-receives-fda-breakthrough-device-designation-for-wearable-vein-dilation-device/>. Visited October 2023
29. Marsh AM, Genova R, Buick Lopez JL. Dialysis fistula. [Updated 2023 May 23]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK559085/>. Visited October 2023
30. Lawson JH, Niklason LE, Roy-Chaudhury P. Challenges and novel therapies for vascular access in haemodialysis. *Nat Rev Nephrol.* 2020 Oct;16(10):586-602
31. Alabi O, Teruya T, Sheng N, Bianchi C, Chiriano J, Abou-ZamZam A. Distal radial artery embolization: an alternative approach towards access preservation and limb salvage in radiocephalic arteriovenous fistulae complicated by steal syndrome. *Ann Vasc Surg.* 2016 May;33:131.e1-5
32. Brouwer DJ. Cannulation camp: basic needle cannulation training for dialysis staff. *Dial Transplant.* 2011 Oct; 40(10):434-439
33. United States Renal Data System. *2022 USRDS Annual Data Report: Epidemiology of kidney disease in the United States.* National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2022 (Volume 2, Table H.12). Available at www.usrds.org/reference.aspx. Accessed May 2023
34. CareFusion. ChloraPrep®. Establishing a new standard for skin antisepsis. http://pages.carefusion.com/rs/565-YXD-236/images/IP_ChloraPrep-Surgical-Presentation_IM_EN.pdf. Accessed October 2023
35. Kapoor T, Meyer KB, Johnson DS. Infection prevention and the medical director: uncharted territory. *Clin J Am Soc Nephrol.* 2015 May 7;10(5):863-74
36. Angelini Pharma. ExSept® Plus antimicrobial exit site, skin & wound cleanser. https://www.angelinipharma.us/media/xaiq22k/exsept-ifu_update_with-cannulation.pdf. Visited April 2024
37. Parisotto MT, Schoder VU, Miriunis C, Grassmann AH, Scatizzi LP, Kaufmann P, Stopper A, Marcelli D. Cannulation technique influences arteriovenous fistula and graft survival. *Kidney Int.* 2014 Oct;86(4):790-7
38. Karkhah S, Pourshaikhian M, Ghorbani Vajargah P, Zaboli Mahdiabadi M, Mollaei A, Maroufizadeh S, Hosseini SJ, Osuji J, Moghadamnia MT. Needle direction and distance of arteriovenous fistula cannulation in hemodialysis adequacy; a systematic review and meta-analysis. *Arch Acad Emerg Med.* 2023 May 20;11(1):e39
39. Wang LP, Tsai LH, Huang HY, Okoli C, Guo SE. Effect of buttonhole cannulation versus rope-ladder cannulation in hemodialysis patients with vascular access: a systematic review and meta-analysis of randomized/clinical controlled trials. *Medicine (Baltimore).* 2022 Jul 22;101(29):e29597
40. Hammes M, Boghosian M, Cassel K, Watson S, Funaki B, Doshi T, Mahmoudzadeh Akherat SM, Hines J, Coe F. Increased inlet blood flow velocity predicts low wall

- shear stress in the cephalic arch of patients with brachiocephalic fistula access. *PLoS One.* 2016 Apr 13;11(4):e0152873
41. Fulker D, Kang M, Simmons A, Barber T. The flow field near a venous needle in hemodialysis: a computational study. *Hemodial Int.* 2013 Oct;17(4):602-11
 42. Staaf K, Fernström A, Uhlin F. Preconditions that facilitate cannulation in arteriovenous fistula: A mixed-methods study. *J Ren Care.* 2023 Dec;49(4):264-277
 43. Brouwer-Maier DJ. Cannulation of arteriovenous vascular access: science and art. In: Nissenson AR, Fine RN, Mehrotra R, Zaritsky J (Eds.), *Handbook of Dialysis Therapy*, 6th ed. Elsevier, Philadelphia. 2023
 44. Bushey M. Buttonhole cannulation of arteriovenous fistulas: a dialysis nurse's perspective. *Kidney360.* 2020 Mar 5;1(4):279-280
 45. Mott S, Prowant BF. The "touch cannulation" technique for hemodialysis. *Nephrol Nurs J.* 2008 Jan-Feb;35(1):65-6
 46. Ball LK. The buttonhole technique: strategies to reduce infections. *Nephrol Nurs J.* 2010 Sep-Oct;37(5):473-7; quiz 478
 47. Jose MD, Marshall MR, Read G, Lioufas N, Ling J, Snelling P, Polkinghorne KR. Fatal dialysis vascular access hemorrhage. *Am J Kidney Dis.* 2017 Oct;70(4):570-575
 48. Chan DYF, Dobson S, Barber T. Hemodialysis taping styles and their effect on reducing the chance of venous needle dislodgement. *Semin Dial.* 2021 May;34(3):218-223
 49. Speranza-Reid J, Brouwer-Maier D, Cruz CM, Inglese M. Venous needle dislodgement and access-bloodline separation. *Nephrol Nurs J.* 2021 Jul-Aug;48(4):347-365
 50. Ibrahim MB, Abdelaal Badawi SE, Alameri RA. Assessment of pain and anxiety during arteriovenous fistula cannulation among hemodialysis patients: a cross-sectional study in Saudi Arabia. *J Multidiscip Healthc.* 2022 Apr 5;15:705-718
 51. Schoch M, Bennett PN, Currey J, Hutchinson AM. Nurses' perceptions of point-of-care ultrasound for haemodialysis access assessment and guided cannulation: a qualitative study. *J Clin Nurs.* 2023 Dec;32(23-24):8116-8125
 52. Kumbar L, Soi V, Adams E, Brown Deacon C, Zidan M, Yee J. Coronal mode ultrasound guided hemodialysis cannulation: a pilot randomized comparison with standard cannulation technique. *Hemodial Int.* 2018 Jan;22(1):23-30
 53. Centers for Medicare and Medicaid Services. ESRD surveyor training interpretive guidance. Final Version 1.1. October 3, 2008.
<https://www.hhs.gov/guidance/document/esrd-surveyor-training-interpretive-guidance-version-11>. Visited April 2024
 54. Cleveland Clinic. Pain and the brain: what is the gate control theory? September 20, 2022. <https://health.clevelandclinic.org/gate-control-theory-of-pain/>. Visited October 2023
 55. Kosmadakis G, Amara B, Costel G, Lescure C. Pain associated with arteriovenous fistula cannulation: still a problem. *Nephrol Ther.* 2022 Feb;18(1):59-62
 56. Khosravi Pour A, Hejazi S, Kameli A, Hoseini Azizi T, Armat MR, Eshghi M. Cooling spray or lidocaine spray and needle insertion pain in hemodialysis patients: an open-label cross-over randomized clinical trial. *BMC Anesthesiol.* 2023 Mar

7;23(1):69

57. Centers for Medicare & Medicaid Services. CY 2024 ESRD PPS Consolidated Billing List Attachment B. <https://www.cms.gov/files/document/items-and-services-subject-esrd-pps-consolidated-billing-effective-1-1-2024.pdf>. Visited April 2024
58. Çelik G, Özbek O, Yılmaz M, Duman I, Özbek S, Apiliogullari S. Vapocoolant spray vs lidocaine/prilocaine cream for reducing the pain of venipuncture in hemodialysis patients: a randomized, placebo-controlled, crossover study. *Int J Med Sci.* 2011;8(7):623-7
59. Shaheen S, Arshad AR, Khattak MAK. Comparison of prilocaine/lidocaine cream with piroxicam gel for reducing pain during cannulation of arteriovenous fistula for adults undergoing haemodialysis: a randomized crossover clinical trial. *J Vasc Access.* 2022 Dec 27:11297298221142375
60. ACTAVIS. EMLA cream. (package insert)
https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/019941s021lbl.pdf. Visited April 2024
61. Lee K, Kim D, Lee H, Lee E. The effect of using vapocoolant spray for pain reduction in arteriovenous fistula cannulation among patients undergoing hemodialysis: A randomized control trial. *Appl Nurs Res.* 2023 Jun;71:151674
62. Teligent Pharma, Inc. Lidocaine hydrochloride. (package insert)
<https://dailymed.nlm.nih.gov/dailymed/fda/fdaDrugXsl.cfm?setid=b9ecc644-1c3f-46c5-91ec-d310884393bd&type=display>. Visited April 2024
63. Ball LK. Improving arteriovenous fistula cannulation skills. *Nephrol Nurs J.* 2005 Nov-Dec;32(6):611-7; quiz 618
64. Silva DMD, Silva RMCRA, Pereira ER, Ferreira HC, Alcantara VCG, Oliveira FDS. The body marked by the arteriovenous fistula: a phenomenological point of view. *Rev Bras Enferm.* 2018 Nov-Dec;71(6):2869-2875
65. Jones RG, Khawaja A, Tullett K, Inston NG. Early experience and observations in endovascular dialysis fistula re-intervention. *J Vasc Access.* 2020 Nov;21(6):818-825
66. Wasse H, Alvarez AC, Brouwer-Maier D, Hull JE, Balamuthusamy S, Litchfield TF, Cooper RI, Rajan DK, Niyyar VD, Agarwal AK, Abreo K, Lok CE, Jennings WC. Patient selection, education, and cannulation of percutaneous arteriovenous fistulae: an ASDIN White Paper. *J Vasc Access.* 2020 Nov;21(6):810-817
67. Lok CE, Rajan DK, Clement J, Kiaii M, Sidhu R, Thomson K, Buldo G, Dipchand C, Moist L, Sasal J; NEAT Investigators. Endovascular proximal forearm arteriovenous fistula for hemodialysis access: results of the prospective, multicenter novel endovascular access trial (NEAT). *Am J Kidney Dis.* 2017 Oct;70(4):486-497
68. Bontinis A, Bontinis V, Koutsoumpelis A, Wilminck T, Giannopoulos A, Rafailidis V, Chorti A, Ktenidis K. A systematic review aggregated data and individual participant data meta-analysis of percutaneous endovascular arteriovenous fistula. *J Vasc Surg.* 2023 Apr;77(4):1252-1261.e3
69. Dawoud D, Lok CE, Waheed U. Recent advances in arteriovenous access creation for hemodialysis: new horizons in dialysis vascular access. *Adv Chronic Kidney Dis.* 2020 May;27(3):191-198

70. Goolsby C, Rojas LE, Andersen M, Charlton N, Tilley L, Pasley J, Rasmussen TE, Levy MJ. Potentially survivable fatal vascular access hemorrhage with tourniquet use: a post-mortem analysis. *J Am Coll Emerg Physicians Open*. 2020 Aug 17;1(6):1224-1229.
71. Greenstein R, Nawrocki P, Nesbit C. Bottle it up: prehospital management of an AV fistula bleed using a bottle cap. *Am J Emerg Med*. 2023 May;67:197.e1-197.e2.
72. Williams D, Leuthardt EC, Genin GM, Zayed M. Tailoring of arteriovenous graft-to-vein anastomosis angle to attenuate pathological flow fields. *Sci Rep*. 2021 Jun 9;11(1):12153.
73. Neyra NR, Wazir S. The evolving panorama of vascular access in the 21st century. *Front Nephrol*. 2022 Oct 26;2:917265.
74. Levin SR, Farber A, Cheng TW, Arinze N, Jones DW, Kalish JA, Rybin D, Siracuse JJ. Risk assessment of significant upper extremity arteriovenous graft infection in the Vascular Quality Initiative. *J Vasc Surg*. 2020 Mar;71(3):913-919.
75. Hajibandeh S, Burton H, Gleed P, Hajibandeh S, Wilmink T. Impact of arteriovenous fistulas versus arteriovenous grafts on vascular access performance in haemodialysis patients: a systematic review and meta-analysis. *Vascular*. 2022 Dec;30(6):1021-1033.
76. Merit Medical. HeRO® graft instructions for use. https://www.merit.com/wp-content/uploads/2017/02/403225007_001.pdf. Visited April 2024.
77. Tabriz DM, Arslan B. HeRO Graft: indications, technique, outcomes, and secondary intervention. *Semin Intervent Radiol*. 2022 Feb 18;39(1):82-89.
78. Merit Medical. HeRO® Graft care and cannulation. https://www.merit.com/wp-content/uploads/2016/03/XX_ML0724.000_HeRO_Care-and-Cann_EU.pdf. Visited April 2024.
79. Perry JW, Hardy D, Agarwal S, Agarwal G. Safety and efficacy of a modified HeRO dialysis device in achieving early graft cannulation: a single-institution experience. *J Vasc Surg Cases Innov Tech*. 2017 Sep 19;3(3):175-179.
80. Roetker NS, Guo H, Ramey DR, McMullan CJ, Atkins GB, Wetmore JB. Hemodialysis vascular access and risk of major bleeding, thrombosis, and cardiovascular events: a cohort study. *Kidney Med*. 2022 Mar 24;4(6):100456.
81. Almehmi A, Sheta M, Abaza M, Almehmi SE, El-Khudari H, Shaikh A. Endovascular management of thrombosed dialysis vascular circuits. *Semin Intervent Radiol*. 2022 Feb 18;39(1):14-22.
82. Varma R, Betancourt-Torres M, Bready E, Al-Balas A. Dialysis access-associated steal syndrome with percutaneous endovascular arteriovenous fistula creation. *CVIR Endovasc*. 2022 Feb 26;5(1):13.
83. Choi YS, Lee IJ, An JN, Song YR, Kim SG, Lee HS, Kim JK. High-flow arteriovenous fistula and myocardial fibrosis in hemodialysis patients with non-contrast cardiac magnetic resonance imaging. *Front Cardiovasc Med*. 2022 Jul 27;9:922593.
84. Zahra SA, Choudhury RY, Basharat K, Tran T, Begum M, Abotabekh A, Hedayat F, Rimmer L, Harky A, Bashir M. Translational sciences in cardiac failure secondary to arteriovenous fistula in hemodialysis patients. *Ann Vasc Surg*. 2021 Jul;74:431-449.
85. IPRO End-Stage Renal Disease Network of the South Atlantic. Vascular access

- planning guide for professionals. HHSM-500-2016-00006C.
<https://esrd.ipro.org/wp-content/uploads/2020/07/Vascular-Access-Planning-for-Professionals.pdf>. Visited April 2024
86. United States Renal Data System. *2023 USRDS Annual Data Report: Epidemiology of kidney disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD, 2023 (Volume 2, Table H3). Available at <https://usrds-adr.niddk.nih.gov/2023/reference-tables>. Accessed May 2023
87. Redsense Medical. Sensor patch. <https://redsenzemical.com/products/sensor-patch/>. Visited April 2024
88. Teodorescu V. BRAG classification. 2023 PowerPoint.
89. Saeed F, Kousar N, Sinnakirouchenan R, Ramalingam VS, Johnson PB, Holley JL. Blood loss through AV fistula: a case report and literature review. *Int J Nephrol.* 2011;2011:350870
90. Fresenius Medical Care. CombiSet true flow bloodlines.
<https://fmcna.com/products/disposables/bloodlines/combiset/>. Visited June 2024
91. Fresenius Medical Care. CombiSet® Smartech instructions for use.
<https://fmcna.com/content/dam/fmcna/live/support/documents/instructions-for-use/bloodlines---ifus/G71-4582%20-%20CombiSet%20SMARTECH.pdf>. Visited June 2024

Module 8 Peritoneal Dialysis

1. Htay H, Johnson DW, Wiggins KJ, Badve SV, Craig JC, Strippoli GF, Cho Y. Biocompatible dialysis fluids for peritoneal dialysis. *Cochrane Database Syst Rev*. 2018 Oct 26;10(10):CD007554
2. Misra M, Khanna R. Mechanisms of solute clearance and ultrafiltration in peritoneal dialysis. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/mechanisms-of-solute-clearance-and-ultrafiltration-in-peritoneal-dialysis/print>. Visited April 2024
3. Kiebalo T, Holotka J, Habura I, Pawlaczyk K. Nutritional status in peritoneal dialysis: nutritional guidelines, adequacy and the management of malnutrition. *Nutrients*. 2020 Jun 8;12(6):1715
4. Krediet RT. Aging of the peritoneal dialysis membrane. *Front Physiol*. 2022 Apr 28;13:885802
5. Cleveland Clinic. Peritoneum. <https://my.clevelandclinic.org/health/body/22894-peritoneum>. Visited April 2024
6. Li J, Liu Y, Liu J. A review of research progress on mechanisms of peritoneal fibrosis related to peritoneal dialysis. *Front Physiol*. 2023 Sep 25;14:1220450
7. Niu W, Yang X, Yan H, Yu Z, Li Z, Lin X, Gu L, Ni Z, Fang W. Peritoneal protein clearance is associated with cardiovascular events but not mortality in peritoneal dialysis patients. *Front Med (Lausanne)*. 2022 Jun 2;9:748934
8. Crabtree JH, Shrestha BM, Chow KM, Figueiredo AE, Povlsen JV, Wilkie M, Abdel-Aal A, Cullis B, Goh BL, Briggs VR, Brown EA, Dor FJMF. Creating and maintaining optimal peritoneal dialysis access in the adult patient: 2019 update. *Perit Dial Int*. 2019 Sep-Oct;39(5):414-436
9. Kim K, Son YK, Lee SM, Kim SE, An WS. Early technical complications and long-term survival of urgent peritoneal dialysis according to break-in periods. *PLoS One*. 2018 Oct 26;13(10):e0206426
10. Khan SF, Rosner MH. Optimizing peritoneal dialysis catheter placement. *Front Nephrol*. 2023 Apr 11;3:1056574
11. Salzer WL. Peritoneal dialysis-related peritonitis: challenges and solutions. *Int J Nephrol Renovasc Dis*. 2018 Jun 11;11:173-186
12. Marki E, Moisoglou I, Aggelidou S, Malliarou M, Tsaras K, Papathanasiou IV. Body image, emotional intelligence and quality of life in peritoneal dialysis patients. *AIMS Public Health*. 2023 Aug 14;10(3):698-709
13. Crabtree JH, Mancini A, Piraino B, Gellens M, Abdel Aal AK, Todd L, Lambertson K, Ales L, Derico JR, Allison C. A practical guide to PD access care—infectious and non-infectious complications management. Baxter International. 2022. <https://www.pdempowers.com/sites/g/files/eby sai3941/files/2022-12/PD%20ACCESS%20GUIDE%202022%20-%20COMPLETE%2011-10-22%20INTERACTIVE.pdf>. Visited April 2024
14. Centers for Disease Control and Prevention. Infection control for peritoneal dialysis (PD) patients after a disaster. <https://www.cdc.gov/disasters/icfordialysis.html>.

Visited April 2024

15. Fresenius Medical Care. Home therapies product catalogue 2017. https://fmcna.com/content/dam/fmcna/live/support/documents/product-catalogs/HomeTherapies_1000378-F_2017_r6_new.pdf. Visited April 2024
16. Angelini Pharma. Alcavis® 50. https://www.angelinipharma.us/media/um1ggx5d/new-2020-alcavis-procedure-specific-ifus_print_f.pdf. Visited April 2024
17. Angelini Pharma. Exsept Plus®. <https://www.angelinipharma.us/therapeutic-areas/dialysis/exsept-plus/>. Visited April 2024
18. Blake P. Drain pain, overfill, and how they are connected. *Perit Dial Int.* 2014 Jun;34(4):342-4
19. Alrowiyyi IM, Bargman J. A review of residual kidney function in peritoneal dialysis patients. *Indian J Nephrol.* 2023 Jul-Aug;33(4):239-246
20. Goossen K, Becker M, Marshall MR, Bühn S, Breuing J, Firaneck CA, Hess S, Nariai H, Sloand JA, Yao Q, Chang TI, Chen J, Paniagua R, Takatori Y, Wada J, Pieper D. Icodextrin versus glucose solutions for the once-daily long dwell in peritoneal dialysis: an enriched systematic review and meta-analysis of randomized controlled trials. *Am J Kidney Dis.* 2020 Jun;75(6):830-846
21. Taheri S, Thiagaraj SS, Shukla TS, Gutlapalli SD, Farhat H, Muthiah K, Pallipamu N, Hamid P. A review on major pathways leading to peritoneal fibrosis in patients receiving continuous peritoneal dialysis. *Cureus.* 2022 Nov 22;14(11):e31799
22. Baxter Healthcare Corporation. Full prescribing information [DIANEAL]. https://www.baxterpi.com/pi-pdf/Dianeal_PI.pdf. Visited April 2024
23. Schmitt CP, Haraldsson B, Doetschmann R, Zimmering M, Greiner C, Böswald M, Klaus G, Passlick-Deetjen J, Schaefer F. Effects of pH-neutral, bicarbonate-buffered dialysis fluid on peritoneal transport kinetics in children. *Kidney Int.* 2002 Apr;61(4):1527-36
24. Chen JHC, Johnson DW, Cho Y, Cheetham M, Sud K, Hayat A, Stallard B, Clayton P, Davies CE, Borlace M, Boudville N. Associations of neutral pH, low-GDP peritoneal dialysis solutions with patient survival, transfer to haemodialysis and peritonitis. *Nephrol Dial Transplant.* 2024 Jan 31;39(2):222-232
25. Cambien G, Dupuis A, Guiheneuc J, Bauwens M, Belmouaz M, Ayraud-Thevenot S. Endocrine disruptors in dialysis therapies: a literature review. *Environ Int.* 2023 Aug;178:108100
26. Fresenius Medical Care. FDA approves new container system for peritoneal dialysis solutions. Oct. 19, 2020. <https://fmcna.com/company/our-company/news-releases/fda-approves-new-container-system-pd-solutions/>. Visited April 2024
27. Baxter Healthcare Corporation. Full prescribing information [Extraneal®]. https://baxterpi.com/pi-pdf/Extraneal_PI.pdf. Visited April 2024
28. Misra M, Khanna R. Peritoneal equilibration test. In: UpToDate, Connor RF (ed), Wolters Kluwer. <https://www.uptodate.com/contents/peritoneal-equilibration-test>. Visited April 2024

29. Htay H, Johnson DW, Craig JC, Teixeira-Pinto A, Hawley CM, Cho Y. Urgent-start peritoneal dialysis versus haemodialysis for people with chronic kidney disease. *Cochrane Database of Systematic Reviews* 2021, Issue 1. Art. No.: CD012899
30. Bartosova M, Schmitt CP. Biocompatible peritoneal dialysis: the target is still way off. *Front Physiol.* 2019 Jan 7;9:1853
31. Kosmadakis G, Albaret J, Da Costa Correia E, Somda F, Aguilera D. Constipation in peritoneal dialysis patients. *Perit Dial Int.* 2019 Sep-Oct;39(5):399-404
32. Oza-Gajera BP, Abdel-Aal AK, Almehmi A. Complications of percutaneous peritoneal dialysis catheter. *Semin Intervent Radiol.* 2022 Feb 18;39(1):40-46
33. Cheng BC, Tsai NW, Lai YR, Huang CC, Lu CH. Impact of intra-abdominal adhesion on dialysis outcome in peritoneal dialysis patients. *Biomed Res Int.* 2018 Sep 25;2018:1978765
34. Wang AW, Prieto JM, Cauvi DM, Bickler SW, De Maio A. The greater omentum—a vibrant and enigmatic immunologic organ involved in injury and infection resolution. *Shock.* 2020 Apr;53(4):384-390
35. Rajora N, De Gregorio L, Saxena R. Peritoneal dialysis use in patients with ascites: a review. *Am J Kidney Dis.* 2021 Nov;78(5):728-735
36. Alferes D, Almeida C, Carmo R, Lopes D, Fernandes JC, Gomes AM, Almeida MC. Risk factors for abdominal wall hernias in peritoneal dialysis patients. *Nephrol Dial Transplant.* 2022 May;37(suppl 3):MO674
37. Danford CJ, Lin SC, Smith MP, Wolf JL. Encapsulating peritoneal sclerosis. *World J Gastroenterol.* 2018 Jul 28;24(28):3101-3111
38. Dossin T, Goffin E. When the color of peritoneal dialysis effluent can be used as a diagnostic tool. *Semin Dial.* 2019 Jan;32(1):72-79
39. Burkart JM, Bleyer A. Peritoneal catheter exit-site and tunnel infections in peritoneal dialysis in adults. In: UpToDate, Connor RF (ed), Wolters Kluwer. https://www.uptodate.com/contents/peritoneal-catheter-exit-site-and-tunnel-infections-in-peritoneal-dialysis-in-adults?topicRef=4426&source=see_link#H71400278. Visited November 2024
40. Crabtree JH. Managing peritoneal dialysis catheter complications (a two-part series) part 2: exit-site/tunnel infections, relapsing peritonitis, and acute abdominal emergencies. 2018. Baxter International Inc. <https://www.pdemowers.com/sites/g/files/eby54016/files/2020-05/Exit-Site-Tunnel-Infections-Relapsing-Peritonitis-and-Acute-Abdominal-Emergencies-Participant-guide-USMPMG23219-0026d.pdf>. Visited April 2024
41. Htay H, Johnson DW, Craig JC, Schena FP, Strippoli GF, Tong A, Cho Y. Catheter type, placement and insertion techniques for preventing catheter-related infections in chronic peritoneal dialysis patients. *Cochrane Database Syst Rev.* 2019 May 31;5(5):CD004680
42. Yap DY, Chu WL, Ng F, Yip TP, Lui SL, Lo WK. Risk factors and outcome of contamination in patients on peritoneal dialysis—a single-center experience of 15 years. *Perit Dial Int.* 2012 Nov-Dec;32(6):612-6
43. Li PK, Chow KM, Cho Y, Fan S, Figueiredo AE, Harris T, Kanjanabuch T, Kim YL, Madero M, Malyszko J, Mehrotra R, Okpechi IG, Perl J, Piraino B, Runnegar N,

- Teitelbaum I, Wong JK, Yu X, Johnson DW. ISPD peritonitis guideline recommendations: 2022 update on prevention and treatment. *Perit Dial Int.* 2022 Mar;42(2):110-153
44. So SWY, Chen L, Woo AYH, Ng DMH, Wong JKW, Chow KM, Runnegar N, Johnson DW, Li PK. Stability and compatibility of antibiotics in peritoneal dialysis solutions. *Clin Kidney J.* 2022 Jan 17;15(6):1071-1078
45. Juarez Villa D, Cano Escobar KB, Toledo Ramirez S, Zepeda Quiroz I. Fungal peritonitis associated with peritoneal dialysis due to non-albicans candida: a case series. *Cureus.* 2022 Dec 18;14(12):e32658
46. Lambie M, Zhao J, McCullough K, Davies SJ, Kawanishi H, Johnson DW, Sloand JA, Sanabria M, Kanjanabuch T, Kim YL, Shen JI, Pisoni RL, Robinson BM, Perl J; PDOPPS Steering Committee. Variation in peritoneal dialysis time on therapy by country: results from the Peritoneal Dialysis Outcomes and Practice Patterns Study. *Clin J Am Soc Nephrol.* 2022 Jun;17(6):861-871

Module 9 Hemodialysis Procedures

1. Centers for Disease Control and Prevention. CDC's core infection prevention and control practices for safe healthcare delivery in all settings.
<https://www.cdc.gov/infectioncontrol/guidelines/core-practices/index.html>. Visited April 2024
2. Recommendations for preventing transmission of infections among chronic hemodialysis patients. *MMWR Recomm Rep.* 2001 Apr 27;50(RR-5):1-43
3. United States Department of Labor. Occupational Safety and Health Administration. *Guidelines for nursing homes: ergonomics for the prevention of musculoskeletal disorders.* (OSHA 3182-3R 2009).
https://www.osha.gov/sites/default/files/publications/final_nh_guidelines.pdf. Visited April 2024
4. Wang HH, Wu JL, Lee YC, Ho LC, Chang MY, Liou HH, Hung SY. Risk of serious falls between hemodialysis and peritoneal dialysis patients: a nationwide population-based cohort study. *Sci Rep.* 2020 May 8;10(1):7799
5. Kutner NG, Zhang R, Huang Y, Wasse H. Falls among hemodialysis patients: potential opportunities for prevention? *Clin Kidney J.* 2014 Jun;7(3):257-63
6. Sehgal M, Jacobs J, Biggs WS. Mobility assistive device use in older adults. *Am Fam Physician.* 2021 Jun 15;103(12):737-744
7. Bergman R, De Jesus O. Patient care transfer techniques. [Updated 2022 Oct 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. <https://www.ncbi.nlm.nih.gov/books/NBK564305/>. Visited December 2023
8. United States Department of Labor. Occupational Safety and Health Administration. Worker safety in hospitals: understanding the problem.
<https://www.osha.gov/hospitals/understanding-problem>. Visited November 2023
9. Waters TR, Nelson A, Hughes N, Menzel N. Safe patient handling training for schools of nursing. Curricular materials. National Institute for Occupational Safety and Health; United States Veterans Health Administration; American Nurses Association. November 2009. Department of Health and Human Services. (NIOSH) 2009-127. <https://stacks.cdc.gov/view/cdc/39807>. Visited April 2024
10. Stevens S. Assisting the blind and visually impaired: guidelines for eye health workers and other helpers. *Community Eye Health.* 2003;16(45):7-9
11. Safe 'N' Clear. Facing treatment of kidney disease with hearing disabilities.
<https://safenclear.com/facing-treatment-of-kidney-disease-with-hearing-disabilities-2/>. Visited April 2024
12. Kang SM, Lim HW, Yu H. Idiopathic sudden sensorineural hearing loss in dialysis patients. *Ren Fail.* 2018 Nov;40(1):170-174
13. Tariq RA, Sharma S. Inappropriate medical abbreviations. 2023 May 22. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 30085548
14. Arslanian J. *The hemodialysis treatment.* In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association.

2020. pp. 1002-1019
15. Pittard JD. Safety monitors in hemodialysis. In: Nissenson AR, Fine RN, Mehrotra R, Zaritsky J (Eds.), *Handbook of Dialysis Therapy*, 6th ed. Elsevier, Philadelphia. 2023
 16. Payne GM. *Water treatment*. In C. S. Counts (Ed.), *Core Curriculum for Nephrology Nursing* (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp. 988-1001
 17. Kanbay M, Ertuglu LA, Afsar B, Ozdogan E, Siriopol D, Covic A, Basile C, Ortiz A. An update review of intradialytic hypotension: concept, risk factors, clinical implications and management. *Clin Kidney J.* 2020 Jul 8;13(6):981-993
 18. Stegmayr BG. Sources of mortality on dialysis with an emphasis on microemboli. *Semin Dial.* 2016 Nov;29(6):442-446
 19. End-Stage Renal Disease Network Coordinating Center. *It only takes a minute to save your patient's lifeline*. Prepared under contract with the Centers for Medicare & Medicaid Services. CMS Contract Number: HHSM-500-2013-NW002C. https://cdn.ymaws.com/www.asdin.org/resource/resmgr/associate_resources/staff-complete-guide.pdf. Visited April 2024
 20. Flythe JE, Chang TI, Gallagher MP, Lindley E, Madero M, Sarafidis PA, Unruh ML, Wang AY, Weiner DE, Cheung M, Jadoul M, Winkelmayer WC, Polkinghorne KR; Conference Participants. Blood pressure and volume management in dialysis: conclusions from a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference. *Kidney Int.* 2020 May;97(5):861-876
 21. Lin K. For accurate blood pressure measurement, cuff size matters. American Family Physician Community Blog. August 21, 2023. <https://www.aafp.org/pubs/afp/afp-community-blog/entry/for-accurate-blood-pressure-measurement-cuff-size-matters.html>. Visited April 2024
 22. American Heart Association. All about heart rate (pulse). <https://www.heart.org/en/health-topics/high-blood-pressure/the-facts-about-high-blood-pressure/all-about-heart-rate-pulse>. January 2024
 23. Torp KD, Modi P, Pollard EJ, Simon LV. Pulse oximetry. [Updated 2023 Jul 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. <https://www.ncbi.nlm.nih.gov/books/NBK470348/>. Visited January 2024
 24. Sapra A, Malik A, Bhandari P. Vital sign assessment. [Updated 2023 May 1]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. <https://www.ncbi.nlm.nih.gov/books/NBK553213/>. Visited February 2024
 25. Hussein WF, Arramreddy R, Sun SJ, Reiterman M, Schiller B. Higher ultrafiltration rate is associated with longer dialysis recovery time in patients undergoing conventional hemodialysis. *Am J Nephrol.* 2017;46(1):3-10
 26. Canaud B, Kooman JP, Selby NM, Taal MW, Francis S, Maierhofer A, Kopperschmidt P, Collins A, Kotanko P. Dialysis-induced cardiovascular and multiorgan morbidity. *Kidney Int Rep.* 2020 Sep 9;5(11):1856-1869
 27. Loutradis C, Sarafidis PA, Ferro CJ, Zoccali C. Volume overload in hemodialysis: diagnosis, cardiovascular consequences, and management. *Nephrol Dial Transplant.* 2021 Dec 2;36(12):2182-2193
 28. Bazzano G, Galazzi A, Giusti GD, Panigada M, Laquintana D. The order of draw

- during blood collection: a systematic literature review. *Int J Environ Res Public Health.* 2021 Feb 7;18(4):1568
29. Bayot ML, Tadi P. Laboratory Tube Collection. 2023 Aug 8. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 32310451
30. Bush V, Cohen R. The evolution of evacuated blood collection tubes. *Laboratory Medicine.* 2003 Apr;34(4):304-310
31. Labcorp. Blood specimens: chemistry and hematology.
<https://www.labcorp.com/resource/blood-specimens-chemistry-and-hematology>. Visited December 2023
32. Centers for Disease Control and Prevention. Low blood sugar (hypoglycemia).
<https://www.cdc.gov/diabetes/basics/low-blood-sugar.html>. Visited April 2024
33. Mayo Clinic Staff. Blood sugar testing: why, when and how. [January 16, 2024] Sandhya Pruthi Chief Medical Editor. <https://www.mayoclinic.org/diseases-conditions/diabetes/in-depth/blood-sugar/art-20046628>. Visited April 2024
34. Foos JE. The effect of alcohol prep pads and blood drop number on capillary blood glucose values. 2017. *Honors Theses and Capstones.* 335
<https://scholars.unh.edu/cgi/viewcontent.cgi?article=1340&context=honors>. Visited April 2024
35. National Institute of Diabetes and Digestive and Kidney Diseases. Low blood glucose (hypoglycemia). [https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/low-blood-glucose-hypoglycemia#:~:text=Low%20blood%20glucose%2C%20also%20called,deciliter%20\(mg%2FdL\)..](https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/low-blood-glucose-hypoglycemia#:~:text=Low%20blood%20glucose%2C%20also%20called,deciliter%20(mg%2FdL)..) Visited January 2024
36. Bowman CF, Nichols JH. Comparison of accuracy guidelines for hospital glucose meters. *J Diabetes Sci Technol.* 2020 May;14(3):546-552
37. Deziel S, Arslanian J. *Principles of Hemodialysis.* In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp. 964-987
38. Centers for Medicare and Medicaid Services. ESRD surveyor training interpretive guidance. Final Version 1.1. October 3, 2008.
<https://www.hhs.gov/guidance/document/esrd-surveyor-training-interpretive-guidance-version-11>. Visited April 2024
39. Speranza-Reid J, Brouwer-Maier D, Cruz CM, Inglese M. Venous needle dislodgement and access-bloodline separation. *Nephrol Nurs J.* 2021 Jul-Aug;48(4):347-365
40. Dewald G. *Fluid removal: obtaining the estimated dry weight.* In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. Pp. 1020-1033
41. St. John E. *Complications of hemodialysis: prevention and management.* In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. Pp. 1034-1045
42. Sudusinghe D, Riddell A, Gandhi T, Chowdary P, Davenport A. Increased risk of dialysis circuit clotting in hemodialysis patients with COVID-19 is associated with elevated FVIII, fibrinogen and D-dimers. *Hemodial Int.* 2023 Jan;27(1):38-44

43. Ortiz-Melo DI, Kovalik EC. Methods of hemodialysis anticoagulation. In: Nissenson AR, Fine RN, Mehrotra R, Zaritsky J (Eds.), *Handbook of Dialysis Therapy*, 6th ed. Elsevier, Philadelphia. 2023
44. Wolters Kluwer. Nursing documentation: how to avoid the most common medical errors. <https://www.wolterskluwer.com/en/expert-insights/nursing-documentation-how-to-avoid-the-most-common-medical-documentation-errors>. Visited December 2023
45. Centers for Medicare & Medicaid Services. Electronic health records provider. <https://www.cms.gov/Medicare-Medicaid-Coordination/Fraud-Prevention/Medicaid-Integrity-Education/Downloads/docmatters-ehr-providerfactsheet.pdf>. Visited April 2024
46. Rutala WA, Weber DJ, and the Healthcare Infection Control Practices Advisory Committee (HICPAC). Guideline for disinfection and sterilization in healthcare facilities (2008) [Update May 2019]. Centers for Disease Control and Prevention. <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/>. Visited November 2023
47. Diaz AR, Chin AI. Urea kinetic modeling for guiding hemodialysis therapy in adults. In: Nissenson AR, Fine RN, Mehrotra R, Zaritsky J (Eds.), *Handbook of Dialysis Therapy*, 6th ed. Elsevier, Philadelphia. 2023
48. Suri RS. KDOQI hemodialysis adequacy clinical practice guideline update 2015: what you need to know. [slide presentation for National Renal Administrators' Association] April 20, 2016. https://www.kidney.org/sites/default/files/KDOQI-HD-update-NRAA-2016_FINAL.pdf. Visited January 2024
49. Brunelli S. The dialysis prescription. In: Nissenson AR, Fine RN, Mehrotra R, Zaritsky J (Eds.), *Handbook of Dialysis Therapy*, 6th ed. Elsevier, Philadelphia. 2023

Module 10 Infection Control and Hemodialysis Complications

1. Open Resources for Nursing (Open RN); Ernstmeyer K, Christman E, editors. Nursing Skills [Internet]. Eau Claire (WI): Chippewa Valley Technical College; 2021. Chapter 4 Aseptic Technique. <https://www.ncbi.nlm.nih.gov/books/NBK593203/>. Visited April 2024
2. Schmidt RJ, Flythe JE. Non-access-related infections in patients on chronic dialysis. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/non-access-related-infections-in-patients-on-chronic-dialysis>. Visited November 2023
3. Karkar A. Infection control guidelines in hemodialysis facilities. *Kidney Res Clin Pract.* 2018 Mar;37(1):1-3. doi: 10.23876/j.krcp.2018.37.1.1
4. Centers for Disease Control and Prevention. What is sepsis? <https://www.cdc.gov/sepsis/what-is-sepsis.html>. Visited December 2023
5. Centers for Disease Control and Prevention. CDC's core infection prevention and control practices for safe healthcare delivery in all settings. <https://www.cdc.gov/infectioncontrol/guidelines/core-practices/index.html>. Visited November 2023
6. Jain M, Kim ST, Xu C, Li H, Rose G. Efficacy and use of cloth masks: a scoping review. *Cureus.* 2020 Sep 13;12(9):e10423
7. Centers for Disease Control and Prevention. Standard precautions for all patient care. <https://www.cdc.gov/infectioncontrol/basics/standard-precautions.html>. Visited October 2023
8. Broussard IM, Kahwaji CI. Universal precautions. 2023 Jul 29. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 29262198
9. Centers for Disease Control and Prevention. Hand hygiene in healthcare settings. <https://www.cdc.gov/handhygiene/providers/index.html>. Visited October 2024
10. Centers for Disease Control and Prevention. Hand hygiene audit tool. <https://www.cdc.gov/dialysis/PDFs/collaborative/Hemodialysis-Hand-Hygiene-Observations.pdf>. Visited April 2024
11. Centers for Disease Control and Prevention. Recommendations for disinfection and sterilization in healthcare facilities. <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/recommendations.html>. Visited December 2023
12. Smith BA. COVID-19: general approach to infection prevention in the health care setting. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/covid-19-general-approach-to-infection-prevention-in-the-health-care-setting>. Visited November 2023
13. Centers for Medicare and Medicaid Services. ESRD surveyor training interpretive guidance. Final Version 1.1. October 3, 2008. <https://www.hhs.gov/guidance/document/esrd-surveyor-training-interpretive-guidance-version-11>. Visited April 2024
14. Centers for Disease Control and Prevention. Basic facts about mold and

- dampness. <https://www.cdc.gov/mold/faqs.htm#print>. Visited April 2024
15. Centers for Disease Control and Prevention. Aspergillosis statistics. <https://www.cdc.gov/fungal/diseases/aspergillosis/statistics.html#print>. Visited April 2024
16. Centers for Disease Control and Prevention. Environmental surface disinfection in dialysis facilities: notes for clinical managers. https://www.cdc.gov/dialysis/pdfs/collaborative/env_notes_feb13.pdf. Visited February 2024
17. Centers for Disease Control and Prevention. Recommendations for disinfection and sterilization in healthcare facilities. <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/recommendations.html>. Visited March 2024
18. Centers for Disease Control and Prevention. 3. Environmental cleaning supplies and equipment. https://www.cdc.gov/hai/prevent/resource-limited/supplies-equipment.html#anchor_1586813879077. Visited December 2023
19. The Joint Commission. Preventing central line-associated bloodstream infections: useful tools, an international perspective. Nov 20, 2013. https://www.jointcommission.org/-/media/tjc/documents/resources/health-services-research/clabsi-toolkit/clabsi_toolkit_tool_3-8_aseptic_versus_clean_techniquepdf.pdf. Visited April 2024
20. Centers for Disease Control and Prevention. Interim infection prevention and control recommendations for healthcare personnel during the coronavirus disease (COVID-19) pandemic. [Updated May 8, 2023]. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html>. Visited November 2023
21. United States Renal Data System. 2023 USRDS Annual Data Report: Epidemiology of kidney disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2023. (Introduction). <https://usrds-adr.niddk.nih.gov/2023/introduction>. Visited April 2024
22. Centers for Disease Control and Prevention. Recommendations for preventing transmission of infections among chronic hemodialysis patients. *MMWR Recomm Rep.* 2001 Apr 27;50(RR-5):1-43
23. U.S. Department of Labor. Occupational Safety and Health Administration. Occupational exposure to bloodborne pathogens; needlestick and other sharps injuries; final rule. January 18, 2001. <https://www.osha.gov/laws-regulations/federalregister/2001-01-18>. Visited November 2024
24. Dommert-Breckler B. *Human immunodeficiency virus*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 784-785
25. Carbone N, Paulus AB. *Hepatitis B*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 772-778
26. Carbone N, Paulus AB. *Hepatitis C*. In C. S. Counts (Ed.), Core Curriculum for

- Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 779-783
27. Centers for Disease Control and Prevention. About antimicrobial resistance. <https://www.cdc.gov/drugresistance/about.html>. Visited March 2024
28. Finch LL. *Antibiotic and antimicrobial resistance*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 761-770
29. Centers for Disease Control and Prevention. Infection prevention and control for *Candida auris*. <https://www.cdc.gov/fungal/candida-auris/c-auris-infection-control.html#Dialysis>. Visited February 2024
30. Paulus AB. *Herpes Zoster*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 799-804
31. Dommert-Breckler B. *Tuberculosis*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 791-798
32. Greenberg KI, Choi MJ. Hemodialysis emergencies: core curriculum 2021. *Am J Kidney Dis.* 2021 May;77(5):796-809
33. Saha M, Allon M. Diagnosis, treatment, and prevention of hemodialysis emergencies. *Clin J Am Soc Nephrol.* 2017 Feb 7;12(2):357-369
34. St. John E. *Complications of hemodialysis: prevention and management*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 1034-1045
35. Timofte D, Tanasescu MD, Balan DG, Tulin A, Stiru O, Vacaroiu IA, Mihai A, Popa CC, Cosconel CI, Enyedi M, Miricescu D, Papacocea RI, Ionescu D. Management of acute intradialytic cardiovascular complications: updated overview (Review). *Exp Ther Med.* 2021 Mar;21(3):282
36. Duckett SA, Bartman M, Roten RA. Choking. 2022 Sep 19. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 29763116
37. Mayo clinic. Choking: first aid. <https://www.mayoclinic.org/first-aid/first-aid-choking/basics/art-20056637>. Visited April 2024
38. Bhutta BS, Alghoula F, Berim I. Hypoxia. 2022 Aug 9. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 29493941
39. Dewald G. *Fluid removal: obtaining the estimated dry weight*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 1020-1033
40. Javed N, Molina M, Nasr R, Diaz-Fuentes G. Uremic pericarditis with cardiac tamponade in a patient on hemodialysis. *Case Rep Cardiol.* 2023 Nov 6;2023:5099005
41. Herzog CA, Passman R. Evaluation of sudden cardiac arrest and sudden cardiac death in patients on dialysis. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/evaluation-of-sudden-cardiac-arrest-and-sudden-cardiac-death-in-patients-on-dialysis>. Visited January 2024
42. Kay J, Qunibi WY. Dialysis-related amyloidosis. In: UpToDate, Connor RF (Ed),

Wolters Kluwer. <https://www.uptodate.com/contents/dialysis-related-amyloidosis>. Visited January 2024

43. Westphal SG, Plumb T. Calciphylaxis. 2023 Aug 8. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 30085562
44. Gallo Marin B, Aghagoli G, Hu SL, Massoud CM, Robinson-Boston L. Calciphylaxis and Kidney Disease: A Review. *Am J Kidney Dis.* 2023 Feb;81(2):232-239
45. Biglione B, Cucka B, Iriarte C, Locascio JJ, Goldfarb JW, Gutium A, Lima XT, Kroshinsky D. A retrospective review of outcomes after hyperbaric oxygen therapy for the treatment of calciphylaxis. *J Am Acad Dermatol.* 2024 Jan;90(1):45-51
46. Chen W, Bushinsky D. Chronic kidney disease—mineral and bone disorder. In: Nissenson AR, Fine RN, Mehrotra R, Zaritsky J (Eds.), *Handbook of Dialysis Therapy*, 6th ed. Elsevier, Philadelphia. 2023
47. Dube P, DeRiso A, Patel M, Battepati D, Khatib-Shahidi B, Sharma H, Gupta R, Malhotra D, Dworkin L, Haller S, Kennedy D. Vascular calcification in chronic kidney disease: diversity in the vessel wall. *Biomedicines.* 2021 Apr 8;9(4):404
48. Bowman B, Rosner MH. Common clinical problems in hemodialysis. In: Nissenson AR, Fine RN, Mehrotra R, Zaritsky J (Eds.), *Handbook of Dialysis Therapy*, 6th ed. Elsevier, Philadelphia. 2023
49. Mohanasundaram S. Headaches during dialysis: a brief review.
<https://www.renalfellow.org/2022/07/12/headaches-during-dialysis-a-brief-review/>. Visited March 2024
50. Chhaya KT, Mankad S, Shah MK, Patel M, Desai D, Desai SD. Headache associated with hemodialysis in patients with end-stage renal disease in India: a common yet overlooked comorbidity. *Ann Indian Acad Neurol.* 2022 Jan-Feb;25(1):82-87
51. Arghide Y, Faraji A, Raygani AAV, Salari N, Omrani H, Mohammadi MM. The effect of hemodialysis with cool dialysate on nausea in hemodialysis patients: a randomized clinical trial. *Health Sci Rep.* 2023 Nov 21;6(11):e1709
52. Rafi Fathurrohman M, Suparti S. Analysis on factors affecting nausea and vomiting severity suffered by patients in the early phase of hemodialysis therapy". *Proceedings Series on Health & Medical Sciences*, vol. 1, Dec. 2020, pp. 30-34.
<https://conferenceproceedings.ump.ac.id/index.php/pshms/article/view/29>. Visited March 2024
53. Osakwe N, Hashmi MF. Uremic pruritus evaluation and treatment. 2023 Feb 19. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 36508514
54. Salib M, Memon AN, Gowda AS, Rallabhandi B, Bidika E, Fayyaz H, Cancarevic I. Dialysis patients with restless leg syndrome: can we relieve their suffering? *Cureus.* 2020 Aug 26;12(8):e10053
55. Singh G, Patel RH, Boster J. Root cause analysis and medical error prevention. 2023 May 30. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 34033400

Module 11 Water Treatment and Equipment

1. Winter TC, Harvey JW, Franke OL, Alley WM. Ground water and surface water a single resource. [U.S. Geological Survey Circular 1139] U.S. Geological Survey. Denver, CO 1998
2. U.S. Geological Survey. USGS Water Science School. Water, the universal solvent. <https://www.usgs.gov/special-topics/water-science-school/science/water-universal-solvent>. Visited April 2024
3. U.S. Environmental Protection Agency. Types of drinking water contaminants. <https://www.epa.gov/ccl/types-drinking-water-contaminants>. Visited January 2024
4. U.S. Environmental Protection Agency. Hydraulic fracturing for oil and gas: impacts from the hydraulic fracturing water cycle on drinking water resources in the United States. Executive Summary. 2016. Office of Research and Development, Washington, DC. EPA/600/R-16/236ES. https://www.epa.gov/sites/default/files/2016-12/documents/hfdwa_executive_summary.pdf. Visited May 2024
5. Denchak M. Fracking 101. [Natural Resources Defense Council] <https://www.nrdc.org/stories/fracking-101#what-is>. Visited April 2024
6. United States Environmental Protection Agency. Overview of the Safe Drinking Water Act. <https://www.epa.gov/sdwa/overview-safe-drinking-water-act>. Visited May 2024
7. United States Environmental Protection Agency. Information about public water systems. <https://www.epa.gov/dwreginfo/information-about-public-water-systems>. Visited May 2024
8. Texas Commission on Environmental Quality. Controlling nitrification in public water systems with chloramines. <https://www.tceq.texas.gov/drinkingwater/disinfection/nitrification.html>. Visited February 2024
9. Centers for Disease Control and Prevention. Community water fluoridation recommendations. <https://www.cdc.gov/fluoridation/about/community-water-fluoridation-recommendations.html>. Visited May 2024
10. United States Environmental Protection Agency. pH. <https://www.epa.gov/caddis/ph#high>. Visited May 2024
11. Centers for Disease Control and Prevention. Consumer confidence reports. https://www.cdc.gov/healthywater/drinking/public/understanding_ccr.html. Visited February 2024
12. United States Environmental Protection Agency. Secondary drinking water standards: guidance for nuisance chemicals. <https://www.epa.gov/sdwa/secondary-drinking-water-standards-guidance-nuisance-chemicals#what-are-secondary>. Visited February 2024
13. Canaud B, Lucena R, Ward R. Water and dialysis fluid purity for contemporary hemodialysis. *Semin Dial.* 2023 Sep 11
14. Association for the Advancement of Medical Instrumentation. Complete dialysis

- collection 2022 edition. Association for the Advancement of Medical Instrumentation. Arlington, VA. 2022
15. United States Environmental Protection Agency. National primary drinking water regulations. <https://www.nrc.gov/docs/ML1307/ML13078A040.pdf>. Visited May 2024
 16. Bacle A, Dupuis A, Belmouaz M, Bauwens M, Cambien G, Venisse N, Pierre-Eugene P, Potin S, Migeot V, Ayraud-Thevenot S. Overexposure to Bisphenol A and its chlorinated derivatives of patients with end-stage renal disease during online hemodiafiltration. *Biomolecules*. 2019 Aug 22;9(9):403
 17. Hassan MS, Hebah HA, Mourad TAH, El-Sharabasy RM. Impact of water treatment on anemia in hemodialysis patients. *Indian J Nephrol*. 2023 May-Jun;33(3):183-187
 18. Payne GM. *Water treatment*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 988-1001
 19. Centers for Medicare & Medicaid Services. Dialysis. <https://www.cms.gov/medicare/health-safety-standards/guidance-for-laws-regulations/dialysis>. Visited February 2024
 20. Paradis H. New innovations in dialysis water treatment technology. Powerpoint presentation at: DialysisTechConneXion40, March 28-31, 2023 Las Vegas, NV.
 21. Fresenius Medical Care. AquaA delivers what matters most. <https://fmcna.com/products/in-center-hemodialysis-equipment/aqua-a-central-dialysis-water-system/>. Visited May 2024
 22. Centers for Medicare and Medicaid Services. ESRD surveyor training interpretive guidance. Final Version 1.1. October 3, 2008. <https://www.hhs.gov/guidance/document/esrd-surveyor-training-interpretive-guidance-version-11>. Visited April 2024
 23. Layman-Amato R, Curtis J, Payne GM. Water treatment for hemodialysis: an update. *Nephrol Nurs J*. 2013 Sep-Oct;40(5):383-404, 465 quiz 405
 24. NxStage Home Therapies. Therapy handbook NxStage® hemodialysis treatment. NxStage Home Therapies. Lawrence, MA. 2015
 25. UpToDate. Water system monitoring. In UpToDate, Connor RF (Ed), Wolters Kluwer. https://www.uptodate.com/contents/image/print?topicKey=1896&search=&imageKey=NEPH%2F130465&source=see_link. Visited February 2024
 26. Hoenich N, Ward RA, Bieber SD. Assuring water quality for hemodialysis. In: UpToDate, Connor RF (Ed), Wolters Kluwer. <https://www.uptodate.com/contents/assuring-water-quality-for-hemodialysis#H1524827057>. Visited February 2024
 27. Kasperek T, Rodriguez OE. What medical directors need to know about dialysis facility water management. *Clin J Am Soc Nephrol*. 2015 Jun 5;10(6):1061-71
 28. Centers for Disease Control and Prevention. Dialysis wall boxes and drains. https://www.cdc.gov/dialysis-safety/hcp/recommendations-resources/dialysis-wall-boxes-and-drains.html?CDC_AAref_Val=https://www.cdc.gov/dialysis/guidelines/wall-drains.html

[boxes.html](#). Visited May 2024

29. de Wolff FA, Berend K, van der Voet GB. Subacute fatal aluminum poisoning in dialyzed patients: post-mortem toxicological findings. *Forensic Sci Int.* 2002 Aug 14;128(1-2):41-3

Module 12 Emergency Planning and Response

1. Martin-Lester MJ. *Essentials of disaster and emergency preparedness in nephrology nursing*. In C. S. Counts (Ed.), Core Curriculum for Nephrology Nursing (7th ed). Pitman, NJ: American Nephrology Nurses' Association. 2020. pp 964-987
2. Centers for Medicare & Medicaid Services. Emergency preparedness for dialysis facilities—a guide for chronic dialysis facilities.
<https://www.cms.gov/medicare/end-stage-renal-disease/esrdnetworkorganizations/downloads/emergencypreparednessforfacilities2.pdf>. Visited January 2024
3. IPRO End-Stage Renal Disease Network Program. End stage renal disease facilities requirements CMS emergency preparedness final rule. [Updates effective March 26, 2021]. <https://esrd.ipro.org/wp-content/uploads/2021/05/aspr-tracie-cms-ep-rule-esrd-requirements.pdf>. Visited January 2024
4. Henderson T. Tillamook dialysis closure has patients fearing the worst. In: The Lund Report. <https://www.opb.org/article/2024/02/12/tillamook-dialysis-closure-patients/>. Visited May 2024
5. Patients relocated after dialysis clinic catches fire. KRGV.com.
<https://www.krgv.com/news/patients-relocated-after-dialysis-clinic-caughts-fire>. Visited February 2024
6. DaVita Kidney Care. A DaVita dialysis center's fast moves guide patients to safety during a wildfire. In: Desert Sun. Part of the USA TODAY network.
<https://www.desertsun.com/story/sponsor-story/davita/2021/11/03/davita-dialysis-centers-fast-moves-guide-patients-safety-during-wildfire/6251021001/>. Visited February 2024
7. Sarbak M. 'I would never hurt anybody': Phoenix man apologizes for driving car into dialysis center. Fox 10 Phoenix; August 14, 2023.
<https://www.fox10phoenix.com/news/i-would-never-hurt-anybody-phoenix-man-apologizes-for-driving-car-into-dialysis-center>. Visited May 2024
8. Sepulveda LD. Phoenix dialysis center evacuated after hazmat spill. In: Arizona Republic; May 16, 2023 [Updated May 16, 2023].
<https://www.azcentral.com/story/news/local/phoenix-breaking/2023/05/16/phoenix-dialysis-center-evacuated-after-hazmat-spill/70222984007/>. Visited May 2024
9. Kwatcher J. Staying safe from violence at dialysis.
<https://www.dpcedcenter.org/wp-content/uploads/2020/06/staying-safe-from-violence-at-dialysis-english.pdf>. Visited February 2024
10. News 13 Florida. Dialysis patient shot in the middle of treatment in Orlando.
https://spectrumnews1.com/wi/madison/news/2013/5/20/armed_assault_report. Visited March 2024
11. NBC Connecticut. Bomb threat at New Haven Pride Center causes evacuations and road closures. <https://www.nbcconnecticut.com/news/local/new-haven->

- [police-investigate-bomb-threat-at-pride-center/3110560/](https://www.fbi.gov/file-repository/active_shooter_planning_and_response_in_a_healthcare_setting.pdf/view). Visited March 2024
12. Healthcare & Public health Sector Coordinating Council. Active shooter—planning and response. (Healthcare setting). 2017. https://www.fbi.gov/file-repository/active_shooter_planning_and_response_in_a_healthcare_setting.pdf/view. Visited April 2024
13. U.S. Department of Homeland Security. Emergency alerts. <https://www.ready.gov/alerts>. Visited February 2024
14. U.S. Department of Homeland Security. Wireless emergency alerts. <https://www.fema.gov/emergency-managers/practitioners/integrated-public-alert-warning-system/public/wireless-emergency-alerts>. Visited February 2024
15. U.S. Department of Homeland Security. Be aware be prepared take action—a guide for alerts and warnings. 2021. https://www.ready.gov/sites/default/files/2022-02/fema_guide-for-alerts-and-warnings_2021.pdf.pdf. Visited February 2024
16. U.S. Department of Homeland Security. Emergency alert system. <https://www.fema.gov/emergency-managers/practitioners/integrated-public-alert-warning-system/public/emergency-alert-system>. Visited May 2024
17. Blum MF, Feng Y, Anderson GB, Segev DL, McAdams-DeMarco M, Grams ME. Hurricanes and mortality among patients receiving dialysis. *J Am Soc Nephrol.* 2022 Sep;33(9):1757-1766
18. Kopp JB, Ball LK, Cohen A, Kenney RJ, Lempert KD, Miller PE, Muntner P, Qureshi N, Yelton SA. Kidney patient care in disasters: lessons from the hurricanes and earthquake of 2005. *Clin J Am Soc Nephrol.* 2007 Jul;2(4):814-24
19. Dent L, Finne K, Lurie N. Progress in emergency preparedness for dialysis care 10 years after Hurricane Katrina. *Am J Kidney Dis.* 2015 Nov;66(5):742-4
20. Avilés Mendoza GJ, Finne KP, Torre Leon F, Burke LM, Cabrera-Marquez J, Mercado Casillas AM, Malave G, Brown C, Kelman J, Kopp JB. Observations from the emergency management of dialysis patients evacuated from the US Virgin Islands to Puerto Rico following hurricane Irma. *BMC Health Serv Res.* 2021 Nov 16;21(1):1239
21. Rodriguez CH. Dialysis patients are still trekking 12 hours for care after Hurricane Maria. *The Atlantic.* April 2018. <https://www.theatlantic.com/health/archive/2018/04/puerto-rico-dialysis-hurricane-maria/557741/#>. Visited April 2024
22. Neumann ME. Dialysis clinic undamaged after Maui fire, but power, water keep doors shut. *Nephrol News Issues.* <https://www.healio.com/news/nephrology/20230901/dialysis-clinic-undamaged-after-maui-fire-but-power-water-keep-doors-shut>. Visited February 2024
23. Centers for Medicare & Medicaid Services. Preparing for emergencies: a guide for people on dialysis. Version 2.2; March 2023. https://www.kcercoalition.com/contentassets/3cfb4cf6139d4666963124f63f33ba1d/cmspreparingforemergencies_508-compliant-_updated-32023.pdf. Visited February 2024
24. Kidney Community Emergency Response. Extreme summer heat: tips for dialysis patients.

- https://www.kcercoalition.com/contentassets/d77a95ece6034e20ba42d86c64634754/kcer_extreme-summer-heat-tips-for-dialysis-patients_final_508.pdf. Visited February 2024
25. U.S. Department of Homeland Security. Tsunamis.
<https://www.ready.gov/tsunamis>. Visited February 2024
26. U.S. Department of Homeland Security. Be prepared for a winter storm.
https://www.fema.gov/sites/default/files/documents/fema_hm-be-prepared-for-a-winter-storm_english.pdf. Visited February 2024
27. U.S. Department of Homeland Security. Radiation emergencies.
<https://www.ready.gov/radiation>. Visited February 2024
28. U.S. Department of Homeland Security. Earthquakes.
<https://www.ready.gov/earthquakes>. Visited February 2024
29. U.S. Department of Homeland Security. Drought. <https://www.ready.gov/drought>. Visited February 2024
30. U.S. Department of Homeland Security. Be prepared for a tornado. <https://fema-community-files.s3.amazonaws.com/hazard-information-sheets/Tornado-English.pdf>. Visited February 2024
31. U.S. Department of Homeland Security. Wildfires. <https://www.ready.gov/wildfires>. Visited February 2024
32. Xi Y, Kshirsagar AV, Wade TJ, Richardson DB, Brookhart MA, Wyatt L, Rappold AG. Mortality in US hemodialysis patients following exposure to wildfire smoke. *J Am Soc Nephrol*. 2020 Aug;31(8):1824-1835
33. U.S. Department of Homeland Security. Hurricanes.
<https://www.ready.gov/hurricanes>. Visited February 2024
34. U.S. Department of Homeland Security. Power outages.
<https://www.ready.gov/power-outages>. Visited February 2024
35. U.S. Department of Homeland Security. Floods. <https://www.ready.gov/floods>. Visited February 2024
36. U.S. Department of Homeland Security. Pandemics.
<https://www.ready.gov/pandemic>. Visited February 2024
37. U.S. Department of Homeland Security. Landslides & debris flow.
<https://www.ready.gov/landslides-debris-flow>. Visited February 2024
38. U.S. Department of Homeland Security. Attacks in crowded and public spaces.
<https://www.ready.gov/public-spaces>. Visited February 2024
39. U.S. Department of Homeland Security. Be prepared for an active shooter.
<https://fema-community-files.s3.amazonaws.com/hazard-information-sheets/Active+Shooter-English.pdf>. Visited February 2024
40. Smith RS, Zucker RJ, Frasso R. Natural disasters in the Americas, dialysis patients, and implications for emergency planning: a systematic review. *Prev Chronic Dis*. 2020 Jun 11;17:E42