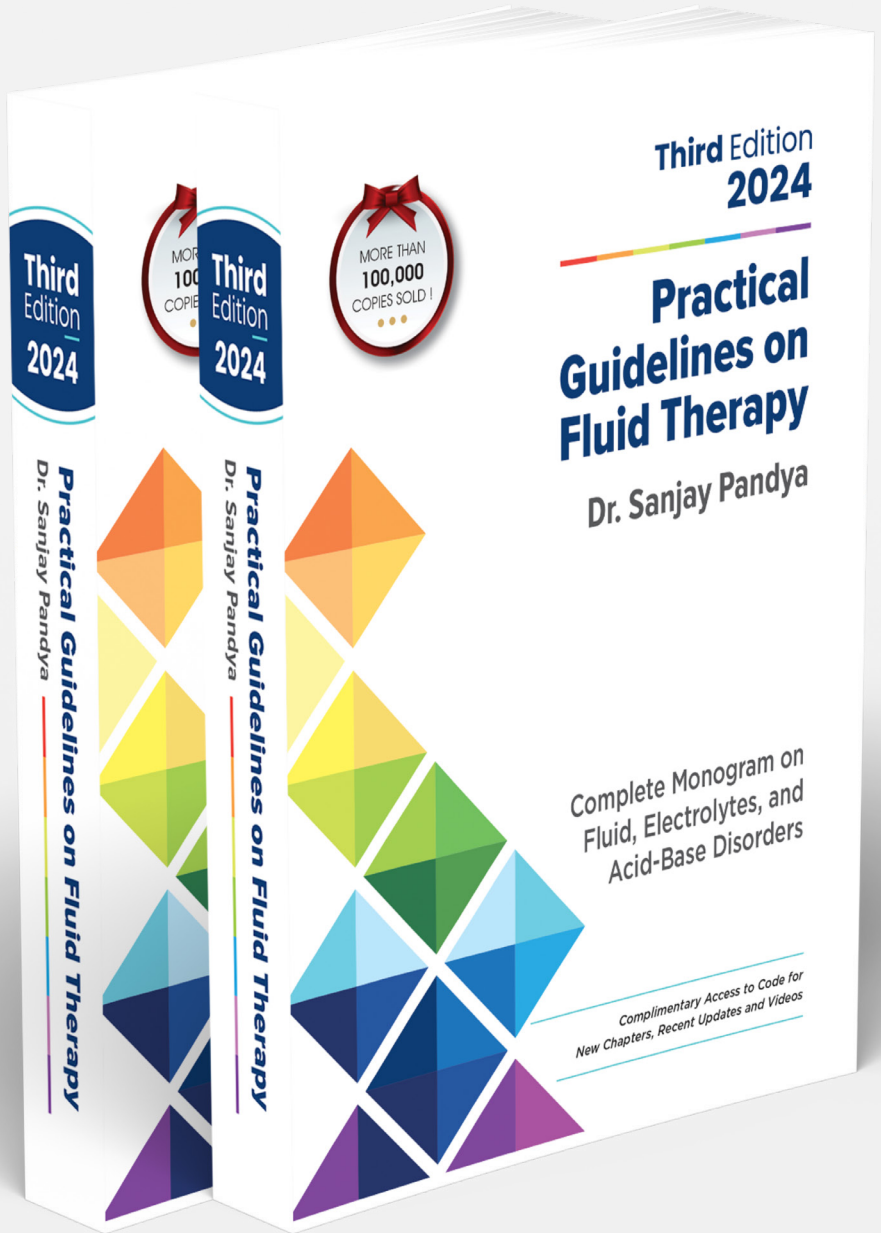
Fluid therapy.org

Chapter 44:

Postoperative Fluid Therapy



To get a copy of the book, visit: **www.fluidtherapy.org**

Fluid therapy.org

Table of Contents

44 Postoperative Fluid Therapy

Postoperative fluid therapy is crucial for managing patients' fluid needs, ensuring their physiological stability, maintaining hydration and tissue perfusion, restoring fluid balance, and supporting recovery during the postoperative period. The administration of fluid and electrolytes during the postoperative period depends on a thorough patient evaluation, and no single postoperative fluid regimen suits everyone [1].

THE GOAL OF FLUID THERAPY

The aim of postoperative fluid therapy is to keep the patient normovolemic, maintain an adequate circulating blood volume, optimize organ perfusion, promote wound healing, provide adequate calories to prevent catabolism and prevent complications such as hypovolemia, fluid overload, electrolyte imbalances, and acid-base disturbances.

In postoperative patients, the major principles of management of fluid balance are:

- To replace ongoing losses (hemorrhage, drainage, third space losses, and insensible losses)
- To provide maintenance requirements
- To correct preexisting deficits (preoperative and intraoperative losses)

CAUSES OF HYPOVOLEMIA

Hypovolemia and hypotension are common postoperative complications, and their important causes include:

- Bleeding: Intraoperative and postoperative blood loss.
- Fluid deficit: Inadequate correction of the preoperative starvation (nothing by mouth-NPO) deficit, utilization of "zero-balance" or "restrictive fluid strategy" to replace intraoperative losses, failure to adequately replace maintenance fluid requirements during prolonged surgeries, and ongoing fluid losses from the gastrointestinal tract (such as vomiting and diarrhea).

REFERENCES

1. Kayilioglu SI, Dinc T, Sozen I, et al. Postoperative fluid management. World J Crit Care Med. 2015;4(3):192–201.
2. Sweeney RM, McKendry RA, Bedi A. Perioperative intravenous fluid therapy for adults. Ulster Med J. 2013;82(3):171–8.
3. Powell-Tuck J, Gosling P, Lobo DN, et al. GIFTASUP: British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients. Revised 7 March 2011. Available at: https://www.bapen.org.uk/pdfs/bapen_pubs/giftasup.pdf [accessed on 3 June 2023].
4. Thiele RH, Raghunathan K, Brudney CS, et al. American Society for Enhanced Recovery (ASER) and Perioperative Quality Initiative (POQI) joint consensus statement on perioperative fluid management within an enhanced recovery pathway for colorectal surgery. Perioper Med (Lond) 2016;5:24.
5. Feldheiser A, Aziz O, Baldini G, et al. Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice. Acta Anaesthesiol Scand. 2016;60(3):289–334.
6. Miller TE, Myles PS. Perioperative fluid therapy for major surgery. Anesthesiology. 2019;130(5):825–832.
7. O'Rourke K, Morrison B, Sen S, et al. Fluid management for enhanced recovery surgery. 2019;2:37.
8. Lewis SJ, Egger M, Sylvester PA, et al. Early enteral feeding versus "nil by mouth" after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. BMJ. 2001;323(7316):773–6.
9. Malhotra N, Khanna S, Pasrija S, et al. Early oral hydration and its impact on bowel activity after elective caesarean section: Our experience. Eur J Obstet Gynecol Reprod Biol 2005;120(1):53–6.
10. Makaryus R, Miller TE, Gan TJ. Current concepts of fluid management in enhanced recovery pathways. Br J Anaesth. 2018;120(2):376–383.
11. Moemen ME. Fluid therapy: Too much or too little. Egyptian Journal of Anaesthesia 2010;26(4):313–318.
12. National, Clinical Guideline Centre UK. "Intravenous Fluid Therapy: Intravenous Fluid Therapy in Adults in Hospital" (2013).
13. Li W. Fluid Therapy in Post-operative care. Perioperative Care. York teaching hospitals NHS foundation trust Version 1.0 (08/09/2017) [Internet]. Available from: https://www.yorkperioperativemedicine.nhs.uk/health-professionals/preoperative-care/post-operative-care/fluid-therapy/. Accessed June 3, 2023.
14. Parker T, Brealey D, Dyson A, et al. Optimising organ perfusion in the high-risk surgical and critical care patient: a narrative review. Br J Anaesth. 2019;123(2):170–176.
15. Malbrain MLNG, Langer T, Annane D, et al. Intravenous fluid therapy in the perioperative and critical care setting: Executive summary of the International Fluid Academy (IFA). Ann Intensive Care. 2020;10(1):64.
16. Moritz ML, Ayus JC. Maintenance intravenous fluids in acutely ill patients. N Engl J Med. 2015;373(14):1350–60.

17. Chung HM, Kluge R, Schrier RW, et al. Postoperative hyponatremia: a prospective study. Arch Intern Med 1986;146(2):333–6.
18. Steele A, Gowrishankar M, Abrahamson S, et al. Postoperative hyponatremia despite near-isotonic saline infusion: a phenomenon of desalination. Ann Intern Med 1997;126(1):20–5.
19. Plain D5W or hypotonic saline solutions post-op could result in acute hyponatremia and death in healthy children. ISMP Medication Safety Alert 2009;7:1–4.
20. Winata AS, Jen WY, Teng ML, et al. Intravenous maintenance fluid tonicity and hyponatremia after major surgery- a cohort study. Int J Surg. 2019;67:1–7.
21. Moritz ML, Ayus JC. Prevention of hospital-acquired hyponatremia: a case for using isotonic saline. Pediatrics 2003;111(2):227–30.
22. Moritz ML, Ayus JC. Water water everywhere: standardizing postoperative fluid therapy with 0.9% normal saline. Anesth Analg. 2010;110(2):293–5.
23. Oh GJ, Sutherland SM. Perioperative fluid management and postoperative hyponatremia in children. Pediatr Nephrol. 2016;31(1):53–60.
24. Burdett E, Dushianthan A, Bennett-Guerrero E, et al. Perioperative buffered versus non-buffered fluid administration for surgery in adults. Cochrane Database Syst Rev. 2012;12:CD004089.
25. Lehr AR, Rached-d'Astous S, Parker M, et al. Impact of balanced versus unbalanced fluid resuscitation on clinical outcomes in critically ill children: protocol for a systematic review and meta-analysis.Syst Rev. 2019;8(1):195.
26. Miller TE, Bunke M, Nisbet P, et al. Fluid resuscitation practice patterns in intensive care units of the USA: a cross-sectional survey of critical care physicians. Perioper Med (Lond) 2016;5:15.
27. Jonsson AB, Perner A. Changes from 2012 to 2015 in intravenous fluid solutions issued to hospital departments. Acta Anaesthesiol Scand. 2017;61(5):532–538.
28. Semler MW, Self WH, Wanderer JP, et al. Balanced crystalloids versus saline in critically ill adults. New Engl J Med 2018;378(9):829–839.
29. Semler MW, Kellum JA. Balanced crystalloid solutions. Am J Respir Crit Care Med. 2019;199(8):952–960.
30. Gladden LB. Lactate metabolism: A new paradigm for the third millennium. J. Physiol. 2004;558(Pt 1):5–30.
31. Tommasino C, Picozzi V. Volume and electrolyte management. Best Pract Res Clin Anaesthesiol. 2007;21(4):497–516.
32. Myburgh JA, Mythen MG. Resuscitation fluids. N Engl J Med. 2013;369(13):1243–51.
33. Reddy S, Weinberg L, Young P. Crystalloid fluid therapy. Crit Care. 2016;20:59.
34. Ryden SE, Oberman HA. Compatibility of common intravenous solutions with CPD blood. transfusion. 1975;15(3):250–5.
35. Wakim KG. ''Normal'' 0.9 per cent salt solution is neither ''normal'' nor physiological. JAMA 1970;214(9):1710.
36. Kellum JA. Abnormal saline and the history of intravenous fluids. Nat. Rev. Nephrol. 2018;14(6):358–360.
37. Reid F, Lobo DN, Williams RN, et al. (Ab)normal saline and physiological Hartmann's solution: a randomized double-blind crossover study. Clin Sci (Lond). 2003;104(1):17–24.
38. Lobo DN, Awad S. Should chloride-rich crystalloids remain the mainstay of fluid resuscitation to prevent "pre-renal" acute kidney injury? con. Kidney International. 2014;86(6):1096–1105.
39. Yunos NM, Bellomo R, Glassford N, et al. Chloride-liberal vs. Chloride-restrictive intravenous fluid administration and acute kidney injury: an extended analysis. Intensive Care Med 2015;41(2):257–64.
40. Heng Li, Sun SR, Yap JQ, et al. 0.9% saline is neither normal nor physiological. J Zhejiang Univ Sci B. 2016;17(3):181–187.
41. Maheshwari K, Turan A, Makarova N, et al. Saline versus lactated ringer's solution: The saline or Lactated Ringer's (SOLAR) trial. Anesthesiology. 2020;132(4):614–24.
42. Mythen MG, Swart M, Acheson N, et al. Perioperative fluid management: Consensus statement from the enhanced recovery partnership. Perioper Med (Lond) 2012;1:2.
43. Shaw AD, Bagshaw SM, Goldstein SL, et al. Major complications, mortality, and resource utilization after open abdominal surgery: 0.9% saline compared to Plasma Lyte. Ann Surg 2012;255(5):821–829.
44. Rizoli S. PlasmaLyte. J Trauma 2011;70(5 Suppl):S17–8.
45. Ergin B, Kapucu A, Guerci P, et al. The role of bicarbonate precursors in balanced fluids during haemorrhagic shock with and without compromised liver function. British Journal of Anaesthesia 2016;117(4):521–8.
46. Weinberg L, Collins N, Van Mourik K, et al. PlasmaLyte 148: A clinical review. World J Crit Care Med. 2016;5(4):235–250.
47. Wiedermann CJ. Phases of fluid management and the roles of human albumin solution in perioperative and critically ill patients. Curr Med Res Opin. 2020;36(12):1961–1973.
48. Carson JL, Grossman BJ, Kleinman S, et al. Red blood cell transfusion: A clinical practice guideline from the AABB. Ann Intern Med. 2012;157(1):49–58.
49. Walsh SR, Walsh CJ. Intravenous fluid-associated morbidity in postoperative patients. Ann R Coll Surg Engl. 2005;87(2):126–30.
50. Harris B, Schopflin C, Khaghani C, et al. Perioperative intravenous fluid prescribing: a multi-centre audit. Perioper Med (Lond). 2015;4:15.
51. Lu G, Yan Q, Huang Y, et al. Prevention and control system of hypokalemia in fast recovery after abdominal surgery. Curr Ther Res Clin Exp. 2013;74:68–73.

52. Muhammad Ali S, Shaikh N, Shahid F, et al. Hypokalemia Leading to Postoperative Critical Arrhythmias: Case Reports and Literature Review. Cureus. 2020;12(5):e8149.
53. Zhu Q, Li X, Tan F, et al. Prevalence and risk factors for hypokalemia in patients scheduled for laparoscopic colorectal resection and its association with post-operative recovery. BMC Gastroenterol. 2018;18(1):152.
54. Prescribing Intravenous Fluids for Adults. Fluid and Electrolyte Guideline Working Party. Queensland Health 2016. Available at: https://www.health.qld.gov.au/__data/assets/pdf_file/0024/700089/ivfluid-glines-adult.pdf (Accessed on 4 June 2023).
55. Rassam SS, Counsell DJ. Perioperative fluid therapy. Contin Educ Anaesth Crit Care and Pain 2005;5(5):161–165.
56. Lu G, Xu L, Zhong Y, et al. Significance of serum potassium level monitoring during the course of post-operative rehabilitation in patients with hypokalemia. World Journal of Surgery. 2014;38(4):790–794.
57. Yang Y, Yang J, Yao X, et al. Association between Blood Potassium Level and Recovery of Postoperative Gastrointestinal Motility during Continuous Renal Replacement Therapy in Patient Undergoing Open Abdominal Surgery. Biomed Res Int. 2019;2019:6392751.
58. Miller TE, Roche AM, Mythen M. Fluid management and goal-directed therapy as an adjunct to enhanced recovery after surgery (ERAS). Can J Anesth/J Can Anesth. 2014;62(2):158–68.
59. Padhi S, Bullock I, Li L, et al. Intravenous fluid therapy for adults in hospital: summary of NICE guidance. BMJ 2013;347:f7073.
60. Balakumar V, Murugan R, Sileanu FE, et al. Both Positive and Negative Fluid Balance May Be Associated With Reduced Long-Term Survival in the Critically Ill. Crit Care Med. 2017;45(8):e749–e757.

KidneyEducation 

Join the Mission to Fight Kidney Diseases

Explore the world's largest multilingual website created by a global team of over 100 nephrologists.

www.KidneyEducation.com

» Read online or download the 200-page book "Save Your Kidneys" in 40 languages—completely free.

» This comprehensive resource offers valuable information on preventing and managing common kidney problems, tailored for kidney patients and their families.

» It's an authentic guide, prepared by nephrologists and free from any external funding.