

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
1	ERAS Society. Accessed August 30, 2024. https://erassociety.org/	Guideline	n/a	n/a	n/a	n/a	ERAS Society guidelines	IVA
2	Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E et al. Guidelines for enhanced recovery after lung surgery: recommendations of the Enhanced Recovery After Surgery (ERAS) Society and the European Society of Thoracic Surgeons (ESTS). <i>Eur J Cardiothorac Surg.</i> 2019;55(1):91–115. [IIIA] [PubMed: 30304509]	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations are provided for pre-op, intra-op and post-op.	IIIA
3	Altman AD, Robert M, Armbrust R et al. Guidelines for vulvar and vaginal surgery: Enhanced Recovery After Surgery Society recommendations. <i>Am J Obstet Gynecol.</i> 2020;223(4):475–485. [IIIA] [PubMed: 32717257]	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations are provided for pre-op, intra-op and post-op.	IIIA
4	Bisch SP, Nelson G. Outcomes of enhanced recovery after surgery (ERAS) in gynecologic oncology: a review. <i>Curr Oncol.</i> 2022;29(2):631–640. [VA] [PubMed: 35200556]	Expert Opinion	n/a	n/a	n/a	n/a	ERAS impact on outcomes are discussed.	VA
5	Brustia R, Monsel A, Skurzak S et al. Guidelines for perioperative care for liver transplantation: enhanced recovery after surgery (ERAS) recommendations. <i>Transplantation.</i> 2022;106(3):552–561. [IIIA] [PubMed: 33966024]	Systematic Review	n/a	n/a	n/a	n/a	evidence based recommendations are provided for pre-op, intra-op and post-op	IIIA
6	Ceresoli M, Braga M, Zanini N et al. Enhanced perioperative care in emergency general surgery: the WSES position paper. <i>World J Emerg Surg.</i> 2023;18(1):47. [VA] [PubMed: 37803362]	Literature Review	n/a	n/a	n/a	n/a	Support of ERAS protocols in emergency general surgery.	VA
7	Chakravarthy VB, Yokoi H, Coughlin DJ, Manlapaz MR, Krishnaney AA. Development and implementation of a comprehensive spine surgery enhanced recovery after surgery protocol: the Cleveland Clinic experience. <i>Neurosurg Focus.</i> 2019;46(4):E11. [VA] [PubMed: 30933912]	Organizational Experience	Implemented an ERAS protocol for spine surgery	n/a	n/a	n/a	Demonstrated success with cost savings and decrease in infection rates and decrease need for transfusions but with noted challenges	VA
8	Engelman DT, Ben Ali W, Williams JB et al. Guidelines for perioperative care in cardiac surgery: Enhanced Recovery After Surgery Society recommendations. <i>JAMA Surg.</i> 2019;154(8):755–766. [IIIA] [PubMed: 31054241]	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations are provided for pre-op, intra-op and post-op.	IIIA
9	Feldheiser A, Aziz O, Baldini G et al. Enhanced recovery after surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice. <i>Acta Anaesthesiol Scand.</i> 2016;60(3):289–334. [IIIA] [PubMed: 26514824]	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations for pre-op, post-op and intra-op for anesthesia care in GI surgery	IIIA
10	Ghosh A, Chatterji U. An evidence-based review of enhanced recovery after surgery in total knee replacement surgery. <i>J Perioper Pract.</i> 2019;29(9):281–290. [VA] [PubMed: 30212288]	Literature Review	n/a	n/a	n/a	n/a	ERAS recommendations for total knee replacement surgery, evidence is reviewed.	VA
11	Gianotti L, Sandini M, Romagnoli S, Carli F, Ljungqvist O. Enhanced recovery programs in gastrointestinal surgery: actions to promote optimal perioperative nutritional and metabolic care. <i>Clin Nutr.</i> 2020;39(7):2014–2024. [VA] [PubMed: 31699468]	Expert Opinion	n/a	n/a	n/a	n/a	An overview of ERAS in gastrointestinal surgery is discussed.	VA
12	Gregory AJ, Noss CD, Chun R et al. Perioperative optimization of the cardiac surgical patient. <i>Can J Cardiol.</i> 2023;39(4):497–514. [VA] [PubMed: 36746372]	Expert Opinion	n/a	n/a	n/a	n/a	Overview of ERAS components in the cardiac surgical patient.	VA
13	Gustafsson UO, Scott MJ, Hubner M et al. Guidelines for perioperative care in elective colorectal surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations: 2018. <i>World J Surg.</i> 2019;43(3):659–695. [IIIA] [PubMed: 30426190]	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations are provided for pre-op, intra-op and post-op.	IIIA
14	Haywood N, Nickel I, Zhang A et al. Enhanced recovery after thoracic surgery. <i>Thorac Surg Clin.</i> 2020;30(3):259–267. [VA] [PubMed: 32593359]	Expert Opinion	n/a	n/a	n/a	n/a	Overview of ERAS components is patients undergoing thoracic surgery.	VA
15	Huang J, Cao C, Nelson G, Wilson RD. A review of enhanced recovery after surgery principles used for scheduled caesarean delivery. <i>J Obstet Gynaecol Can.</i> 2019;41(12):1775–1788. [VA] [PubMed: 30442516]	Literature Review	n/a	n/a	n/a	n/a	ERAS implementation in patients undergoing C-sections is discussed and literature summarized.	VA
16	Joliat GR, Kobayashi K, Hasegawa K et al. Guidelines for perioperative care for liver surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations 2022. <i>World J Surg.</i> 2023;47(1):11–34. [IIIA] [PubMed: 36310325]	Systematic Review	n/a	n/a	n/a	n/a	Overview of ERAS components in Liver Surgery	IIIA
17	Klek S, Rymarowicz J, Sobocki J et al. Recommendations for modern perioperative care for elective surgery: consensus of panel of experts. <i>Pol Przegl Chir.</i> 2023;95(4):1–5. [VA] [PubMed: 36808061]	Qualitative	Delphi study on ERAS recommendations	n/a	n/a	n/a	Review of ERAS protocols and using a Delphi method updated recommendations was undertaken.	VA
18	Latthe P, Panza J, Marquini GV et al. AUGS-IUGA joint clinical consensus statement on enhanced recovery after urogynecologic surgery: developed by the Joint Writing Group of the International Urogynecological Association and the American Urogynecologic Society. Individual writing group members are noted in the Acknowledgements section. <i>Urogynecology (Phila).</i> 2022;28(11):716–734. [IIIA] [PubMed: 36288110]	Systematic Review	n/a	n/a	n/a	n/a	Overview of ERAS components is presented.	IIIA
19	Low DE, Allum W, De Manzoni G et al. Guidelines for perioperative care in esophagectomy: Enhanced Recovery After Surgery (ERAS) Society recommendations. <i>World J Surg.</i> 2019;43(2):299–330. [IIIA] [PubMed: 30276441]	Systematic Review	n/a	n/a	n/a	n/a	ERAS recommendations for patient undergoing Esophagectomy.	IIIA
20	Mac Curtain B.M., O'Mahony A, Temperley HC, Ng ZQ. Enhanced recovery after surgery protocols and emergency surgery: a systematic review and meta-analysis of randomized controlled trials. <i>ANZ J Surg.</i> 2023;93(7-8):1780–1786. [IA] [PubMed: 37282791]	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	ERAS in emergency surgery enhanced patient recovery without adverse outcomes.	IA
21	McGinigle KL, Spangler EL, Ayyash K et al. A framework for perioperative care for lower extremity vascular bypasses: a consensus statement by the Enhanced Recovery after Surgery (ERAS) Society and Society for Vascular Surgery. <i>J Vasc Surg.</i> 2023;77(5):1295–1315. [IIIA] [PubMed: 36931611]	Systematic Review	n/a	n/a	n/a	n/a	ERAS recommendations for perioperative care in patients undergoing lower extremity vascular surgery.	IIIA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
22	McGinagle KL, Spangler EL, Pichel AC et al. Perioperative care in open aortic vascular surgery: a consensus statement by the Enhanced Recovery After Surgery (ERAS) Society and Society for Vascular Surgery. <i>J Vasc Surg.</i> 2022;75(6):1796–1820. [IIIA] [PubMed: 35181517]	Systematic Review	n/a	n/a	n/a	n/a	ERAS recommendations for perioperative care in patients undergoing open aortic vascular surgery.	IIIA
23	Peden CJ, Aggarwal G, Aitken RJ et al. Enhanced Recovery After Surgery (ERAS) Society consensus guidelines for emergency laparotomy part 3: organizational aspects and general considerations for management of the emergency laparotomy patient. <i>World J Surg.</i> 2023;47(8):1881–1898. [IIIA] [PubMed: 37277506]	Systematic Review	n/a	n/a	n/a	n/a	ERAS recommendations for emergency laparotomy.	IIIA
23	Peden J., Aggarwal, Geeta, Aitken, Robert J., et al. Guidelines for Perioperative Care for Emergency Laparotomy Enhanced Recovery After Surgery (ERAS) Society Recommendations: Part 1—Preoperative: Diagnosis, Rapid Assessment and Optimization 2021	Systematic Review	n/a	n/a	n/a	n/a	ERAS components for emergency laparotomy patients is recommended.	
24	Peden CJ, Aggarwal G, Aitken RJ et al. Guidelines for perioperative care for emergency laparotomy Enhanced Recovery After Surgery (ERAS) Society recommendations: Part 1—preoperative: diagnosis, rapid assessment and optimization. <i>World J Surg.</i> 2021;45(5):1272–1290.	Systematic Review	n/a	n/a	n/a	n/a	Provides recommendations for ERAS in patients undergoing emergency laparotomy and discusses less common aspects of care for the surgical patient.	IIIA
25	Persing S, Manahan M, Rosson G. Enhanced recovery after surgery pathways in breast reconstruction. <i>Clin Plast Surg.</i> 2020;47(2):221–243. [VA] [PubMed: 32115049]	Expert Opinion	n/a	n/a	n/a	n/a	Overview of ERAS protocols in breast reconstruction surgery.	VA
26	Peters EJ, Robinson M, Serletis D. Systematic review of enhanced recovery after surgery in patients undergoing cranial surgery. <i>World Neurosurg.</i> 2022;158:279–289. [IIIA] [PubMed: 34740831]	Systematic Review	n/a	n/a	n/a	n/a	ERAS is safe and has potentially favorable outcomes for patients undergoing cranial surgery, more studies should be conducted in this population.	IIIA
27	Sorabella LL, Bauchat JR. Enhanced recovery after surgery: cesarean delivery. <i>Anesthesiol Clin.</i> 2021;39(4):743–760. [VA] [PubMed: 34776107]	Expert Opinion	n/a	n/a	n/a	n/a	ERAS overview of patients undergoing cesarean delivery.	VA
28	Suharwardy S, Carvalho B. Enhanced recovery after surgery for cesarean delivery. <i>Curr Opin Obstet Gynecol.</i> 2020;32(2):113–120. [VA] [PubMed: 32068543]	Literature Review	n/a	n/a	n/a	n/a	Overview of ERAS recommendations in C-section patients.	VA
29	Wainwright TW, Gill M, McDonald DA et al. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. <i>Acta Orthop.</i> 2020;91(1):3–19. [IIIA] [PubMed: 31663402]	Systematic Review	n/a	n/a	n/a	n/a	Updated recommendations from the ERAS society for total hip and knee replacement surgery.	IIIA
30	Nelson G, Wang X, Nelson A et al. Evaluation of the implementation of multiple enhanced recovery after surgery pathways across a provincial health care system in Alberta, Canada. <i>JAMA Netw Open.</i> 2021;4(8):e2119769. [VA] [PubMed: 34357394]	Organizational Experience	One large health system	n/a	n/a	n/a	5 ERAS pathways (colorectal, liver, pancreas, gyn, and radical cystectomy) across 9 sites were implemented. Implementation resulted in improved health care practitioner adherence, LOS and readmission rates.	VA
31	Enhanced Recovery after Surgery: Considerations for Pathway Development and Implementation. American Association of Nurse Anesthesiology (AANA). November 2, 2023. Accessed August 21, 2024. https://issuu.com/aanapublishing/docs/5_-_enhanced_recovery_after_surgery?fr=sY2Y2YTU2NDAMjU [VA]	Expert Opinion	n/a	n/a	n/a	n/a	AANA guidance on creating a ERAS pathway and implementation	
32	Debono B, Corniola MV, Pietton R, Sabatier P, Hamel O, Tessitore E. Benefits of enhanced recovery after surgery for fusion in degenerative spine surgery: impact on outcome, length of stay, and patient satisfaction. <i>Neurosurg Focus.</i> 2019;46(4):E6. [IIIA] [PubMed: 30933923]	Quasi-experimental	ERAS group-1920, before ERAS group 1563 all patients undergoing fusion in degenerative spine surgery	ERAS protocol	Before ERAS	Pt outcomes, LOS, patient satisfaction	The ERAS group had a significant reduction in LOS with no increased postop complications, high patient satisfaction.	IIIA
33	Cerantola Y, Valerio M, Persson B et al. Guidelines for perioperative care after radical cystectomy for bladder cancer: Enhanced Recovery After Surgery (ERAS) Society recommendations. <i>Clin Nutr.</i> 2013;32(6):879–887. [IIIA] [PubMed: 24189391]	Systematic Review	n/a	n/a	n/a	.	Evidence based recommendations in pre-op, post-op and intra-op major urological surgery	IIIA
34	Baimas-George M, Cochran A, Tezber K et al. A 2-year experience with enhanced recovery after surgery: evaluation of compliance and outcomes in pancreatic surgery. <i>J Nurs Care Qual.</i> 2021;36(2):E24–E28. [IIA] [PubMed: 32282506]	Quasi-experimental	99 pts pre-ERAS, 116 with ERAS in elective pancreatic surgery	ERAS program	No ERAS program	Outcomes, cost and compliance measures	Significant decrease in LOS and cost, significant increase in compliance with ERAS implementation, Post op complications, readmission and survival rates did not increase.	IIA
35	Changjun C, Jingkun L, Yun Y et al. Enhanced recovery after total joint arthroplasty (TJA): a contemporary systematic review of clinical outcomes and usage of key elements. <i>Orthop Surg.</i> 2023;15(5):1228–1240. [IIIA] [PubMed: 36971112]	Systematic Review	n/a	n/a	n/a	n/a	ERAS for TJA has favorable clinical outcomes in terms of reducing LOS and overall pain, saving costs, accelerating functional recovery, and reducing complications, although the evidence is still low in quality	IIIA
36	Docherty J, Morgan-Bates K, Stather P. A systematic review and meta-analysis of enhanced recovery for open abdominal aortic aneurysm surgery. <i>Vasc Endovasc Surg.</i> 2022;56(7):655–664. [IIIA]	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	The meta-analysis demonstrates significant benefits of an ERAS program in patients undergoing open AAA surgery. More studies are needed.	IIIA
37	Huang ZD, Gu HY, Zhu J et al. The application of enhanced recovery after surgery for upper gastrointestinal surgery: meta-analysis. <i>BMC Surg.</i> 2020;20(1):3. [IA] [PubMed: 31900149]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	ERAS protocols can reduce the risk of postoperative lung infection and accelerating patient recovery, more research is needed.	IA
38	Klek S, Salowka J, Choruz R et al. Enhanced recovery after surgery (ERAS) protocol is a safe and effective approach in patients with gastrointestinal fistulas undergoing reconstruction: results from a prospective study. <i>Nutrients.</i> 2021;13(6):1953. [IIIB] [PubMed: 34200140]	Nonexperimental	One facility implemented and improved on an ERAS protocol	n/a	n/a	Complications, LOS, PONV, bowel function, readmission rates	Improvements in surgical outcomes was seen, audits of the program should be undertaken.	IIIB

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
39	Lohsiriwat V, Jitmonggan R, Chadbunchachai W, Ungprasert P. Enhanced recovery after surgery in emergency resection for obstructive colorectal cancer: a systematic review and meta-analysis. <i>Int J Colorectal Dis.</i> 2020;35(8):1453–1461. [IIA] [PubMed: 32572602]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	ERAS had advantages over conventional care in patients undergoing emergency resection for obstructive colorectal cancer—including a shorter length of hospitalization, a lower incidence of overall complication, and a quicker gastrointestinal recovery	
40	Mohamed Ibrahim SM, Mahmoud El-Sheikh MA, Salama Abdelfattah AM. Effect of enhanced recovery after surgery protocol on postoperative outcomes of women undergoing abdominal hysterectomy. <i>SAGE Open Nurs.</i> 2023;23779608231165948. [IIA]	Quasi-experimental	148 women undergoing abdominal hysterectomy	ERAS protocol <i>n</i> =74	Traditional care <i>n</i> =74	Postoperative pain, complications and readmissions	Women who received the ERAS protocol had less pain and less complications or readmissions.	IIA
41	Navarro-Martinez S, Sebastián-Tomás JC, Díez Ares JA, et al. Enhanced recovery after bariatric surgery (ERABS) protocol implementation in a laparoscopic center. <i>Minimally Invasive Ther Allied Technol.</i> 2022;31(2):269–275. [IIB]	Quasi-experimental	200 patients undergoing bariatric surgery	ERAS protocol <i>n</i> =80	Traditional care <i>n</i> =120	LOS and postoperative complications	Patients in the ERAS group had a better postoperative recovery, shorter LOS.	IIB
42	Ni X, Jia D, Guo Y, Sun X, Suo J. The efficacy and safety of enhanced recovery after surgery (ERAS) program in laparoscopic digestive system surgery: a meta-analysis of randomized controlled trials. <i>Int J Surg.</i> 2019;69:108–115. [IA] [PubMed: 31376511]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	The results indicated that the ERAS program is associated with faster postoperative rehabilitation, shorter LOS, and better postoperative complication rates. The use of the ERAS program for laparoscopic digestive system surgery is more effective and safe than TPC, and it should be recommended.	IA
43	Noba L, Rodgers S, Chandler C, Balfour A, Hariharan D, Yip VS. Enhanced recovery after surgery (ERAS) reduces hospital costs and improve clinical outcomes in liver surgery: a systematic review and meta-analysis. <i>J Gastrointest Surg.</i> 2020;24(4):918–932. [IIA] [PubMed: 31900738]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	ERAS protocols are safe and feasible in this patient population, reduces LOS and risk of complications with significant cost savings. More research on clinical outcomes.	IIA
44	Noba L, Rodgers S, Doi L, Chandler C, Hariharan D, Yip V. Costs and clinical benefits of enhanced recovery after surgery (ERAS) in pancreaticoduodenectomy: an updated systematic review and meta-analysis. <i>J Cancer Res Clin Oncol.</i> 2023;149(9):6639–6660. [IIA] [PubMed: 36629919]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	This review demonstrated that ERAS is safe and feasible in pancreatic duodenectomy, improves clinical outcomes such as LOS, complications, delayed gastric emptying and mortality rates, without changing readmissions and reoperations, while delivering significant cost savings. Higher compliance is associated with better clinical outcomes, especially LOS and complications.	IIA
45	Robella M, Tonello M, Berchiella P et al. Enhanced recovery after surgery (ERAS) program for patients with peritoneal surface malignancies undergoing cytoreductive surgery with or without HIPEC: a systematic review and a meta-analysis. <i>Cancers (Basel).</i> 2023;15(3):570. [IIIA] [PubMed: 36765534]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Implementation of an ERAS protocol may reduce LOS, postoperative complications after Cytoreductive surgery with or without HIPEC compared to conventional recovery	IIIA
46	Rosa F, Longo F, Pozzo C et al. Enhanced recovery after surgery (ERAS) versus standard recovery for gastric cancer patients: the evidences and the issues. <i>Surg Oncol.</i> 2022;41:101727. [VA] [PubMed: 35189515]	Literature Review	n/a	n/a	n/a	n/a	Overview of ERAS studies and guidelines in patients undergoing surgery for gastric cancer. Adherence to an ERAS protocol leads to an overall reduction in costs and LOS, complications and readmission rates.	VA
47	Shen Y, Lv F, Min S et al. Impact of enhanced recovery after surgery protocol compliance on patients' outcome in benign hysterectomy and establishment of a predictive nomogram model. <i>BMC Anesthesiol.</i> 2021;21(1):289. [IIIA] [PubMed: 34809583]	Nonexperimental	Patients undergoing open or laparoscopic hysterectomy for benign conditions, <i>n</i> =475	n/a	n/a	n/a	Improved compliance with the ERAS protocol was associated with improved recovery and better patient experience undergoing hysterectomy. MIS, PONV prophylaxis, early mobilization, early oral intake, and early removal of urinary drainage were of concern in reducing postoperative complications.	IIIA
48	Soffin EM, Wetmore DS, Barber LA et al. An enhanced recovery after surgery pathway: association with rapid discharge and minimal complications after anterior cervical spine surgery. <i>Neurosurg Focus.</i> 2019;46(4):E9. [IIIB] [PubMed: 30933926]	Nonexperimental	33 spine surgery patients under an ERAS pathway	n/a	n/a	n/a	The ERAS pathway promoted safe, prompt discharge and was associated with minimal complications and no 90 day readmissions.	
49	Sun Z, Qi Y. Application of enhanced recovery after surgery care protocol in the perioperative care of patients undergoing lumbar fusion and internal fixation. <i>J Orthop Surg Res.</i> 2022;17(1):240. [IA] [PubMed: 35436890]	RCT	Patients undergoing lumbar fusion and internal fixation	ERAS protocol <i>n</i> =86	Traditional care <i>n</i> =80	Pain, self-care ability and degree of recovery	LOS and complications were lower in the ERAS group, no difference in cost, self care ability was significantly enhanced and patients in the ERAS group recovered rapidly.	IA
50	Wang S, Wang P, Li X, Sun W, Kong C, Lu S. Enhanced recovery after surgery pathway: association with lower incidence of wound complications and severe hypoalbuminemia in patients undergoing posterior lumbar fusion surgery. <i>J Orthop Surg Res.</i> 2022;17(1):178. [IIA] [PubMed: 35331289]	Quasi-experimental	Patients undergoing posterior lumbar fusion surgery	ERAS protocol <i>n</i> =530	Non-ERAS group <i>n</i> =530	Postoperative wound complications, postop complications, LOS and 90-day readmissions	ERAS group had lower incidence of postop wound related complications, and a lower incidence of severe hypoalbuminemia, also a shorter LOS and lower rate of readmissions.	IIA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
51	Wang YL, Zhang FB, Zheng LE, Yang WW, Ke LL. Enhanced recovery after surgery care to reduce surgical site wound infection and postoperative complications for patients undergoing liver surgery. <i>Int Wound J</i> . 2023;20(9):3540–3549. [IIA] [PubMed: 37218367]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	ERAS was safe and feasible when applied to liver resection, reducing the incidence of wound infection and total postoperative complications, and shortening the length of hospital stay. However, further studies are required to investigate the impact of ERAS protocols on clinical outcomes.	IIA
52	Pędziwiatr M, Mavrikis J, Witowski J et al. Current status of enhanced recovery after surgery (ERAS) protocol in gastrointestinal surgery. <i>Med Oncol</i> . 2018;35(6):95.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses the advantages of ERAS programs on patients undergoing gastrointestinal surgery.	VA
53	Zhu W, Yan Y, Sun Y et al. Implementation of enhanced recovery after surgery (ERAS) protocol for elderly patients receiving surgery for intertrochanteric fracture: a propensity score-matched analysis. <i>J Orthop Surg Res</i> . 2021;16(1):469. [IIA] [PubMed: 34315507]	Quasi-experimental	Elderly patients undergoing surgery for hip fracture	ERAS protocol n=92	Non-ERAS protocol n=98	LOS, pain, complications, functional recovery of the joint	LOS was significantly reduced and the complication rate was lower in the ERAS group. Additionally pain was alleviated and there was early recovery of the patient's hip function.	IIA
54	Agüero-Martínez MO, Tapia-Figueroa VM, Hidalgo-Costa T. Improved recovery protocols in cardiac surgery: a systematic review and meta-analysis of observational and quasi-experimental studies. <i>MEDICC Rev</i> . 2021;23(3-4):46–53. [IIIA] [PubMed: 34516536]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Improved recovery protocols in cardiac surgery reduce perioperative complications in patients and decrease the incidence of hospital readmission in the 30 days after surgery, and also reduce the length of stays in intensive care units and hospitals.	
55	Ahmed OS, Rogers AC, Bolger JC, Mastro Simone A, Robb WB. Meta-analysis of enhanced recovery protocols in bariatric surgery. <i>J Gastrointest Surg</i> . 2018;22(6):964–972. [IIA] [PubMed: 29488124]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	ERAS protocols were associated with a savings of 19.5 minutes of operative time, shortened LOS and improved morbidity.	
56	Arena S, Di Fabrizio D, Impellizzeri P, Gandullia P, Mattioli G, Romeo C. Enhanced recovery after gastrointestinal surgery (ERAS) in pediatric patients: a systematic review and meta-analysis. <i>J Gastrointest Surg</i> . 2021;25(11):2976–2988. [IIA] [PubMed: 34244952]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Length of stay, intraoperative fluid volume, post-operative opioid use, time to first defecation, time to regular diet, time to intravenous fluid stop, and costs were significantly lower in the ERAS patients.	IIA
57	Burchard PR, Dave YA, Loria AP et al. Early postoperative ERAS compliance predicts decreased length of stay and complications following liver resection. <i>HPB (Oxford)</i> . 2022;24(9):1425–1432. [IIIA] [PubMed: 35135723]	Nonexperimental	210 patients who underwent liver resection with an ERAS protocol-retrospective review	n/a	n/a	n/a	Length of stay ERAS program decreased length of stay	IIIA
58	Cao S, Zhang Y, Lin B, Chen J, Chen X, Zhuang C. Enhanced recovery after gynecological surgery: a meta-analysis of randomized controlled trials. <i>Nurs Health Sci</i> . 2023;25(1):30–43. [IA] [PubMed: 36464803]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	There was a significant reduction in LOS, complications and admission rate and a normal functional return. There is still heterogeneity between studies, more research is needed.	IA
59	Carr DA, Saigal R, Zhang F, Bransford RJ, Bellabarba C, Dagal A. Enhanced perioperative care and decreased cost and length of stay after elective major spinal surgery. <i>Neurosurg Focus</i> . 2019;46(4):E5. [IIIA] [PubMed: 30933922]	Quasi-experimental	620 ERAS patients and 183 non-ERAS patients undergoing elective major spinal surgery	ERAS protocol	non-ERAS protocol	Total cost and LOS	The implementation of a multimodal EPOC pathway decreased LOS and cost in major elective spine surgeries	IIIA
60	Elsarrag M, Soldozy S, Patel P et al. Enhanced recovery after spine surgery: a systematic review. <i>Neurosurg Focus</i> . 2019;46(4):E3. [IIIA] [PubMed: 30933920]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Low-certainty evidence suggests that ERAS programmes may shorten length of postoperative hospital stay, reduce readmissions, and facilitate postoperative bowel function recovery without compromising participant safety. Further well-conducted studies are required in order to validate the certainty of these findings.	IB
61	Elsarrag, Mazin, Soldozy, Sauson, Patel, Parantap, et al. Enhanced recovery after spine surgery: a systematic review 2019	Systematic Review	n/a	n/a	n/a	n/a	ERAS applied to spine surgery reduced LOS, accelerated return to function, minimized post-op pain and was cost saving.	IIIA
62	Jeong O, Jang A, Jung MR, Kang JH, Ryu SY. The benefits of enhanced recovery after surgery for gastric cancer: a large before-and-after propensity score matching study. <i>Clin Nutr</i> . 2021;40(4):2162–2168. [IIA] [PubMed: 33069509]	Quasi-experimental	989 patients undergoing gastrectomy	565 ERAS patients	424 non-ERAS patients	LOS, readmission rates, morbidity, mortality, complications.	Demonstrated that ERAS was associated with a 3-day reduction in hospital stay without increased readmission after gastrectomy. This study validated the benefits of ERAS in the clinical setting of gastrectomy.	IIA
63	Greer N, Sultan S, Shaikat A et al. <i>Enhanced Recovery After Surgery (ERAS) Programs for Patients Undergoing Colorectal Surgery</i> . Washington, DC: Department of Veterans Affairs; 2017. Accessed August 21, 2024. https://www.ncbi.nlm.nih.gov/books/NBK519374/ [IIA]	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations in pre-op, intra-op and post-op in colorectal surgery	IIA
64	Jung HC. Utilizing enhanced recovery after surgery pathway in radical cystectomy to decrease hospital length of stay: a systematic review. <i>Urol Nurs</i> . 2022;42(6):291–301. [IIIA]	Systematic Review	n/a	n/a	n/a	n/a	Reported a significantly lower hospital LOS in patient receiving an ERAS protocol.	IIIA
65	Ni X, Jia D, Chen Y, Wang L, Suo J. Is the enhanced recovery after surgery (ERAS) program effective and safe in laparoscopic colorectal cancer surgery? A meta-analysis of randomized controlled trials. <i>J Gastrointest Surg</i> . 2019;23(7):1502–1512. [IA] [PubMed: 30859422]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	ERAS is safe and effective in laparoscopic colorectal surgery and should be implemented.	IA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
66	Kamal YA, Hassanein A. Do perioperative protocols of enhanced recovery after cardiac surgery improve postoperative outcome? <i>Interact Cardiovasc Thorac Surg.</i> 2020;30(5):706–710. [VA] [PubMed: 32236541]	Literature Review	n/a	n/a	n/a	n/a	Postoperative outcomes are better in ERAS protocol patients.	VA
67	Liska D, Cengiz TB, Novello M et al. Do patients with inflammatory bowel disease benefit from an enhanced recovery pathway? <i>Inflamm Bowel Dis.</i> 2020;26(3):476–483. [IIA] [PubMed: 31372647]	Quasi-experimental	Patients undergoing surgery for inflammatory bowel disease	ERAS pathway <i>n</i> =246	No ERAS pathway <i>n</i> =425	LOS and costs	ERAS group had a shorter LOS and reduced costs.	IIA
68	Maj G, Regesta T, Campanella A, Cavoza C, Parodi G, Audo A. Optimal management of patients treated with minimally invasive cardiac surgery in the era of enhanced recovery after surgery and fast-track protocols: a narrative review. <i>J Cardiothorac Vasc Anesth.</i> 2022;36(3):766–775. [VA] [PubMed: 33840614]	Literature Review	n/a	n/a	n/a	n/a	ERAS use in patients undergoing minimally invasive cardiac procedures is feasible and safe with improved outcomes.	VA
69	Melhem AM, Ramly EP, Al Abyad OS et al. Enhanced recovery after cleft lip repair: protocol development and implementation in outreach settings. <i>Cleft Palate Craniofac J.</i> 2023;60(6):724–733. [VA] [PubMed: 35167405]	Expert Opinion	n/a	n/a	n/a	n/a	Implementing an ERAS protocol in this patient population was highly effective in decreasing postoperative pain and reducing opioids and LOS.	VA
70	Miguet C, Jauffret C, Zemmour C et al. Enhanced recovery after surgery and endometrial cancers: results from an initial experience focused on elderly patients. <i>Cancers (Basel).</i> 2023;15(12):3244. [PubMed: 37370854]	Quasi-experimental	427 Endometrial cancer patients	ERAS protocol <i>n</i> =261	Traditional care <i>n</i> =166	LOS, early discharge, post-op morbidity and rehospitalization	ERAS group had significantly shorter LOS and higher early discharge.	IIA
71	Nair A, Al-Aamri HHM, Borkar N, Rangaiah M, Haque PW. Application of enhanced recovery after surgery pathways in patients undergoing laparoscopic cholecystectomy with and without common bile duct exploration: a systematic review and meta-analysis. <i>Sultan Qaboos Univ Med J.</i> 2023;23(2):148–157. [PubMed: 37377820]	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	LOS, time to first flatus, PONV and pain scores were significantly less in the ERAS group than in the conventional one, while readmission and complications were comparable in both groups.	IA
72	Nair A, Mohammed Al-Aamri HH, Ishaq OA, Haque PW. Enhanced recovery after surgery pathways for patients undergoing laparoscopic appendectomy: a systematic review and meta-analysis. <i>J Acute Dis.</i> 2022;11(5):173–180.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	ERAS pathways have a shorter length of stay and earlier postoperative feed initiation for adult patients undergoing laparoscopic appendectomy compared with standard care. Both approaches have similar operative time, surgical site infection incidence, and readmission rate	IA
73	O'Neill AM, Calpin GG, Norris L, Beirne JP. The impact of enhanced recovery after gynaecological surgery: a systematic review and meta-analysis. <i>Gynecol Oncol.</i> 2023;168:8–16.	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	ERAS pathways significantly reduce length of stay without increasing readmission rates or rates of ileus across benign and oncological gynaecological surgery	IIA
74	Roldan HA, Brown AR, Radey J, Hogenbirk JC, Allen LR. Enhanced recovery after surgery reduces length of stay after colorectal surgery in a small rural hospital in Ontario. <i>Can J Rural Med.</i> 2023;28(4):179–189.	Quasi-experimental	Patients undergoing colorectal surgery in a small rural hospital	ERAS protocol <i>n</i> =40	Traditional care (non ERAS) <i>n</i> =40	LOS	LOS was less in the ERAS patient group.	IIIB
75	Sánchez-Iglesias JL, Carbonell-Socias M, Pérez-Benavente MA et al. PROFAST: a randomised trial implementing enhanced recovery after surgery for high complexity advanced ovarian cancer surgery. <i>Eur J Cancer.</i> 2020;136:149–158.	RCT	Women undergoing surgery for ovarian cancer	ERAS protocol <i>n</i> =50	Traditional care <i>n</i> =49	LOS, complications, readmission, mortality	Patients in the ERAS arm had a decreased LOS and decreased rate of readmission. ERAS should be standard of care.	IA
76	Shao X, Li R, Zhang L, Jiang W. Enhanced recovery after surgery protocol for oblique lumbar interbody fusion. <i>Indian J Orthop.</i> 2022;56(6):1073–1082.	Quasi-experimental	Patients undergoing spine surgery	ERAS protocol <i>n</i> =39	Traditional care (non ERAS) <i>n</i> =37	LOS, blood loss, cost, time to walk, blood transfusion, complications	ERAS program decreased length of stay, accelerated functional recovery and decreased costs.	IIA
77	Staartjes VE, de Wispelaere MP, Schröder ML. Improving recovery after elective degenerative spine surgery: 5-year experience with an enhanced recovery after surgery (ERAS) protocol. <i>Neurosurg Focus.</i> 2019;46(4):E7.	Nonexperimental	2592 patients undergoing elective spine surgery-ERAS protocols for 5 years	n/a	n/a	LOS, readmissions, cost	94% of patients were discharged after 1 night, over the 5 year period there was a trend towards a higher proportion of patients being discharged sooner. A decrease in adverse events and no increase in readmissions, an estimated reduction in nursing cost of 46.8%	IIIA
78	Szerlip M, Tabachnick D, Hamandi M et al. Safe implementation of enhanced recovery after surgery protocol in transfemoral transcatheter aortic valve replacement. <i>Proc (Bayl Univ Med Cent).</i> 2020;34(1):5–10.	Quasi-experimental	Patients undergoing transfemoral transcatheter aortic valve replacement (TAVR)	ERAS protocol <i>n</i> =121	Pre-ERAS patients <i>n</i> =368	LOS, complications, readmission, mortality	ERAS protocol was associated with shorter LOS without readmission.	IIA
79	Tan YY, Liaw F, Warner R, Myers S, Ghanem A. Enhanced recovery pathways for flap-based reconstruction: systematic review and meta-analysis. <i>Aesthetic Plast Surg.</i> 2021;45(5):2096–2115.	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	ERAS pathways reduced LOS and should be adapted to each institution according to needs, resources and caseload.	IIIA
80	Tarıkcı Kılıç E, Demirbilek T, Naderi S. Does an enhanced recovery after surgery protocol change costs and outcomes of single-level lumbar microdiscectomy? <i>Neurosurg Focus.</i> 2019;46(4):E10.	Quasi-experimental	Patients undergoing single level lumbar microdiscectomy	ERAS protocol <i>n</i> =60	Non-ERAS protocol <i>n</i> =60	Cost effectiveness and post-op outcomes	The ERAS group had decreased OR time, intraoperative blood loss and decreased intraoperative opioid administration. First oral intake and mobilization were earlier in the ERAS group and they had less PONV. LOS was shorter and there was less pain in the ERAS group. Found to be cost effective.	IIA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
81	Visioni A, Shah R, Gabriel E, Attwood K, Kukar M, Nurkin S. Enhanced recovery after surgery for noncolorectal surgery?: a systematic review and meta-analysis of major abdominal surgery. <i>Ann Surg.</i> 2018;267(1):57–65.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	ERAS protocols decreased length of stay and cost by not increasing complications or readmission rates. This study adds to the evidence that ERAS protocols are safe to implement and are beneficial to surgical patients and the healthcare system across multiple abdominal procedures.	IIA
82	Wang P, Wang Q, Kong C et al. Enhanced recovery after surgery (ERAS) program for elderly patients with short-level lumbar fusion. <i>J Orthop Surg Res.</i> 2020;15(1):299.	Quasi-experimental	Patients over the age of 65 undergoing short-level lumbar fusion	ERAS protocol n=96	Non-ERAS group n=96	Patient satisfaction, complications, LOS, postop pain and 30 day readmission rates.	The ERAS group had a statistically significant shorter LOS.	IIA
83	Wee IY, Syn NL, Shabbir A, Kim G, So JBY. Enhanced recovery versus conventional care in gastric cancer surgery: a meta-analysis of randomized and non-randomized controlled trials. <i>Gastric Cancer.</i> 2019;22(3):423–434	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Compared to conventional care, ERAS reduces hospital stay, costs, surgical stress response and time to return of gut function, without increasing post-operative morbidity in gastric cancer surgery. However, precaution is necessary to reduce the increased risk of hospital readmission when adopting ERAS.	IIIA
84	Zaed I, Bossi B, Ganau M, Tinterri B, Giordano M, Chibbaro S. Current state of benefits of enhanced recovery after surgery (ERAS) in spinal surgeries: a systematic review of the literature. <i>Neurochirurgie.</i> 2022;68(1):61–68.	Systematic Review	n/a	n/a	n/a	n/a	ERAS appears to be helpful at reducing LOS and decreased complication rates, there is a lack of high quality evidence in this population, more RCTs should be conducted.	IIIA
85	Zhang H, Wang Z, Li K. Clinical application of enhanced recovery after surgery in lumbar disk herniation patients undergoing dynamic stabilization and discectomy. <i>J Back Musculoskeletal Rehabil.</i> 2022;35(1):47–53.	Quasi-experimental	119 patients undergoing lumbar disk herniation stabilization and discectomy surgery	ERAS protocol n=56	Traditional care n=62	Patient reported outcomes, pain, function	the ERAS group had lower postoperative VAS score and ODI and higher postoperative JOA score and rate of improved JOA score compared with the control group. Intraoperative blood loss, operation time, ambulation time and length of stay were all lower in the ERAS group than in the control group	IIA
86	Nguyen Y, Fernandez L, Trainer B, McNulty M, Kazior MR. Decreased length of stay and opioid usage after liver cancer surgery with enhanced recovery pathway implementation. <i>Qual Manag Health Care.</i> 2023;32(4):217–221.	Organizational Experience		n/a	n/a	n/a	ERAS program implemented for patients undergoing liver cancer surgery, all areas of periop were covered. The implementation decreased LOS and perioperative opioid consumption.	VA
87	Bowles LA, Heet W, Waterbeck J, Chastain L, Monroe M, Davies CC. The effect of an enhanced recovery after surgery protocol on opioid consumption, pain and length of stay among patients undergoing prostatectomy and nephrectomy. <i>J Perioper Nurs.</i> 2022;35(2):e-27–e-31.	Quasi-experimental	303 patients undergoing prostatectomy and nephrectomy	ERAS protocol n=170	Traditional protocol (non-ERAS) n=133	Opioid consumption, pain, LOS	Significant difference for all three outcomes.	IIA
88	Brown ML, Simpson V, Clark AB et al. ERAS implementation in an urban patient population undergoing gynecologic surgery. <i>Best Pract Res Clin Obstet Gynaecol.</i> 2022;85(Pt B):1–11.	Quasi-experimental	Patients undergoing gyn surgery in one facility	ERAS protocol n=271	Non-ERAS group n=318	LOS, pain, opioid use, readmission rates	ERAS group had shorter LOS, decrease in pain and a decrease in opioid use.	IIA
89	Flanders TM, Ifrach J, Sinha S et al. Reduction of postoperative opioid use after elective spine and peripheral nerve surgery using an enhanced recovery after surgery program. <i>Pain Med.</i> 2020;21(12):3283–3291.	Quasi-experimental	Patients undergoing elective spine and peripheral nerve surgery.	ERAS protocol-1,141 patients	149 patients without an ERAS protocol	Opioid use one month post surgery, opioid use on postop day 1 and at 3 and 6 months post surgery, inpatient pain scores, patient satisfaction scores, postop foley catheter removal, ambulation on day 1, LOS, complications and ICU admissions.	Significant reduction in the use of opioids at 1, 3 and 6 months, PCA use nearly eliminated in the ERAS group, ERAS patients mobilized faster and fewer required catheterization, ERAS group had a decreased LOS.	IIA
90	Chen L, Zheng J, Kong D, Yang L. Effect of enhanced recovery after surgery protocol on patients who underwent off-pump coronary artery bypass graft. <i>Asian Nurs Res (Korean Soc Nurs Sci).</i> 2020;14(1):44–49.	Quasi-experimental	94 patients undergoing off-pump coronary artery bypass graft	ERAS protocol n=47	Traditional protocol (non-ERAS) n=47	Effect on patients	ERAS improved pt knowledge, shortened fasting time, increased patient activity and improved 6 minute walk test.	IIA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
91	Tan JQ, Chen YB, Wang WH, Zhou SL, Zhou QL, Li P. Application of enhanced recovery after surgery in perioperative period of tympanoplasty and mastoidectomy. <i>Ear Nose Throat J</i> . 2021;100(10 suppl):10455–10495.	RCT	Patients undergoing tympanoplasty and mastoidectomy	ERAS protocol n=35	Non-ERAS protocol n=30	Patient anxiety, post-op pain, comfort level	ERAS group had decreased anxiety and pain and improved comfort.	IB
92	Ji ZW, Fan CY, Yu ZL, Wu XX, Mao HQ. Enhanced recovery after surgery (ERAS) relieves psychological stress in patients with osteoporotic vertebral compression fracture undergoing percutaneous kyphoplasty: an observational retrospective cohort study. <i>J Orthop Surg Res</i> . 2023;18(1):218.	Quasi-experimental	532 undergoing percutaneous kyphoplasty	ERAS protocol n=251	non-ERAS protocol n=281	Rate of depression and anxiety.	Patients in the ERAS group had a decrease in depression and anxiety.	IIA
93	de Boer HD, Scott MJ, Fawcett WJ. Anaesthesia role in enhanced recovery after surgery: a revolution in care outcomes. <i>Curr Opin Anaesthesiol</i> . 2023;36(2):202–207.	Expert Opinion	n/a	n/a	n/a	n/a	Overview of ERAS components in all phases of care, auditing and outcomes, cost.	VA
94	Krupa S, Ozga D, Kolowca M, Widenka K. Effect of the 'enhanced recovery after surgery protocol' on the workload of nurses in cardiac patients. <i>94</i> . 2020;22(3):146–151.	Quasi-experimental	100 surgical patients	ERAS protocol n=50	Non-ERAS protocol n=50	Workload of nurses	The workload of nurses is lower in the ERAS group.	IIB
95	Lovely JK, Hyland SJ, Smith AN, Nelson G, Ljungqvist O, Parrish RH. 2nd. Clinical pharmacist perspectives for optimizing pharmacotherapy within enhanced recovery after surgery (ERAS) programs. <i>Int J Surg</i> . 2019;63:58–62.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses the role of pharmacotherapy in ERAS and pharmacist led endeavors.	VA
96	Bicket MC, Brat GA, Hutfless S, Wu CL, Nesbit SA, Alexander GC. Optimizing opioid prescribing and pain treatment for surgery: review and conceptual framework. <i>Am J Health-Syst Pharm</i> . 2019;76(18):1403–1412.	Literature Review	n/a	n/a	n/a	n/a	Described an urgent need for interventions to address the opioid crisis, including providing ERAS programs and multi-modal pain analgesia.	VA
97	Martin L, Gillis C, Ljungqvist O. Preoperative nutrition care in enhanced recovery after surgery programs: are we missing an opportunity? <i>Curr Opin Clin Nutr Metab Care</i> . 2021;24(5):453–463.	Literature Review	n/a	n/a	n/a	n/a	The importance of preoperative nutrition and screening patients is discussed.	VA
98	Afonso AM, Tokita HK, McCormick PJ, Twersky RS. Enhanced recovery programs in outpatient surgery. <i>Anesthesiol Clin</i> . 2019;37(2): 225–238.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses the application of ERAS to ambulatory surgery settings.	
99	Cukierman DS, Cata JP, Gan TJ. Enhanced recovery protocols for ambulatory surgery. <i>Best Pract Res Clin Anaesthesiol</i> . 2023;37(3):285–303.	Expert Opinion	n/a	n/a	n/a	n/a	Reviews the current evidence on ERAS elements and implementing them in ambulatory surgery.	VA
100	Kaye AD, Renschler J, Cramer K et al. The role of clinical pharmacology in enhanced recovery after surgery protocols: a comprehensive review. <i>Anaesthesiol Intensive Ther</i> . 2020;52(2):154–164.	Expert Opinion	n/a	n/a	n/a	n/a	ERAS protocol in ambulatory surgery including pharmacology are discussed.	VA
101	Powers BK, Ponder HL, Findley R et al. Enhanced Recovery After Surgery (ERAS) Society abdominal and thoracic surgery recommendations: a systematic review and comparison of guidelines for perioperative and pharmacotherapy core items. <i>World J Surg</i> . 2024;48(3):509–523.	Systematic Review	21 ERAS guidelines	n/a	n/a	n/a	Consensus was found for aspects in 21 current ERAS guidelines related to pharmacotherapy choice, details related to doses, regimen, timing of administration as well as unique aspects pertaining to specific surgeries remain to be researched and harmonized to promote guideline consistency and further optimize patient outcomes	
102	Rourke K, Halyk LJ, MacNeil J, Malic C. Perioperative protocols in ambulatory breast reconstruction: a systematic review. <i>J Plast Reconstr Aesthet Surg</i> . 2023;85:252–263.	Systematic Review	n/a	n/a	n/a	n/a	Authors added two new items and modified seven items in the ERAS protocol for ambulatory breast reconstruction patients.	IIIA
103	Smith HJ, Leath CA 3rd, Straughn JM Jr. Enhanced recovery after surgery in surgical specialties: gynecologic oncology. <i>Surg Clin North Am</i> . 2018;98(6):1275–1285	Expert Opinion	n/a	n/a	n/a	n/a	An overview of ERAS in gynecologic oncology is discussed, implementation strategies are included.	VA
104	Hayman A. Enhanced recovery after surgery in community hospitals. <i>Surg Clin North Am</i> . 2018;98(6):1233–1239.	Expert Opinion	n/a	n/a	n/a	n/a	Implementing ERAS in a community hospital is discussed.	VA
105	Pearsall EA, McLeod RS. enhanced recovery after surgery: implementation strategies, barriers and facilitators. <i>Surg Clin North Am</i> . 2018;98(6):1201–1210.	Expert Opinion	n/a	n/a	n/a	n/a	Implementation success in ERAS is discussed, including barriers and how to overcome.	VA
106	Nelson G. Enhanced recovery in gynecologic oncology surgery—state of the science. <i>Curr Oncol Rep</i> . 2023;25(10):1097–1104.	Expert Opinion	n/a	n/a	n/a	n/a	An overview of the evidence supporting the use of ERAS in gynecologic oncology surgery and implementation strategies.	VA
107	Saraswathula A, Gourin CG, Vosler PS. Guide to enhanced recovery for cancer patients undergoing surgery: head and neck cancer. <i>Ann Surg Oncol</i> . 2021;28(12):6932–6935.	Expert Opinion	n/a	n/a	n/a	n/a	Outlines key participants and critical action areas in ERAS protocols in this population of patients, barriers to effective implementation are highlighted.	VA
108	Jawitz OK, Bradford WT, McConnell G, Engel J, Allender JE, Williams JB. How to start an enhanced recovery after surgery cardiac program. <i>Crit Care Clin</i> . 2020;36(4):571–579.	Expert Opinion	n/a	n/a	n/a	n/a	Strategies and guidance for starting an ERAS program are discussed.	VA
109	Belouaer A, Cossu G, Papadakis GE et al. Implementation of the enhanced recovery after surgery (ERAS) program in neurosurgery. <i>Acta Neurochir (Wien)</i> . 2023;165(11):3137–3145.	Organizational Experience	One neurosurgery program in one hospital	n/a	n/a	n/a	ERAS program implementation using a multidisciplinary team, an ERAS coach and a dedicated nurse coordinator is discussed.	VA
110	Spencer P, Scott M. Implementing enhanced recovery after surgery across a United States health system. <i>Anesthesiol Clin</i> . 2022;40(1):1–21.	Organizational Experience		n/a	n/a	n/a	Describes the implementation of ERAS pathways across all surgical specialties in on health care system.	VA
111	Ljungqvist O, de Boer HD, Balfour A et al. Opportunities and challenges for the next phase of enhanced recovery after surgery: a review. <i>JAMA Surg</i> . 2021;156(8):775–784.	Expert Opinion		n/a	n/a	n/a	Discusses implementation and opportunities to improve patient outcomes.	
112	Roulin D, Demartines N. Principles of enhanced recovery in gastrointestinal surgery. <i>Langenbecks Arch Surg</i> . 2022;407(7):2619–2627.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses the evidence on perioperative management in GI surgery. Focusing on continuous improvement and ERAS compliance.	VA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE	
113	Xiaoyan C, Wenbin H, Li D et al. Construction and application of enhanced recovery after surgery—optimized management system with nurse-led multidisciplinary cooperation. <i>Nurs Open</i> . 2023;10(7):4526–4535.	Quasi-experimental	Surgical patients, nurses and physicians	220 surgical patients along with 82 nurses and 98 physicians in an ERAS optimized management system	220 surgical patients, 82 nurses and 98 physicians who were not in the ERAS system	ERAS observation indicators, nurse professional identity scores, physician satisfaction scores	ERAS optimization led by nurses that was multi-disciplinary was effective at implementation and increased patient recovery and enhanced nurse professional identity.	IIA	
114	Ellis DB, Agarwala A, Cavallo E et al. Implementing ERAS: how we achieved success within an anesthesia department. <i>BMC Anesthesiol</i> . 2021;21(1):36.	Organizational Experience	One facility	n/a	n/a	n/a	Implementation of the anesthesia bundle in the ERAS pathway is described.	VA	
115	Noble KA. Put PEP in your step with a podiatric enhanced recovery after surgery protocol in the outpatient adult population: a best practice implementation project. <i>JBI Evid Implement</i> . 2021;19(1):39–55.	Organizational Experience	Day surgery facility in the podiatric patient population	n/a	n/a	n/a	Decreased post-op pain and LOS, further research is needed.	VA	
116	Building Your Core Team. Agency for Healthcare Research and Quality. 2023. Accessed August 30, 2024. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2Fwww.ahrq.gov%2Fsites%2Fdefault%2Ffiles%2Fwysiwyg%2Fhai%2Ftools%2Fsurgery%2F8-building-core-team.docx	Expert Opinion	n/a	n/a	n/a	n/a	ERAS implementation guide AHRQ	VA	
117	Grosh T, Elkassabany NM. Enhanced recovery after shoulder arthroplasty. <i>Anesthesiol Clin</i> . 2018;36(3):417–430.	Organizational Experience	One organization's ERAS protocol	n/a	n/a	n/a	ERAS in joint arthroplasty is discussed and the need to promote universal adoption.	VA	
118	Salenger R, Morton-Bailey V, Grant M, Gregory A, Williams JB, Engelman DT. Cardiac enhanced recovery after surgery: a guide to team building and successful implementation. <i>Semin Thorac Cardiovasc Surg</i> . 2020;32(2):187–196.	Expert Opinion	n/a	n/a	n/a	n/a	A discussion on successful ERAS implementation.	VA	
119	Shah PR, Leichte S, Spencer P. Enhanced recovery after surgery, Lean, and claims-based quality databases: how does it all make sense? <i>Curr Opin Anaesthesiol</i> . 2021;34(2):161–167.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses lean change management and	IIIA	
120	Brown D, Khaja A. Nursing perspectives on enhanced recovery after surgery. <i>Surg Clin North Am</i> . 2018;98(6):1211–1221.	Expert Opinion	n/a	n/a	n/a	n/a	Nurses role in ERAS.	VA	
121	Huber GF, Dort JC. Reducing morbidity and complications after major head and neck cancer surgery: the (future) role of enhanced recovery after surgery protocols. <i>Curr Opin Otolaryngol Head Neck Surg</i> . 2018;26(2):71–77.	Expert Opinion	n/a	n/a	n/a	n/a	Various aspects of ERAS protocols are discussed.	VA	
122	Pooya S, Johnston K, Estakhri P, Fathi A. Successful implementation of enhanced recovery after surgery program in a safety-net hospital: barriers and facilitators. <i>J Perianesth Nurs</i> . 2021;36(5):468–472.	Organizational Experience	n/a	n/a	n/a	n/a	Addresses the barriers to implementation and how to overcome to improve quality and reduce cost.	VA	
123	Shah TA, Knapp L, Cohen ME, Brethauer SA, Wick EC, Ko CY. Truth of colorectal enhanced recovery programs: process measure compliance in 151 hospitals. <i>J Am Coll Surg</i> . 2023;236(4):543–550.	Nonexperimental	150 hospitals, ERAS process measures, studied 663 opportunities for improvement	n/a	n/a	Improvement in process compliance	Hospitals have difficulty improving process compliance with ERAS, focus should be on improving ERAS adoption across all hospital types.	IIIA	
124	Feldman LS, Delaney CP, Ljungqvist O, Carli F, eds. <i>The SAGES / ERAS Society Manual of Enhanced Recovery Programs for Gastrointestinal Surgery</i> . Springer; 2015.	Expert Opinion	n/a	n/a	n/a	n/a	Overview of ERAS and implementation.	VA	
125	Gap Analysis and Goal-Setting Form. Agency for Healthcare Research and Quality. 2023. Accessed August 30, 2024. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2Fwww.ahrq.gov%2Fsites%2Fdefault%2Ffiles%2Fwysiwyg%2Fhai%2Ftools%2Fsurgery%2F6-gap-analysis-goal.docx	Expert Opinion	n/a	n/a	n/a	n/a	ERAS implementation guide AHRQ	VA	
126	Pilkington M, Nelson G, Cauley C et al. Development of an enhanced recovery after surgery surgical safety checklist through a modified Delphi process. <i>JAMA Netw Open</i> . 2023;6(2):e2248460.	Qualitative	105 ERAS experts	n/a	n/a	n/a	Create an ERAS Surgical Safety Checklist	The SSC could be modified to align with ERAS recommendations for patients undergoing major surgery within an ERAS protocol. The stakeholder and expert generated ERAS SSC could be adopted directly, or the recommendations for modification could be applied to an existing institutional SSC to facilitate implementation.	IIIA
127	Worrall, Douglas M., Tanella, Anthony, DeMaria, Samuel, Jr and Miles, Brett A. Anesthesia and Enhanced Recovery After Head and Neck Surgery 2019	Expert Opinion	n/a	n/a	n/a	n/a	ERAS overview and implementation of a protocol is discussed.	VA	
128	Rosyidah R, Dewanto A, Hapsari ED, Widyastuti Y. Health professionals perception of enhanced recovery after surgery: a scoping review. <i>J Perianesth Nurs</i> . 2022;37(6):956–960.	Systematic Review	n/a	n/a	n/a	n/a	For the ERAS program to be successfully implemented, all healthcare workers must receive continuous training to improve their knowledge of the program, and also demonstrate discipline, strong communication skills, as well as teamwork. A barrier is inadequate time and resources. Knowledge of ERAS programs should be improved due to inadequate understanding.	IIIB	

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
129	McGreevey JD 3rd. Order sets in electronic health records: principles of good practice. <i>Chest</i> . 2013;143(1):228–235.	Organizational Experience	n/a	n/a	n/a	n/a	Order sets as a clinical decision tool are reviewed in the context of the electronic medical record. One academic medical center's experience in developing an EHR order set embedded with EBP principles and lessons learned for future order set development.	VA
130	Smith TW Jr, Wang X, Singer MA, Godellas CV, Vaince FT. Enhanced recovery after surgery: a clinical review of implementation across multiple surgical subspecialties. <i>Am J Surg</i> . 2020;219(3):530–534.	Expert Opinion	n/a	n/a	n/a	n/a	A comparison of ERAS across surgical subspecialties with metrics of improvement and success rates.	VA
131	Colebatch E, Lockwood C. Enhanced perioperative nutritional care for patients undergoing elective colorectal surgery at Calvary North Adelaide Hospital: a best practice implementation project. <i>JBI Evid Synth</i> . 2020;18(1):224–242.	Organizational Experience	One facility	n/a	n/a	n/a	The evaluation of current practice and implementation of best practices related to ERAS nutrition protocols are described. Improvement in fasting, preop carb drinks, early feeding were noted.	VA
132	Carrilho MPG, Pontifice-Sousa P, Marques RMD. ERAS program—nursing care for patients undergoing colorectal surgery. <i>Acta Paul Enferm</i> . 2021;34:eAPE002105.	Literature Review	n/a	n/a	n/a	n/a	Nursing role in ERAS program is discussed.	VA
133	Hou Q, Luo X, Li H, Hou Y, Zhang Z. The role of nursing in enhanced recovery after surgery programs in accordance with spine surgery: a mini review. <i>J Integr Nurs</i> . 2022;4(1):42–47.	Literature Review	n/a	n/a	n/a	n/a	The role of the ERAS nurse in spine surgery is reviewed.	VA
134	Zheng L, Zhang S. Application and evaluation of a care plan for enhanced recovery after thyroidectomy. <i>Inquiry</i> . 2022;59: 469580221090404.	Quasi-experimental	120 patients undergoing thyroidectomy	ERAS protocol n=60	Non-ERAS protocol n=60	Outcomes	The ERAS group had significantly less pain, LOS, and cost than the conventional group.	IIA
135	Mendes DIA, Ferrito CRC. Preoperative nursing consultations: implementation and evaluation. <i>Journal of Nursing Reference</i> . 2021;5(8):1–8.	Quasi-experimental	161 Surgical patients	ERAS nursing consultation n=93	No ERAS nursing consultation n=65	Pt satisfaction, LOS, mobilization	Pt satisfaction, LOS and mobilization were all improved in the ERAS consultation group	IIB
136	Conti D, Pandolfini L, Ballo P et al. The role of the recovery room in improving adherence during an enhanced recovery after surgery (ERAS) implementation program for colorectal surgery: a single-center retrospective analysis. <i>J Perianesth Nurs</i> . 2023;38(2):232–235.	Nonexperimental	149 ERAS protocol patients, 119 went to the recovery room and 30 went to the ward post surgery	n/a	n/a	Effect of the recovery room nurse	The RR nurse guaranteed effective patient assistance and ensured appropriate compliance to the postoperative ERAS items.	IIIA
137	Schultz KP, Kaplan J, Rappaport NH. The nuts and bolts of a successful non-narcotic perioperative enhanced recovery after surgery protocol. <i>Aesthet Surg J</i> . 2021;41(11):NP1769–NP1774.	Literature Review	n/a	n/a	n/a	n/a	Discusses ERAS medications and the effectiveness of ERAS protocols on pain control, also addresses patient counseling.	VA
138	Mendes, Diana I. A., Ferrito, Candida R. d. A. C. and Goncalves, Maria I. R. Nursing Interventions in the Enhanced Recovery After Surgery R: Scoping Review 2018	Literature Review	n/a	n/a	n/a	n/a	Nursing role in ERAS program is discussed.	VA
139	Jensen BT. Organization factors in the ERAS bladder cancer pathway: the multifarious role of the ERAS nurse, why and what is important? <i>Semin Oncol Nurs</i> . 2021;37(1):151106.	Expert Opinion	n/a	n/a	n/a	n/a	Overview of the role of the ERAS nurse.	VA
140	Bordonada K, Davo-Otomo S, Zucker ME, Saito H. The impact of the nurse navigator on patients on a colorectal surgery pathway. <i>Medsurg Nurs</i> . 2020;29(2):109–116.	Quasi-experimental	100 colorectal surgery patients on an ERAS pathway	ERAS nurse navigator n=50	Without a nurse navigator n=50	LOS, SSI rates, readmissions	Use of a nurse navigator may impact patient adherence to protocols, improve patient outcomes and may decrease the need for analgesia at discharge, promoting high quality, cost effective health care.	IIA
141	Baimas-George M, Watson M, Elhage S, Parala-Metz A, Vrochides D, Davis BR. Prehabilitation in frail surgical patients: a systematic review. <i>World J Surg</i> . 2020;44(11):3668–3678.	Systematic Review	n/a	n/a	n/a	n/a	There were 5 studies in this review for this population of patients, prehabilitation in frail patients may lessen operative risk.	IIB
142	Baldini G, Ferreira V, Carli F. Preoperative preparations for enhanced recovery after surgery programs: a role for prehabilitation. <i>Surg Clin North Am</i> . 2018;98(6):1149–1169.	Expert Opinion	n/a	n/a	n/a	n/a	Detailed explanation of the role of prehabilitation to address modifiable risk factors in surgical patients.	VA
143	Bierle DM, Raslau D, Regan DW, Sundsted KK, Mauck KF. Preoperative evaluation before noncardiac surgery. <i>Mayo Clin Proc</i> . 2020;95(4):807–822.	Expert Opinion	n/a	n/a	n/a	n/a	Focuses on a structured approach to pre-surgical evaluations, evidence for screening tools and preoperative testing are discussed.	VA
144	Bolshinsky V, Li MH, Ismail H, Burbury K, Riedel B, Heriot A. Multimodal prehabilitation programs as a bundle of care in gastrointestinal cancer surgery: a systematic review. <i>Dis Colon Rectum</i> . 2018;61(1):124–138.	Systematic Review	n/a	n/a	n/a	n/a	Prehab programs and the importance of the process are discussed, implications for future research.	IIIA
145	Borrell-Vega J, Esparza Gutierrez AG, Humeidan ML. Multimodal prehabilitation programs for older surgical patients. <i>Anesthesiol Clin</i> . 2019;37(3):437–452.	Literature Review	n/a	n/a	n/a	n/a	Various aspects of prehabilitation are discussed.	VA
146	Carli F, Bessisow A, Awasthi R, Liberman S. Prehabilitation: finally utilizing frailty screening data. <i>Eur J Surg Oncol</i> . 2020;46(3):321–325.	Expert Opinion	n/a	n/a	n/a	n/a	Prehab is discussed and the role of interdisciplinary teams.	VA
147	Chabot K, Gillis C, Carli F. Prehabilitation: metabolic considerations. <i>Curr Opin Clin Nutr Metab Care</i> . 2020;23(4):271–276.	Expert Opinion	n/a	n/a	n/a	n/a	Prehab is discussed and the role of interdisciplinary teams and future research.	VA
148	Durey BJ, Fritche D, Martin DS, Best LMJ. The effect of preoperative exercise intervention on patient outcomes following bar-iatric surgery: a systematic review and meta-analysis. <i>Obes Surg</i> . 2022;32(1):160–169.	Systematic Review	n/a	n/a	n/a	n/a	RCRI.	IIIA
149	Duro-Ocana P, Zambolin F, Jones AW et al. Efficacy of supervised exercise prehabilitation programs to improve major abdominal surgery outcomes: a systematic review and meta-analysis. <i>J Clin Anesth</i> . 2023;86:111053.	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	Primary	IA
150	Rohi A, Olofsson MET, Jakobsson JG. Ambulatory anesthesia and discharge: an update around guidelines and trends. <i>Curr Opin Anaesthesiol</i> . 2022;35(6):691–697.	Expert Opinion	n/a	n/a	n/a	n/a	Provided an overview of recent changes in anesthesia and same day discharge.	VB
151	Esser T, Zimmer P, Schier R. Preoperative exercise and prehabilitation. <i>Curr Opin Anaesthesiol</i> . 2022;35(6):667–673.	Expert Opinion	n/a	n/a	n/a	n/a	A discussion of prehab and future research.	VB

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
152	Falz R, Bischoff C, Thieme R et al. Effects and duration of exercise-based prehabilitation in surgical therapy of colon and rectal cancer: a systematic review and meta-analysis. <i>J Cancer Res Clin Oncol</i> . 2022;148(9):2187–2213.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Prehabilitation while the patient is preparing to undergo surgery for colorectal carcinoma improves functional capacity; and might reduce postoperative overall complications, but does not shorten the LOS.	IA
153	Ferreira V, Lawson C, Ekmekjian T, Carli F, Scheede-Bergdahl C, Chevalier S. Effects of preoperative nutrition and multimodal prehabilitation on functional capacity and postoperative complications in surgical lung cancer patients: a systematic review. <i>Support Care Cancer</i> . 2021;29(10):5597–5610.	Systematic Review	n/a	n/a	n/a	n/a	Prehabilitation using multiple methods that combine nutrition and exercise may have benefits.	IIIA
154	Fuller S, Kumar SR, Roy N et al. The American Association for Thoracic Surgery Congenital Cardiac Surgery Working Group 2021 consensus document on a comprehensive perioperative approach to enhanced recovery after pediatric cardiac surgery. <i>J Thorac Cardiovasc Surg</i> . 2021;162(3):931–954.	Systematic Review	n/a	n/a	n/a	n/a	Systematic review and delphi for consensus recommendations in pediatric patients undergoing cardiac surgery.	IIIA
155	Gillis C, Buhler K, Bresee L et al. Effects of nutritional prehabilitation, with and without exercise, on outcomes of patients who undergo colorectal surgery: a systematic review and meta-analysis. <i>Gastroenterology</i> . 2018;155(2):391–410.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Review found that nutritional prehabilitation alone or combined with an exercise program significantly decreased length of hospital stay by 2 days in patients undergoing colorectal surgery. There is some evidence that multimodal prehabilitation accelerated the return to presurgical functional capacity	IA
156	Gillis C, Gramlich L, Culos-Reed SN et al. Third-variable effects: tools to understand who, when, why, and how patients benefit from surgical prehabilitation. <i>J Surg Res</i> . 2021;258:443–452.	Expert Opinion	n/a	n/a	n/a	n/a	Tools looking at prehab components is discussed.	VA
157	Gillis C, Ljungqvist O, Carli F. Prehabilitation, enhanced recovery after surgery, or both? A narrative review. <i>Br J Anaesth</i> . 2022;128(3):434–448.	Expert Opinion	n/a	n/a	n/a	n/a	Prehab and ERAS are discussed.	VA
158	Guinn NR, Schwartz J, Arora RC et al. Perioperative quality initiative and enhanced recovery after surgery—Cardiac Society consensus statement on the management of preoperative anemia and iron deficiency in adult cardiac surgery patients. <i>Anesth Analg</i> . 2022;135(3):532–544.	Systematic Review	n/a	n/a	n/a	n/a	Addresses anemia and iron deficiency.	IIIA
159	Gurlit S, Gogol M. Prehabilitation is better than cure. <i>Curr Opin Anaesthesiol</i> . 2019;32(1):108–115.	Expert Opinion	n/a	n/a	n/a	n/a	Elements of prehab are discussed.	VA
160	Hassan A, Boyle S, Lai W et al. Prehabilitation and education in major abdominal and thoracic surgery reduces length of stay and ventilation days. <i>Physiother Pract Res</i> . 2022;43(2):149–156.	Quasi-experimental	elective major abdominal or thoracic surgery	Patient education and exercise training n=185	No education or exercise training n=185	LOS, postop pneumonia, unplanned ICU intubation, prolonged mechanical ventilation, hospital readmission, mortality	The exercise group experienced significant reductions in LOS and prolonged ventilation, less superficial SSIs and no other significant differences.	IIA
161	Hayashi K, Janowski A, Lesnak JB, Sluka KA. Preoperative exercise has a modest effect on postoperative pain, function, quality of life, and complications: a systematic review and meta-analysis. <i>Phys Ther</i> . 2023;103(3):pzac169.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Preoperative exercise has a modest effect on postoperative pain, function, and quality of life within the first 6 months after surgery and reduces the risk of developing postoperative complications in individuals undergoing joint replacement surgery.	IIA
162	Hirsch KR, Wolfe RR, Ferrando AA. Pre- and post-surgical nutrition for preservation of muscle mass, strength, and functionality following orthopedic surgery. <i>Nutrients</i> . 2021;13(5):1675.	Literature Review	n/a	n/a	n/a	n/a	Oral nutrition strategies before and after surgery are discussed.	VA
163	Hunter TL, Sarno DL, Jumreornvong O, Esparza R, Flores LE, Silver JK. The role of surgical prehabilitation during the COVID-19 pandemic and beyond. <i>Phys Med Rehabil Clin N Am</i> . 2023;34(3):523–538.	Expert Opinion	n/a	n/a	n/a	n/a	Surgical prehab is discussed.	VA
164	Jensen BT, Lauridsen SV, Scheede-Bergdahl C. The potential of prehabilitation in radical cystectomy pathways: where are we now? <i>Semin Oncol Nurs</i> . 2021;37(1):151107.	Literature Review	n/a	n/a	n/a	n/a	A multi-modal approach to prehab is discussed.	VA
165	Kumar C, Salzman B, Colburn JL. Preoperative assessment in older adults: a comprehensive approach. <i>Am Fam Physician</i> . 2018;98(4):214–220.	Expert Opinion	n/a	n/a	n/a	n/a	Preoperative assessment in older adults is discussed.	VA
166	Liu C, Lu Z, Zhu M, Lu X. Trimodal prehabilitation for older surgical patients: a systematic review and meta-analysis. <i>Aging Clin Exp Res</i> . 2022;34(3):485–494.	Systematic Review w/	n/a	n/a	n/a	n/a	Prehab improved functional status in older surgical patients.	IIA
167	Lobo DN, Gianotti L, Adiamah A et al. Perioperative nutrition: recommendations from the ESPEN expert group. <i>Clin Nutr</i> . 2020;39(11):3211–3227.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses the nutritional and metabolic management of surgical patients.	VA
168	Miralpeix E, Mancebo G, Gayete S, Corcoy M, Solé-Sedeño J. Role and impact of multimodal prehabilitation for gynecologic oncology patients in an enhanced recovery after surgery (ERAS) program. <i>Int J Gynecol Cancer</i> . 2019;29(8):1235–1243.	Literature Review	n/a	n/a	n/a	n/a	The role of prehab in gynecology oncology patients is discussed including guidance for future research.	VA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE	
169	Molenaar CJ, van Rooijen SJ, Fokkenrood HJ, Roumen RM, Janssen L, Slooter GD. Prehabilitation versus no prehabilitation to improve functional capacity, reduce postoperative complications and improve quality of life in colorectal cancer surgery. <i>Cochrane Database Syst Rev</i> . 2023;5:CD013259.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Prehab may result in improved functional capacity, evidence is moderate to low.	IA	
170	Murphy AE, Belmont SL, Moriber NA. The use of therapeutic inhaled essential oils (TIEO) as a holistic approach to decrease preoperative anxiety in ERAS gynecological surgery. <i>J Perianesth Nurs</i> . 2022;37(6):787–794.	Quasi-experimental	53 women undergoing gynecologic surgery	Essential oil aromatherapy	anxiety level before essential oil therapy	Anxiety	Essential oils demonstrated a statistically significant decrease in anxiety scores within this population of patients.	IB	
171	Ng P, Lee JKD, Tan KY. Finding value with prehabilitation in older persons receiving surgery. <i>Curr Opin Support Palliat Care</i> . 2022; 16(1):19-24.	Literature Review	n/a	n/a	n/a	n/a	Multi-modal prehab improves functional outcomes following surgery, addressing frailty and overcoming barriers through program design is discussed.	VA	
172	Norris CM, Close JCT. Prehabilitation for the frailty syndrome: improving outcomes for our most vulnerable patients. <i>Anesth Analg</i> . 2020;130(6):1524–1533.	Literature Review	n/a	n/a	n/a	n/a	The role of prehab in frailty is discussed.	VA	
173	Ocón Bretón MJ, Tapia Guerrero MJ, Ramírez Rodríguez JM et al. Multidisciplinary consensus on nutritional and metabolic therapy in enhanced recovery after abdominal surgery programs: NutRICA Project. <i>Endocrinol Diabetes Nutr (Engl Ed)</i> . 2022;69(2):98–111.	Literature Review	n/a	n/a	n/a	n/a	This review looked at nutritional strategies and recommendation consensus among two societies in Spain.	VA	
174	Ponnambalam M, Alex RM. Preoperative optimization and rapid discharge after coronary artery bypass grafting. <i>Curr Opin Cardiol</i> . 2023;38(6):471–477.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses current evidence and guidelines for preoperative optimization of patients undergoing CABG.	VA	
175	Rinninella E, Biondi A, Cintoni M et al. NutriCatt Protocol improves body composition and clinical outcomes in elderly patients undergoing colorectal surgery in ERAS program: a retrospective cohort study. <i>Nutrients</i> . 2021;13(6):1781.	Quasi-experimental	302 elderly patients undergoing colorectal surgery	Perioperative nutritional protocol with ERAS n=166	Standard ERAS protocol n=136	Complications, LOS	The nutritional protocol showed significant improvements in that group of patients and should be recommended as part of the ERAS program in elderly patients.	IIA	
176	Ripollés-Melchor J, Carli F, Coca-Martínez M, Barbero-Mielgo M, Ramírez-Rodríguez JM, García-Erce JA. Committed to be fit. The value of preoperative care in the perioperative medicine era. <i>Minerva Anesthesiol</i> . 2018;84(5):615–625.	Expert Opinion	n/a	n/a	n/a	n/a	Recommendations for Prehab and introduces a perioperative algorithm for prehab	VA	
177	Sanchez Leon RM, Rajaraman A, Kubwimana MN. Optimizing nutritional status of patients prior to major surgical intervention. <i>Methodist DeBakey Cardiovasc J</i> . 2023;19(4):85–96	Literature Review	n/a	n/a	n/a	n/a	Overview of nutrition, screening, ERAS nutrition related elements, role of interdisciplinary teams.	VA	
178	Shakya P, Poudel S. Prehabilitation in patients before major surgery: a review article. <i>JNMA J Nepal Med Assoc</i> . 2022;60(254):909–915.	Expert Opinion	n/a	n/a	n/a	n/a	An overview of prehab elements is discussed.	VA	
179	Thoft Jensen B, Jensen JB, Love-Retinger N, Bowker M, Retinger C, Dalbagni G. Implementing a multimodal prehabilitation program to radical cystectomy in a comprehensive cancer center: a pilot study to assess feasibility and outcomes. <i>Urol Nurs</i> . 2019;39(6):303–313.	Nonexperimental	32 patients who had a radical cystectomy under a 2 week multimodal prehab program	n/a	n/a	n/a	Feasibility and clinical relevance	Implementing the program was feasible and clinically relevant. It supported the maintenance of nutritional and physical function of patients post surgery.	IIIB
180	Voorn MJ, Franssen RFW, Hoogeboom TJ et al. Evidence base for exercise prehabilitation suggests favourable outcomes for patients undergoing surgery for non-small cell lung cancer despite being of low therapeutic quality: a systematic review and meta-analysis. <i>Eur J Surg Oncol</i> . 2023;49(5):879–894.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Although risk of ineffectiveness was high for half of the prehabilitation programs and certainty of evidence was very low to moderate, prehabilitation seems to result in a reduction of post operative pulmonary and severe complications, as well as LOS in patients undergoing surgery for NSCLC.	IIIA	
181	Yang A, Sokolof J, Gulati A. The effect of preoperative exercise on upper extremity recovery following breast cancer surgery: a systematic review. <i>Int J Rehabil Res</i> . 2018;41(3):189–196.	Systematic Review	n/a	n/a	n/a	n/a	Implementing an exercise program and optimizing preoperative fitness before breast cancer surgery in conjunction with rehab may benefit this group of patients.	IIIA	
182	Yau DKW, Underwood MJ, Joynt GM, Lee A. Effect of preparative rehabilitation on recovery after cardiac surgery: a systematic review. <i>Ann Phys Rehabil Med</i> . 2021;64(2):101391.	Systematic Review	n/a	n/a	n/a	n/a	Despite the high heterogeneity among physical prehabilitation trials and the uncertainty regarding robust clinical outcomes, physical prehabilitation before cardiac surgery seems to enhance selected postoperative functional performance measures and slightly reduce the hospital length of stay after cardiac surgery.	IA	
183	Ghignone F, Hernandez P, Mahmoud NN, Ugolini G. Functional recovery in senior adults undergoing surgery for colorectal cancer: assessment tools and strategies to preserve functional status. <i>Eur J Surg Oncol</i> . 2020;46(3):387–393.	Expert Opinion	n/a	n/a	n/a	n/a	Some tools and strategies for functional recovery in patients undergoing surgery for colorectal cancer are discussed.	VA	
184	Licina A, Silvers A, Laughlin H, Russell J, Wan C. Pathway for enhanced recovery after spinal surgery—a systematic review of evidence for use of individual components. <i>BMC Anesthesiol</i> . 2021;21(1):74.	Systematic Review	n/a	n/a	n/a	n/a	ERAS components with high and moderate quality of evidence are presented.	IIIA	
185	Ashok A, Niyogi D, Ranganathan P et al. The enhanced recovery after surgery (ERAS) protocol to promote recovery following esophageal cancer resection. <i>Surg Today</i> . 2020;50(4):323–334.	Expert Opinion	n/a	n/a	n/a	n/a	Success of ERAS in one institution is described.	VA	
186	Kowa CY, Jin Z, Gan TJ. Framework, component, and implementation of enhanced recovery pathways. <i>J Anesth</i> . 2022;36(5):648–660.	Expert Opinion	n/a	n/a	n/a	n/a	Overview of ERAS components.	VA	

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
187	Scott MJ, Baldini G, Fearon KCH et al. Enhanced recovery after surgery (ERAS) for gastrointestinal surgery, part 1: pathophysiological considerations. <i>Acta Anaesthesiol Scand</i> . 2015;59(10):1212–1231.	Systematic Review	n/a	n/a	n/a	n/a	Overview of ERAS recommendations.	IIIA
188	Jain SR, Kandarpa VL, Yaow CYL et al. The role and effect of multimodal prehabilitation before major abdominal surgery: a systemic review and meta-analysis. <i>World J Surg</i> . 2023;47(1):86–102.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Multimodal prehabilitation improves functional capacity and reduces postoperative complication rates. The studies in the analysis had high degree of heterogeneity between the prehab interventions, therefore the results are interpreted with caution.	IIIA
189	Zaouter C, Dampousse R, Moore A, Stevens LM, Gauthier A, Carrier FM. Elements not graded in the cardiac enhanced recovery after surgery guidelines might improve postoperative outcome: a comprehensive narrative review. <i>J Cardiothorac Vasc Anesth</i> . 2022;36(3):746–765.	Literature Review	n/a	n/a	n/a	n/a	This review looked at components of ERAS that were not graded or recommended, these could be incorporated into an ERAS program for cardiac patients.	VA
190	Charlesworth M, Klein A. Enhanced recovery after cardiac surgery. <i>Anesthesiol Clin</i> . 2022;40(1):143–155.	Expert Opinion	n/a	n/a	n/a	n/a	Looked at ERAS components in cardiac surgery and emphasized and how to tailor components to all cardiac surgery patients, future research on quality of care.	VA
191	Chow WB, Rosenthal RA, Merkow RP et al. Optimal preoperative assessment of the geriatric surgical patient: a best practices guideline from the American College of Surgeons National Surgical Quality Improvement Program and the American Geriatrics Society. <i>J Am Coll Surg</i> . 2012;215(4):453–466.	Guideline	n/a	n/a	n/a	n/a	NSQIP/AGS best practice guidelines for optimal preoperative assessment of the geriatric surgical patient.	IVA
192	Debono B, Wainwright TW, Wang MY et al. Consensus statement for perioperative care in lumbar spinal fusion: Enhanced Recovery After Surgery (ERAS) Society recommendations. <i>Spine J</i> . 2021;21(5):729–752.	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations are provided for pre-op, intra-op and post-op.	IIIA
193	Hübner M, Kusamura S, Villeneuve L et al. Guidelines for perioperative care in cytoreductive surgery (CRS) with or without hyperthermic intraperitoneal chemotherapy (HIPEC): Enhanced Recovery After Surgery (ERAS) Society recommendations—part I: preoperative and intraoperative management. <i>Eur J Surg Oncol</i> . 2020;46(12):2292–2310.	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations in pre-op, intra-op in Cytoreductive surgery.	IIIA
194	Scott MJ, Aggarwal G, Aitken RJ et al. Consensus guidelines for perioperative care for emergency laparotomy Enhanced Recovery After Surgery (ERAS) Society recommendations part 2—emergency laparotomy: intra- and postoperative care. <i>World J Surg</i> . 2023;47(8):1850–1880.	Systematic Review	n/a	n/a	n/a	n/a	Overview of ERAS recommendations.	IIIA
195	Vernooij LM, van Klei WA, Moons KG, Takada T, van Waes J, Damen JA. The comparative and added prognostic value of biomarkers to the Revised Cardiac Risk Index for preoperative prediction of major adverse cardiac events and all-cause mortality in patients who undergo noncardiac surgery. <i>Cochrane Database Syst Rev</i> . 2021;12(12):CD013139.	Systematic Review	n/a	n/a	n/a	n/a	107 articles included in the review. The aim of the review was to investigate if the addition of biomarkers to the RCRI improves predictions of heart related complications during hospitalization in patients undergoing noncardiac surgery. Predictions seem to improve with the addition of some biomarkers derived from blood. These are troponin (which measures muscular damage of the heart), brain natriuretic peptide (BNP) and (NT-pro)brain natriuretic peptide (NTproBNP) (which both measure severity of heart failure). Conclusion was that Troponin, BNP and NT-proBNP may improve the ability of the RCRI to predict heart-related complications. The ACS-NSQIP-MICA and ACS-NSQIP surgical risk score tools seem to be better at predicting postoperative complications than the RCRI tool, but not heart-related complications. However, due to deficiencies in how the studies were conducted, there is uncertainly whether the results found apply to all patients undergoing surgery other than heart surgery. More and better research on biomarkers with promising predictive performance in other settings is needed.	IIIA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
196	Duceppe E, Patel A, Chan MTV, et al. Preoperative N-Terminal Pro-B-Type Natriuretic Peptide and Cardiovascular Events After Noncardiac Surgery: A Cohort Study. <i>Ann Intern Med.</i> 2020;172(2):96–104. doi:10.7326/M19-2501.	Quasi-experimental	16 hospitals in 9 countries, 10,402 patients age 45 or older having noncardiac surgery	NT-proBNP level before surgery and troponin T levels measured daily for up to 3 days after surgery	n/a	To determine if preoperative NT-proBNP has additional predictive value beyond a clinical risk score for the composite of vascular death and myocardial injury after noncardiac surgery (MINS) within 30 days after surgery.	Preoperative NT-proBNP is strongly associated with vascular death and MONS within 30 days after noncardiac surgery and improves cardiac risk prediction in addition to the RCRI.	IIA
197	Zhang L, Li N, Li Y, Zeng X, Liu M. Cardiac Biomarkers Predicting MACE in Patients Undergoing Noncardiac Surgery: A Meta-Analysis. <i>Front Physiol.</i> 2018;9:1923. doi:10.3389/fphys.2018.01923.	Systematic Review w/ Meta-Analysis	26 studies with 7,877 participants	n/a	n/a	n/a	Patients with elevated BNP/NT-proBNP, Troponin, and hs-CRP preoperatively or immediately postoperatively were at much higher risk of postoperative major cardiovascular events in patients undergoing noncardiac surgery.	IIIA
198	Halvorsen S, Mehilli J, Cassese S et al. 2022 ESC guidelines on cardiovascular assessment and management of patients undergoing non-cardiac surgery. <i>Eur Heart J.</i> 2022;43(39):3826–3924.	Guideline	n/a	n/a	n/a	n/a	European Society of Cardiology guidelines on cardiovascular assessment and management of patients undergoing non-cardiac surgery, endorsed by the European Society of Anaesthesiology and Intensive Care.	IVA
199	Dort JC, Farwell DG, Findlay M et al. Optimal perioperative care in major head and neck cancer surgery with free flap reconstruction: a consensus review and recommendations from the Enhanced Recovery After Surgery Society. <i>JAMA Otolaryngol Head Neck Surg.</i> 2017;143(3):292–303.	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations are provided for pre-op, intra-op and post-op in major head and neck cancer surgery.	IIIA
200	Hasil L, Fenton TR, Ljungqvist O, Gillis C. From clinical guidelines to practice: the nutrition elements for enhancing recovery after colorectal surgery. <i>Nutr Clin Pract.</i> 2022;37(2):300–315.	Expert Opinion	n/a	n/a	n/a	n/a	The role of nutrition is discussed and how dieticians can be part of the multidisciplinary team.	VA
202	Coleman SR, Chen M, Patel S et al. Enhanced recovery pathways for cardiac surgery. <i>Curr Pain Headache Rep.</i> 2019;23(4):28.	Expert Opinion	n/a	n/a	n/a	n/a	Overview of ERAS components in all phases of care in cardiac surgery.	VA
203	Bisch S, Nelson G, Altman A. Impact of nutrition on enhanced recovery after surgery (ERAS) in gynecologic oncology. <i>Nutrients.</i> 2019;11(5):1088.	Expert Opinion	n/a	n/a	n/a	n/a	The role of nutrition is discussed.	VA
204	Martínez-Ortega AJ, Piñar-Gutiérrez A, Serrano-Aguayo P et al. Perioperative nutritional support: a review of current literature. <i>Nutrients.</i> 2022;14(8):1601.	Literature Review	n/a	n/a	n/a	n/a	Perioperative nutritional support is discussed along with relevant guidelines.	VA
205	Wischmeyer PE, Carli F, Evans DC et al. American Society for Enhanced Recovery and Perioperative Quality Initiative joint consensus statement on nutrition screening and therapy within a surgical enhanced recovery pathway. <i>Anesth Analg.</i> 2018;126(6):1883–1895.	Consensus	n/a	n/a	n/a	n/a	Consensus guidelines for nutrition screening and therapy within an ERAS pathway.	IVA
206	Srivastava D, Hill S, Carty S et al. Surgery and opioids: evidence-based expert consensus guidelines on the perioperative use of opioids in the United Kingdom. <i>Br J Anaesth.</i> 2021;126(6):1208–1216.	Consensus	n/a	n/a	n/a	n/a	Consensus guidelines for the perioperative use of opioids in the UK including a perioperative plan.	IVA
207	Bruns ERJ, Argillander TE, Van Den Heuvel B et al. Oral nutrition as a form of pre-operative enhancement in patients undergoing surgery for colorectal cancer: a systematic review. <i>Surg Infect (Larchmt).</i> 2018;19(1):1–10.	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	Studies are too heterogenous to conclude that preop oral nutritional support makes a difference but targeting at risk patients is important.	IA
208	Pinto ACS, Ferreira RS, Gomes PM, de Andrade LB, de Medeiros Tavares J. Evaluation of the effects of prolonged fasting prior to and after operating. <i>Rev Fundam Care Online.</i> 2021;13(1):1161–1166.	Nonexperimental	610 general surgery patients	n/a	n/a	Fasting time	Patients fasted for longer than safety standards stipulate cause complications. Multidisciplinary teams should implement protocols to support fasting guidelines.	IIIB
209	Baxter R, Squiers J, Conner W et al. Enhanced recovery after surgery: a narrative review of its application in cardiac surgery. <i>Ann Thorac Surg.</i> 2020;109(6):1937–1944.	Literature Review	n/a	n/a	n/a	n/a	Presents current ERAS research for use in cardiac surgery.	VA
210	Stenberg E, Dos Reis Falcão LF, O’Kane M et al. Guidelines for perioperative care in bariatric surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations: a 2021 update. <i>World J Surg.</i> 2022;46(4):729–751.	Systematic Review	n/a	n/a	n/a	n/a	An updated review of ERAS in bariatric populations with recommended interventions, quality of evidence is low in this population.	IIIA
211	Osman BM, Tieu TG, Caceres YG, Hernandez VH. Current trends and future directions for outpatient total joint arthroplasty: a review of the anesthesia choices and analgesic options. <i>J Am Acad Orthop Surg Glob Res Rev.</i> 2023;7(9):e22.00259.	Expert Opinion	n/a	n/a	n/a	n/a	Overview of multi-modal analgesia and anesthesia for outpatients undergoing total joint surgery.	VA
212	Gillis C, Wischmeyer PE. Pre-operative nutrition and the elective surgical patient: why, how and what? <i>Anaesthesia.</i> 2019;74(Suppl 1):27–35.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses strategies to avoid preoperative malnutrition.	VA
213	Altman AD, Helpman L, McGee J et al. Enhanced recovery after surgery: implementing a new standard of surgical care. <i>CMAJ.</i> 2019;191(17):E469–E475.	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations are provided for pre-op, intra-op and post-op	

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
214	Changjun C, Xin Z, Yue L, Liyile C, Pengde K. Key elements of enhanced recovery after total joint arthroplasty: a reanalysis of the enhanced recovery after surgery guidelines. <i>Orthop Surg</i> . 2023;15(3):671–678.	Literature Review	n/a	n/a	n/a	n/a	ERAS components are supported by evidence, implementation needs to be optimized.	VA
215	Brodersen F, Wagner J, Uzunoglu FG, Petersen-Ewert C. Impact of preoperative patient education on postoperative recovery in abdominal surgery: a systematic review. <i>World J Surg</i> . 2023;47(4):937–947.	Systematic Review	n/a	n/a	n/a	n/a	Potential effects of pt education, implementation and framework but studies are of poor quality.	IIIA
216	Bollag L, Lim G, Sultan P et al. Society for Obstetric Anesthesia and Perinatology: consensus statement and recommendations for enhanced recovery after cesarean. <i>Anesth Analg</i> . 2021;132(5):1362–1377.	Consensus	n/a	n/a	n/a	n/a	Consensus statement giving practical and evidence based recommendations for ERAS in Cesarean patients	IVA
217	Brown JK, Singh K, Dumitru R, Chan E, Kim MP. The benefits of enhanced recovery after surgery programs and their application in cardiothoracic surgery. <i>Methodist Debaque Cardiovasc J</i> . 2018;14(2):77–88.	Organizational Experience	A single hospital	n/a	n/a	n/a	Implementation of ERAS in cardiac surgery in one institution is described, implementing ERAS is safe and effective.	VA
218	Wu CL, King AB, Geiger TM et al. American Society for Enhanced Recovery and Perioperative Quality Initiative joint consensus statement on perioperative opioid minimization in opioid-naïve patients. <i>Anesth Analg</i> . 2019;129(2):567–577.	Consensus	n/a	n/a	n/a	n/a	yes+11	IVA
219	Tubog TD. Overview of multimodal analgesia initiated in the perioperative setting. <i>J Perioper Pract</i> . 2021;31(5):191–198.	Literature Review	n/a	n/a	n/a	n/a	An overview of the literature on multimodal analgesia.	VA
220	Madsen AM, Martin JM, Linder BJ, Gebhart JB. Perioperative opioid management for minimally invasive hysterectomy. <i>Best Pract Res Clin Obstet Gynaecol</i> . 2022;85(Pt B):68–80.	Expert Opinion	n/a	n/a	n/a	n/a	Opioid crisis is discussed with strategies for multi-modal analgesia and minimizing opioid use.	VA
221	Burns S, Urman R, Pian R, Coppes OJM. Reducing new persistent opioid use after surgery: a review of interventions. <i>Curr Pain Headache Rep</i> . 2021;25(5):27.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses the opioid epidemic and the use of multi-modal analgesia for pain control.	VA
222	Day MS, Boryan A. Current evidence-based approaches to multimodal pain control and opioid minimization after arthroscopic and knee preservation surgery. <i>J Am Acad Orthop Surg</i> . 2024;32(1):e24–e32.	Expert Opinion	n/a	n/a	n/a	n/a	Multimodal pain control to minimize opioid consumption is discussed.	
223	Joshi GP, Abdelmalak BB, Weigel WA et al. 2023 American Society of Anesthesiologists practice guidelines for preoperative fasting: carbohydrate-containing clear liquids with or without protein, chewing gum, and pediatric fasting duration—a modular update of the 2017 American Society of Anesthesiologists practice guidelines for preoperative fasting. <i>Anesthesiology</i> . 2023;138(2):132–151.	Guideline	n/a	n/a	n/a	n/a	Update to ASA fasting guidelines to include carbohydrate loading, gum chewing and peds fasting.	IVA
223	Lu J, Khamar J, McKechnie T et al. Preoperative carbohydrate loading before colorectal surgery: a systematic review and meta-analysis of randomized controlled trials. <i>Int J Colorectal Dis</i> . 2022;37(12):2431–2450.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Preoperative carbohydrate loading does not significantly impact postoperative glycemic control in patients undergoing colorectal surgery; however, it may be associated with a shorter length of stay and faster return of bowel function. It merits consideration for inclusion within colorectal enhanced recovery after surgery protocols.	IA
224	Ackerman RS, Tufts CW, DePinto DG et al. How sweet is this? A review and evaluation of preoperative carbohydrate loading in the Enhanced Recovery After Surgery Model. <i>Nutr Clin Pract</i> . 2020;35(2):246–253.	Expert Opinion	n/a	n/a	n/a	n/a	Discussed the importance of carbohydrate loading, reviews the evidence.	
225	Fawcett WJ, Thomas M. Pre-operative fasting in adults and children: clinical practice and guidelines. <i>Anaesthesia</i> . 2019;74(1):83–88.	Expert Opinion	n/a	n/a	n/a	n/a	Fasting and carbohydrate loading in adults and children is discussed.	VA
226	Garmpis N, Dimitroulis D, Garmpi A et al. Enhanced recovery after surgery: is it time to change our strategy regarding laparoscopic colectomy? <i>In Vivo</i> . 2019;33(3):669–674.	Expert Opinion	n/a	n/a	n/a	n/a	Overview of ERAS in Laparoscopic colectomy patients.	VA
227	Gianotti L, Sandini M, Hackert T. Preoperative carbohydrates: what is new? <i>Curr Opin Clin Nutr Metab Care</i> . 2020;23(4):262–270.	Literature Review	n/a	n/a	n/a	n/a	Discusses carbohydrate loading.	VA
228	Huang EY, Li JZ, Chung D et al. Carbohydrate loading and aspiration risk in bariatric patients: safety in preoperative enhanced recovery protocols. <i>J Am Coll Surg</i> . 2023;236(6):1200–1206.	Quasi-experimental	203 patients undergoing bariatric surgery	Carbohydrate loading n=94	Non-carbohydrate loading n=109	Safety of a preoperative carb loading drink	In an ERAS protocol, proton pump inhibitor use and a preoperative carbohydrate drink 2 to 4 hours before bariatric surgery did not increase aspiration risk based on gastric volumes and should strongly be considered in all eligible bariatric patients.	IIB
229	Kotfis K, Jamioł-Milc D, Skonieczna-Zydecka K, Folwarski M, Stachowska E. The effect of preoperative carbohydrate loading on clinical and biochemical outcomes after cardiac surgery: a systematic review and meta-analysis of randomized trials. <i>Nutrients</i> . 2020;12(10):3105.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Preoperative oral carb loading in patients undergoing cardiac surgery demonstrated a 20% reduction in the use of inotropic drugs, a 50% reduction of the length of ICU stay, a 28% decrease in aortic clamping duration and a 35% decrease of postoperative insulin requirement	IA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
231	Robinson KN, Cassidy BA, Hegazi RA, Wischmeyer PE. Preoperative carbohydrate loading in surgical patients with type 2 diabetes: are concerns supported by data? <i>Clin Nutr ESPEN</i> . 2021;45:1–8.	Literature Review	n/a	n/a	n/a	n/a	The available research suggests that carbohydrate loading may be implemented in those with T2DM without increased risk for intra- and postoperative hyperglycemia or surgical complications. However, there is strong justification for future research to definitively study this topic. Ultimately, the inclusion of preoperative carbohydrate loading for surgical patients with DM should be guided by the surgical team's clinical judgment and individualized based on patient needs and characteristics.	VA
232	Yi HC, Ibrahim Z, Abu Zaid Z et al. Impact of enhanced recovery after surgery with preoperative whey protein-infused carbohydrate loading and postoperative early oral feeding among surgical gynecologic cancer patients: an open-labelled randomized controlled trial. <i>Nutrients</i> . 2020;12(1):264.	RCT	Surgical gynecologic cancer patients	Preoperative whey infused carbohydrate drink and postoperative early oral feeding n=62	Usual care n=56	LOS, complications	The intervention group has a significant shorter LOS and lower readmission in one month.	IA
233	Ban KA, Gibbons MM, Ko CY et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for colorectal surgery. <i>Anesth Analg</i> . 2019;128(5):879–889.	Literature Review	n/a	n/a	n/a	n/a	ERAS program components for patients undergoing colorectal surgery are described.	VA
234	Nelson G, Fotopoulou C, Taylor J et al. Enhanced Recovery After Surgery (ERAS) Society guidelines for gynecologic oncology: addressing implementation challenges – 2023 update. <i>Gynecol Oncol</i> . 2023;173:58–67.	Systematic Review	n/a	n/a	n/a	n/a	Focus of this review was on preop, allergies, intraop analgesia, VTE, opioids and barriers to implementation.	IIIA
235	Soffin EM, Gibbons MM, Ko CY et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for total hip arthroplasty. <i>Anesth Analg</i> . 2019;128(3):454–465.	Literature Review	n/a	n/a	n/a	n/a	This review highlights recommendations for ERAS recommendations focused on anesthesia care in patients undergoing total hip arthroplasty.	VA
236	Soffin EM, Gibbons MM, Ko CY et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for total knee arthroplasty. <i>Anesth Analg</i> . 2019;128(3):441–453.	Literature Review	n/a	n/a	n/a	n/a	This review highlights recommendations for ERAS recommendations focused on anesthesia care in patients undergoing total knee arthroplasty.	VA
237	Campos SBG, Barros-Neto JA, Guedes GdS, Moura FA. Pre-operative fasting: why abbreviate? <i>Arq Bras Cir Dig</i> . 2018;31(2):e1377.	Literature Review	n/a	n/a	n/a	n/a	Supports preoperative fasting guidelines and carbohydrate loading.	VA
238	Ge LN, Wang L, Wang F. Effectiveness and safety of preoperative oral carbohydrates in enhanced recovery after surgery protocols for patients with diabetes mellitus: a systematic review. <i>Biomed Res Int</i> . 2020;5623596.	Systematic Review	n/a	n/a	n/a	n/a	The quality of the studies in low and the review shows that oral carbohydrates are probably beneficial for patients with diabetes but more research should be conducted.	IIIA
240	Korytkowski MT, Muniyappa R, Antinori-Lent K et al. Management of hyperglycemia in hospitalized adult patients in non-critical care settings: an Endocrine Society clinical practice guideline. <i>J Clin Endocrinol Metab</i> . 2022;107(8):2101–2128	Guideline	n/a	n/a	n/a	n/a	Endocrine Society guidelines on the management of hyperglycemia in hospitalized adult patients in non-critical care settings, addresses carbohydrate administration before surgery in diabetic patients.	IVA
241	Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures: an updated report by the American Society of Anesthesiologists Task Force on Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration. <i>Anesthesiology</i> . 2017;126(3):376–393.	Guideline	n/a	n/a	n/a	n/a	ASA fasting guidelines	IVA
242	Denkyi L. An exploration of pre-operative fasting practices in adult patients having elective surgery. <i>Br J Nurs</i> . 2020;29(7):436–441.	Literature Review	n/a	n/a	n/a	n/a	The evidence shows that preoperative overnight fasting is associated with the beliefs of health professionals rather than scientific evidence. Importance of education on fasting guidelines.	VA
243	Dorrance M, Copp M. Perioperative fasting: a review. <i>J Perioper Pract</i> . 2020;30(7-8):204–209.	Expert Opinion	n/a	n/a	n/a	n/a	An overview and evidence on perioperative fasting.	VA
244	Jolley A, Jin W, Mansour K, Moore D, Douglas N, Loveday BPT. Reducing preoperative fasting through technology and education in an acute general surgical adult cohort. <i>Joint Comm J Qual Patient Saf</i> . 2023;49(11):584–591.	Organizational Experience	Emergency general surgery unit in one hospital	n/a	n/a	n/a	Pilot program to support fasting guidelines on the ward.	VA
245	King E. Preoperative fasting durations for adult elective surgical patients: convenient for the professional, but detrimental to the patient? A narrative review. <i>J Perioper Pract</i> . 2019;29(12):393–397.	Literature Review	n/a	n/a	n/a	n/a	Discussed poor compliance with fasting guidelines.	VB
246	Yip A, Hogan S, Carey S. Interventions aimed at reducing fasting times in acute hospital patients: a systematic literature review. <i>Nutr Clin Pract</i> . 2021;36(1):133–152.	Systematic Review	n/a	n/a	n/a	n/a	This review highlights that reducing the preoperative fasting period is safe while improving patient's physical and psychological well-being. Further high-quality studies that investigate multimodal interventions, and that utilize implementation science principles, are required in this area.	IIIA
247	Zietlow KE, Wong S, Heflin MT et al. Geriatric preoperative optimization: a review. <i>Am J Med</i> . 2022;135(1):39–48.	Expert Opinion	n/a	n/a	n/a	n/a	A review of the geriatric population and optimization including assessment, screening tools and the multidisciplinary team.	VA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
248	Bratzler DW, Dellinger EP, Olsen KM et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery. <i>Am J Health Syst Pharm.</i> 2013;70(3):195–283.	Guideline	n/a	n/a	n/a	n/a	Evidence based guideline for antimicrobial prophylaxis in surgery.	
249	Hübner M, Kusamura S, Villeneuve L et al. Guidelines for perioperative care in cytoreductive surgery (CRS) with or without hyperthermic intraperitoneal chemotherapy (HIPEC): Enhanced Recovery After Surgery (ERAS) Society recommendations — part II: postoperative management and special considerations. <i>Eur J Surg Oncol.</i> 2020;46(12):2311–2323.	Systematic Review	n/a	n/a	n/a	n/a	Evidence based recommendations in post-op and special considerations in Cytoreductive surgery	IIIA
250	Anderson DR, Morgano GP, Bennett C et al. American Society of Hematology 2019 guidelines for management of venous thromboembolism: prevention of venous thromboembolism in surgical hospitalized patients. <i>Blood Adv.</i> 2019;3(23):3898–3944.	Guideline	n/a	n/a	n/a	n/a	Guidelines for the management of VTE prevention.	IVA
251	Guideline for prevention of venous thromboembolism. In: Guidelines for Perioperative Practice. Denver, CO: AORN, Inc; 2024:1149–1174.	Guideline	n/a	n/a	n/a	n/a	AORN guideline for VTE	IVA
252	Guideline for preoperative patient skin antisepsis. In: Guidelines for Perioperative Practice. Denver, CO: AORN, Inc; 2024:611–664.	Guideline	n/a	n/a	n/a	n/a	AORN guideline for Patient Skin Antisepsis	IVA
253	Guideline for prevention of hypothermia. In: Guidelines for Perioperative Practice. Denver, CO: AORN, Inc; 2024:339–364.	Guideline	n/a	n/a	n/a	n/a	AORN guideline for the prevention of Hypothermia	IVA
254	Chen J, Tu Q, Miao S, Zhou Z, Hu S. Transcutaneous electrical acupoint stimulation for preventing postoperative nausea and vomiting after general anesthesia: a meta-analysis of randomized controlled trials. <i>Int J Surg.</i> 2020;73:57–64.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Transcutaneous electrical acupoint stimulation was associated with lower numbers of patients needing antiemetic rescue, lower incidence of adverse effects after general anesthesia,	IA
255	Soffin EM, Gibbons MM, Wick EC et al. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for hip fracture surgery. <i>Anesth Analg.</i> 2019;128(6):1107–1117.	Literature Review	n/a	n/a	n/a	n/a	This review highlights recommendations for ERAS recommendations focused on anesthesia care in patients undergoing total hip fracture surgery.	VA
256	Gan TJ, Belani KG, Bergese S et al. Fourth consensus guidelines for the management of postoperative nausea and vomiting. <i>Anesth Analg.</i> 2020;131(2):411–448.	Guideline	n/a	n/a	n/a	n/a	Evidence based guideline for the care of postoperative nausea and vomiting in adult and pediatric patients.	IVA
257	Guideline for complementary care. In: <i>Guidelines for Perioperative Practice</i> . Denver, CO: AORN, Inc; 2024:31–78.	Guideline	n/a	n/a	n/a	n/a	AORN guideline for Complementary Care	IVA
258	Simmons JW, Dobyns JB, Paiste J. Enhanced recovery after surgery: intraoperative fluid management strategies. <i>Surg Clin North Am.</i> 2018;98(6):1185–1200.	Expert Opinion	n/a	n/a	n/a	n/a	Goal directed fluid therapy and fluid management is discussed.	
259	Makaryus R, Miller TE, Gan TJ. Current concepts of fluid management in enhanced recovery pathways. <i>Br J Anaesth.</i> 2018;120(2):376–383.	Expert Opinion	n/a	n/a	n/a	n/a	Perioperative fluid management is discussed.	
260	Mladinov D, Isaza E, Gosling AF, Clark AL, Kukreja J, Brzezinski M. Perioperative fluid management. <i>Anesthesiol Clin.</i> 2023;41(3):613–629.	Expert Opinion	n/a	n/a	n/a	n/a	Perioperative fluid management is discussed.	VA
261	French WB, Scott M. Fluid and hemodynamics. <i>Anesthesiol Clin.</i> 2022;40(1):59–71.	Expert Opinion	n/a	n/a	n/a	n/a	Intraoperative fluid therapy is discussed, ERAS pathways can improve perioperative fluid and hemodynamic therapy by avoiding preop dehydration and reducing postoperative dependence on IV fluids.	VA
262	Sun Y, Chai F, Pan C, Romeiser JL, Gan TJ. Effect of perioperative goal-directed hemodynamic therapy on postoperative recovery following major abdominal surgery—a systematic review and meta-analysis of randomized controlled trials. <i>Crit Care.</i> 2017;21(1):141.	Systematic Review w/ Meta-Analysis	45 RCTs adults undergoing abdominal surgery	n/a	n/a	n/a	GDFT was associated with significant reduction in short term mortality, long term mortality, and overall complication rates. It also facilitated gastrointestinal recovery and the time to tolerate an oral diet.	IA
263	Xu C, Peng J, Liu S et al. Goal-directed fluid therapy versus conventional fluid therapy in colorectal surgery: a meta analysis of randomized controlled trials. <i>Int J Surg.</i> 2018;56:264–273.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Compared with conventional fluid therapy, GDFT may not improve patients' postoperative outcome in colorectal surgery. However, the improvement of gastrointestinal function associated with GDFT over conventional fluid therapy was significant in the surgeries that did not use the ERAS protocol.	IA
264	Hoang TN, Musquiz BN, Tubog TD. Impact of goal-directed fluid therapy on postoperative outcomes in colorectal surgery: an evidence-based review. <i>J Perianesth Nurs.</i> 2023;38(4):650–656.	Systematic Review	n/a	n/a	n/a	n/a	GDFT did not shorten LOS but when implemented as part of ERAS there was a significant reduction in LOS, when used in a non-ERAS setting there was a significant reduction in overall morbidity rate and faster time to bowel motility.	IA
265	Dmytriiev D, Nazarchuk O, Melnychenko M, Levchenko B. Optimization of the target strategy of perioperative infusion therapy based on monitoring data of central hemodynamics in order to prevent complications. <i>Front Med (Lausanne).</i> 2022;9:935331.	Expert Opinion	n/a	n/a	n/a	n/a	Describes the benefits of the basic principles of GDFT and methods of monitoring central hemodynamics.	
266	Kan CFK, Skaggs JD. Current commonly used dynamic parameters and monitoring systems for perioperative goal-directed fluid therapy: a review. <i>Yale J Biol Med.</i> 2023;96(1):107–123.	Expert Opinion	n/a	n/a	n/a	n/a	A review of the technology available to monitor GDFT	VA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
267	Grundmann CD, Wischermann JM, Fassbender P, Bischoff P, Frey UH. Hemodynamic monitoring with Hypotension Prediction Index versus arterial waveform analysis alone and incidence of perioperative hypotension. <i>Acta Anaesthesiol Scand</i> . 2021;65(10):1404–1412.	Quasi-experimental	100 patients undergoing moderate or high risk non-cardiac surgery	Hypotension Prediction Index	Arterial waveform analysis	Duration of hypotensive events evaluated by time-weighted average of hypotension.	The implementation of the (HPI) in conjunction with a personalized treatment protocol led to a reduction in both the frequency and duration of hypotension compared to using arterial waveform analysis alone. This research contributes to the growing body of evidence supporting the shift from predicting to actively preventing hypotension through the use of HPI.	
268	Calvo-Vecino JM, Ripollés-Melchor J, Mythen MG et al. Effect of goal-directed haemodynamic therapy on postoperative complications in low-moderate risk surgical patients: a multicentre randomised controlled trial (FEDORA trial). <i>Br J Anaesth</i> . 2018;120(4):734–744.	RCT	Adults undergoing major elective surgery	Goal directed fluid therapy group using a esophageal doppler monitor n=224	Fluids given traditionally	Percentage of patients with moderate or severe postoperative complications during the first 180 days after surgery.	There were significantly fewer complications in the GDFT group than the traditional group (8.6% vs 16.6%)	IA
269	Squara P, Denjean D, Estagnasie P, Brusset A, Dib JC, Dubois C. Noninvasive cardiac output monitoring (NICOM): a clinical validation. <i>Intensive Care Med</i> . 2007;33(7):1191–1194.	Quasi-experimental	110 patients requiring a pulmonary artery catheter following cardiac surgery	Non-invasive cardiac output monitoring (NICOM)	Pulmonary artery catheter cardiac output monitoring	Accuracy, precision, responsiveness, and reliability of NICOM for detecting cardiac output changes.	Cardiac output measured by NICOM had most often acceptable accuracy, precision, and responsiveness in a wide range of circulatory situations.	IIA
270	Waldron NH, Miller TE, Thacker JK et al. A prospective comparison of a noninvasive cardiac output monitor versus esophageal Doppler monitor for goal-directed fluid therapy in colorectal surgery patients. <i>Anesth Analg</i> . 2014;118(5):966–975.	Quasi-experimental	100 adult patients undergoing elective colorectal surgery	GDFT guided by the NICOM while the EDM was connected n=50	GDFT guided by an esophageal doppler monitor (EDM) while the noninvasive cardiac output monitor (NICOM) was connected n=50	Significant differences between the EDM and the NICOM	The NICOM performs similarly to the EDM in guiding GDFT, with no clinically significant differences in outcomes, and offers increased ease of use as well as fewer missing data points. The NICOM may be a viable alternative monitor to guide GDFT.	IIA
271	Brown EN, Pavone KJ, Naranjo M. Multimodal general anesthesia: theory and practice. <i>Anesth Analg</i> . 2018;127(5):1246–1258.	Expert Opinion	n/a	n/a	n/a	n/a	Describes theory behind multi-modal analgesia/anesthesia	VA
272	Thilen SR, Weigel WA, Todd MM et al. 2023 American Society of Anesthesiologists practice guidelines for monitoring and antagonism of neuromuscular blockade: a report by the American Society of Anesthesiologists Task Force on Neuromuscular Blockade. <i>Anesthesiology</i> . 2023;138(1):13–41.	Guideline	n/a	n/a	n/a	n/a	This guideline provides recommendation on the management of neuromuscular monitoring and antagonism of neuromuscular blocking agents during and after anesthesia. The guidance focuses primarily on the type and site of monitoring and the process of antagonizing neuromuscular blockade to reduce residual neuromuscular blockade.	IVA
273	Chou R, Gordon DB, de Leon-Casasola OA et al. Management of Postoperative Pain: A Clinical Practice Guideline From the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council. <i>J Pain</i> . 2016;17(2):131–157.	Guideline	n/a	n/a	n/a	n/a	A clinical practice guideline on management of postoperative pain.	IVA
274	Munro A, Sjaus A, George RB. Anesthesia and analgesia for gynecological surgery. <i>Curr Opin Anaesthesiol</i> . 2018;31(3):274–279.	Expert Opinion	n/a	n/a	n/a	n/a	Multi-modal analgesia is discussed.	VA
275	Sharma R, Louie A, Thai CP, Dizdarevic A. Chest wall nerve blocks for cardiothoracic, breast surgery, and rib-related pain. <i>Curr Pain Headache Rep</i> . 2022;26(1):43–56.	Expert Opinion	n/a	n/a	n/a	n/a	The role of nerve blocks in patients undergoing thoracic, breast surgery and rib-related pain is discussed.	VA
276	Dunkman WJ, Manning MW. Enhanced recovery after surgery and multimodal strategies for analgesia. <i>Surg Clin North Am</i> . 2018;98(6):1171–1184.	Expert Opinion	n/a	n/a	n/a	n/a	with vascular death and MINS within 30 days after noncardiac	VA
277	Nabata KI, Guo R, Nguyen A, Osborn JA, Wiseman SM. Superiority of non-opioid postoperative pain management after thyroid and parathyroid operations: a systematic review and meta-analysis. <i>Surg Oncol</i> . 2022;41:101731	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Non-opioid analgesia was superior to the control group for pain control in patients undergoing thyroid and parathyroid operations with no significant difference in complications	IA
278	Bougie O, Blom J, Zhou G, Murji A, Thurston J. Use and misuse of opioid after gynecologic surgery. <i>Best Pract Res Clin Obstet Gynaecol</i> . 2022;85(Pt B):23–34.	Expert Opinion	n/a	n/a	n/a	n/a	Adherence to ERAS protocols and other strategies to minimize opioid use.	VA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
279	Ibrahim M, Elnabity AM, Hegab A, Alnujaidi OA, El Sanea O. Combined opioid free and loco-regional anaesthesia enhances the quality of recovery in sleeve gastrectomy done under ERAS protocol: a randomized controlled trial. <i>BMC Anesthesiol.</i> 2022;22(1):29.	RCT	103 patients undergoing elective laparoscopic sleeve gastrectomy	Opioid free anesthesia n=51	Multi-modal analgesia n=51	Quality of recovery, opioid consumption, time to ambulate, time to oral fluid and time to discharge.	While regional anaesthesia achieved most of the intraoperative analgesia, avoiding intraoperative opioids with the help of this OFA protocol was able to improve several sensible parameters of postoperative functional recovery.	IA
280	Collinsworth AW, Kouznetsova M, Hall L et al. Impact of an enhanced recovery after surgery program with a multimodal analgesia care pathway on opioid prescribing and clinical outcomes for patients undergoing colorectal surgery. <i>Proc (Baylor Univ Med Cent)</i> . 2023;36(6):706–715.	Quasi-experimental	Elective colorectal surgeries	ERAS program n=238	Traditional care-non-ERAS n=618	Adherence to care processes and opioid use	Implementing ERAS programs that include MMA care pathways as standard of care may result in more judicious use of opioids and reduce patient recovery time	IIA
281	Tepper JL, Harris OM, Triebwasser JE et al. Implementation of an enhanced recovery after surgery pathway to reduce inpatient opioid consumption after cesarean delivery. <i>Am J Perinatol.</i> 2023;40(9):945–952.	Organizational Experience	One hospital 92 women in a non-ERAS group and 91 in an ERAS group	n/a	n/a	n/a	There was a significant reduction in inpatient opioid consumption and is recommended to help combat the opioid epidemic.	VA
282	Keane A, Jardine K, Goldenberg D et al. Opioid versus non-opioid postoperative pain management in otolaryngology. <i>BMC Anesthesiol.</i> 2023;23(1):291.	Nonexperimental	Two tertiary care centers, one in the US and one in Israel	n/a	n/a		The importance of non-opioid pain management strategies, findings were that opioid prescriptions at discharge are significantly higher in the US than in Israel.	IIIA
283	McCoy JA, Gutman S, Hamm RF, Srinivas SK. The association between implementation of an enhanced recovery after cesarean pathway with standardized discharge prescriptions and opioid use and pain experience after cesarean delivery. <i>Am J Perinatol.</i> 2021;38(13):1341–1347.	Organizational Experience	One facility implemented an ERAS pathway	n/a	n/a	n/a	The ERAS pathway resulted in a significant decrease in inpatient and postdischarge opioid consumption while improving pain control.	VA
284	Brusko GD, Kolcun JPG, Heger JA et al. Reductions in length of stay, narcotics use, and pain following implementation of an enhanced recovery after surgery program for 1- to 3-level lumbar fusion surgery. <i>Neurosurg Focus</i> . 2019;46(4):E4.		57 adult patients undergoing elective, posterior 1-3 level lumbar	57 adult patients undergoing elective, posterior 1-3 level lumbar fusion surgery/40 control patients	intraoperative injection of lip	Patients who had the same procedures without the intervention	LOS significantly shorter in the ERAS group, ERAS patients consumed less opioids, postop pain scores were lower in the ERAS group, better ambulation in the ERAS group.	IIA
285	Soffin EM, Wetmore DS, Beckman JD et al. Opioid-free anesthesia within an enhanced recovery after surgery pathway for minimally invasive lumbar spine surgery: a retrospective matched cohort study. <i>Neurosurg Focus</i> . 2019;46(4):E8.	Quasi-experimental	72 patients undergoing spine surgery	ERAS pathway n=36	Traditional care n=36	Opioid consumption	There was a significant reduction in total perioperative opioid consumption in patients in the ERAS group. Compliance with ERAS protocols was highest in the preoperative phase and lowest in the postoperative phase highlighting opportunities to provide patient and provider education.	IIB
286	Hampton H, Torre M, Satalich J et al. Benefits of implementing an enhanced recovery after surgery protocol in ambulatory surgery. <i>Orthop J Sports Med.</i> 2022;10(11):23259671221133412.	Nonexperimental	62 patients pre-eras and 62 post-eras who underwent knee surgery. Retrospective review.	n/a	n/a	Post-op pain scores, recovery time and opioid use.	enhanced recovery pathways protocol that includes a standardized intraoperative periarticular bupivacaine, ketamine, and ketorolac injection improves pain scores in the immediate postoperative window, decreases opioid consumption, and reduces recovery time in the PACU for patients undergoing ACL reconstruction.	IIIA
287	Olausson A, Svensson CJ, Andréll P, Jildénstål P, Thörn S, Wolf A. Total opioid-free general anaesthesia can improve postoperative outcomes after surgery, without evidence of adverse effects on patient safety and pain management: a systematic review and meta-analysis. <i>Acta Anaesthesiol Scand.</i> 2022;66(2):170–185.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Concluded that there is firm evidence that opioid-free anaesthesia significantly reduced adverse postoperative events, mainly postop nausea and vomiting.	IA
288	Chakravarthy V, Yokoi H, Manlapaz MR, Krishnaney AA. Enhanced recovery in spine surgery and perioperative pain management. <i>Neurosurg Clin N Am.</i> 2020;31(1):81–91.	Expert Opinion	n/a	n/a	n/a	n/a	Multi-modal pain strategies and opioid epidemic are discussed.	VA
289	Wong M, Morris S, Wang K, Simpson K. Managing postoperative pain after minimally invasive gynecologic surgery in the era of the opioid epidemic. <i>J Minim Invasive Gynecol.</i> 2018;25(7):1165–1178.	Literature Review	n/a	n/a	n/a	n/a	Using a multi-modal approach and MIS can minimize postop pain and reduce the use of opioids.	VA
290	Moulder JK, Boone JD, Buehler JM, Louie M. Opioid use in the postoperative arena: global reduction in opioids after surgery through enhanced recovery and gynecologic surgery. <i>Clin Obstet Gynecol.</i> 2019;62(1):67–86.	Expert Opinion	n/a	n/a	n/a	n/a	Opioid misuse and multi-modal analgesia is discussed.	VA
291	Schoenbrunner AR, Janis JE. Pain management in plastic surgery. <i>Clin Plast Surg.</i> 2020;47(2):191–201.	Expert Opinion	n/a	n/a	n/a	n/a	Multi-modal analgesia is discussed.	VA
292	Bullock WM, Kumar AH, Manning E, Jones J. Perioperative analgesia in spine surgery: a review of current data supporting future direction. <i>Orthop Clin North Am.</i> 2023;54(4):495–506.	Expert Opinion	n/a	n/a	n/a	n/a	Discusses multi-modal analgesia and ways to reduce opioid consumption.	VA
293	Richebé P, Brulotte V, Raft J. Pharmacological strategies in multimodal analgesia for adults scheduled for ambulatory surgery. <i>Curr Opin Anaesthesiol.</i> 2019;32(6):720–726.	Expert Opinion	n/a	n/a	n/a	n/a	An overview of multi-modal analgesia for adult surgical patients in outpatient surgery.	VA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
294	Gelman D, Gelmanas A, Urbanaitė D et al. Role of multimodal analgesia in the evolving enhanced recovery after surgery pathways. <i>Medicina (Kaunas)</i> . 2018;54(2):20.	Expert Opinion	n/a	n/a	n/a	n/a	Multi-modal analgesia is discussed.	VA
295	Gabriel RA, Swisher MW, Sztain JF, Furnish TJ, Ilfeld BM, Said ET. State of the art opioid-sparing strategies for post-operative pain in adult surgical patients. <i>Expert Opin Pharmacother</i> . 2019;20(8):949–961.	Expert Opinion	n/a	n/a	n/a	n/a	Multi-modal analgesia and non-opioid options are discussed.	VA
296	Silinsky JD, Marcet JE, Anupindi VR et al. Preoperative intravenous meloxicam for moderate-to-severe pain in the immediate postoperative period: a Phase IIIb randomized clinical trial in 55 patients undergoing primary open or laparoscopic colorectal surgery with bowel resection and/or anastomosis. <i>Pain Manag</i> . 2021;11(1):9–21.	RCT	Adults undergoing primary open or laparoscopic colorectal surgery	Meloxicam IV n=27	Placebo n=28	Safety and efficacy of meloxicam	Meloxicam was associated with significant differences in pain intensity and lower opioid consumption and lower resource utilization.	IA
297	Noss C, Prusinkiewicz C, Nelson G, Patel PA, Augoustides JG, Gregory AJ. Enhanced recovery for cardiac surgery. <i>J Cardiothorac Vasc Anesth</i> . 2018;32(6):2760–2770.	Expert Opinion	n/a	n/a	n/a	n/a	ERAS for cardiac surgery is discussed including multimodal analgesia and auditing the program.	VA
298	Ellis DB, Sisodia R, Paul M et al. Impact of gabapentin on PACU length of stay and perioperative intravenous opioid use for ERAS hysterectomy patients. <i>J Med Syst</i> . 2022;46(5):26.	Nonexperimental	2219 ERAS patients receiving gabapentin	n/a	n/a	PACU LOS and opioid requirements	Preoperative gabapentin given as part of an ERAS pathway is associated with statistically but not clinically significant increases in PACU LOS and decreases in total perioperative intravenous opioid use.	IIIA
299	Sukmono R, Ramlan A, Andy A, Satoto D, Septica R. Pre-emptive 600 mg oral gabapentin reduces morphine requirements and postoperative pain following non-obstetric lower abdominal surgery. <i>Anaesthesiol Intensive Ther</i> . 2022;54(1):42–47.	RCT	Patients undergoing non-obstetric lower abdominal surgery	600 mg oral gabapentin two hours before skin incision n=36	Placebo n=36	Post-op pain and morphine requirements	The intervention group has less pain and less requirements for morphine.	IA
300	Peltrini R, Cantoni V, Green R et al. Efficacy of transversus abdominis plane (TAP) block in colorectal surgery: a systematic review and meta-analysis. <i>Tech Coloproctol</i> . 2020;24(8):787–802.	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	TAP blocks provided effective analgesia and a significant reduction in opioid use and did not lead to increased complications.	IIA
301	Torgeson M, Kileny J, Pfeifer C, Narkiewicz L, Obi S. Conventional epidural vs transversus abdominis plane block with liposomal bupivacaine: a randomized trial in colorectal surgery. <i>J Am Coll Surg</i> . 2018;227(1):78–83.	RCT	Patients undergoing open and laparoscopic colorectal surgery	TAP block with liposomal bupivacaine n=44	Epidural n=39	LOS	TAP was associated with a 0.5 day reduction in LOS compared with epidural.	IIA
302	Elsayed HH, Moharram AA. Tailored anaesthesia for thoracoscopic surgery promoting enhanced recovery: The state of the art. <i>Anaesth Crit Care Pain Med</i> . 2021;40(2):100846. doi:10.1016/j.accpm.2021.100846.	Literature Review	n/a	n/a	n/a	n/a	When compared to thoracic epidural analgesia and intercostal nerve block, paravertebral blockade can offer a near similar level of analgesia and has demonstrated ability to fast track patients after thoracic surgery.	VA
303	Gianakos AL, Romanelli F, Rao N et al. Combination lower extremity nerve blocks and their effect on postoperative pain and opioid consumption: a systematic review. <i>J Foot Ankle Surg</i> . 2021;60(1):121–131.	Systematic Review	n/a	n/a	n/a	n/a	Nerve blocks show substantial improvement in postoperative pain levels, opioid consumption and patient satisfaction.	IIA
304	Sztain JF, Gabriel RA, Said ET. Thoracic epidurals are associated with decreased opioid consumption compared to surgical infiltration of liposomal bupivacaine following video-assisted thoracoscopic surgery for lobectomy: a retrospective cohort analysis. <i>J Cardiothorac Vasc Anesth</i> . 2019;33(3):694–698.	Quasi-experimental	Patients undergoing video-assisted thoracoscopic surgery for lobectomy	liposomal bupivacaine injection n=14	Thoracic epidural analgesia n=31	Opioid consumption	Patients consumed less opioids if they received the thoracic epidural compared to liposomal bupivacaine.	IIB
305	Williams L, Iteld L. Moving toward opioid-free breast surgery: regional blocks and a novel technique. <i>Clin Plast Surg</i> . 2021;48(1):123–130.	Expert Opinion	n/a	n/a	n/a	n/a	Different regional blocks for breast surgery are described.	VA
306	Conti D, Valoriani J, Ballo P et al. The clinical impact of pectoral nerve block in an 'enhanced recovery after surgery' program in breast surgery. <i>Pain Manag</i> . 2023;13(10):585–592.	Quasi-experimental	Patients undergoing breast surgery n=114	Pectoral nerve block n=57	General anesthesia alone n=57	Pain, opioid consumption, LOS	All three outcomes were significantly lower in the intervention group.	IIA
307	Pricolo VE, Fei P, Crowley S, Camisa V, Bonvini M. A novel enhanced recovery protocol, combining multimodal analgesia with liposomal bupivacaine and pharmacologic intervention, reduces parenteral opioid use and hospital length of stay after colectomy—a cohort study. <i>Int J Surg Open</i> . 2018;13(12):24–28.	Quasi-experimental	109 patients undergoing elective colectomy	Focused enhanced recovery protocol (ERP), which included multimodal analgesia with liposomal bupivacaine and targeted pharmacologic intervention with intravenous ketorolac and metoclopramide n=39	Time matched controls not using ERP n=34 and a historical control before the introduction of ERP n=36	Postoperative parenteral opioid use and LOS	The ERP protocol patients had significantly less opioid use, shorter LOS and proved to be feasible and effective.	IIA
308	Li, Yujia, Shen, Zhien, Wang, Hongmei, Feng, Tonghui and Xia, Yanfei. Efficacy of liposomal bupivacaine for pain control in shoulder surgery: a systematic review and meta-analysis 2022	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	Liposomal bupivacaine is similar to other agents in terms of overall pain relief, more adequately powered studies should be conducted.	IA
308	Patel MA, Gadsden JC, Nedeljkovic SS et al. Brachial plexus block with liposomal bupivacaine for shoulder surgery improves analgesia and reduces opioid consumption: results from a multicenter, randomized, double-blind, controlled trial. <i>Pain Med</i> . 2020;21(2):387–400.	RCT	Adults undergoing total shoulder arthroplasty or rotator cuff repair	ultrasound guided brachial plexus block with liposomal bupivacaine n=69	Placebo n=72	VAS pain intensity scores, total opioid consumption, percentage of opioid patients and first opioid resucre through 48 hours.	Single-injection BPB with LB 133 mg provided analgesia through 48 hours postsurgery with reduced opioid use compared with placebo after shoulder surgery.	

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
309	Jogerst K, Thomas O, Kosiorek HE et al. Same-day discharge after mastectomy: breast cancer surgery in the era of ERAS. <i>Ann Surg Oncol</i> . 2020;27(9):3436–3445.	Quasi-experimental	Retrospective review of patients undergoing mastectomies from 2013-2018 n=487	140 after ERAS protocol	347 ERAS patients	Postoperative outcomes	ERAS patients had a higher rate of being discharged on the same day, received liposomal bupivacaine for pain control and lower complication rate.	
310	Razi SS, Stephens-McDonnough JA, Haq S et al. Significant reduction of postoperative pain and opioid analgesics requirement with an enhanced recovery after thoracic surgery protocol. <i>J Thorac Cardiovasc Surg</i> . 2021;161(5):1689–1701.	Quasi-experimental	372 patients undergoing thoracic surgery	ERAS protocol with liposomal bupivacaine n=184	Pre-ERAS n=126	pain level, in-hospital and post-discharge opioid use, complications, LOS	ERAS patients had a significant reduction in postop pain and opioid requirements.	I/A
311	Lung BE, Karasavvidis T, Sharma AK et al. Cryoneurolysis is a safe, effective modality to improve rehabilitation after total knee arthroplasty. <i>Life (Basel)</i> . 2022;12(9):1344.	Quasi-experimental	Patients undergoing total knee replacements	Cryoneurolysis n=29	No treatment n=28	ROM improvement and opioid analgesics. Secondary outcomes, postop complications.	Although not statistically significant, cryoneurolysis patients had a shorter length of stay (2.5 vs. 3.5 days) and overall less inpatient and outpatient MME requirements. Cryoneurolysis patients had statistically significant improved 6-week ROM and 1-year follow-up	I/B
312	Isaza E, Santos J, Haro GJ et al. Intercostal nerve cryoanalgesia versus thoracic epidural analgesia in lung transplantation: a retrospective single-center study. <i>Pain Ther</i> . 2023;12(1):201–211.	Quasi-experimental	72 patients undergoing bilateral lung transplantation	Cryoneurolysis n=29	thoracic epidural analgesia n=43	complications, opioid use and pain scores.	In lung transplantation, Cryo was found to be safe with analgesic effectiveness similar to TEA. Cryo may be advantageous in this complex patient population, as it can be used in all clinical scenarios and eliminates risks and delays associated with TEA	
313	Juncker RB, Mirza FM, Gagnier JJ. Reduction in opioid use with perioperative non-pharmacologic analgesia in total knee arthroplasty and ACL reconstruction: a systematic review. <i>SICOT-J</i> . 2021;7:63.	Systematic Review	Analyzed analgesia used in orthopedic surgery patients. Investigating three non-pharmacologic analgesics: percutaneous peripheral nerve stimulation, cryoneurolysis, and auricular acupuncture.	n/a	n/a	n/a	Of these three non-pharmacologic options, cryoneurolysis shows the most promise.	
314	Mihalko WM, Kerkhof AL, Ford MC, Crockarell JR Jr, Harkess JW, Guyton JL. Cryoneurolysis before total knee arthroplasty in patients with severe osteoarthritis for reduction of postoperative pain and opioid use in a single-center randomized controlled trial. <i>J Arthroplasty</i> . 2021;36(5):1590–1598.	RCT	Patients undergoing total knee replacements	Cryoneurolysis n=62	Standard care n=62	Postoperative opioid use	Findings from the analysis suggest that preoperative cryoneurolysis in patients with knee osteoarthritis can reduce opioid consumption and improve functional outcomes after TKA.	I/A
315	O'Connor LA, Dua A, Orhurhu V, Hoeppe LM, Quinn CC. Opioid requirements after intercostal cryoanalgesia in thoracic surgery. <i>J Surg Res</i> . 2022;274:232–241.	Quasi-experimental	Patients undergoing bilateral thoracic surgery	cryoneurolysis n=80	Standard analgesia n=80	Postoperative opioid use	Significantly less opioid use in the cryoneurolysis group.	
316	Raggio BS, Barton B, Grant MC, McCoul ED. Intraoperative cryoanalgesia for reducing post-tonsillectomy pain: a systemic review. <i>Ann Otol Rhinol Laryngol</i> . 2018;127(6):395–401.	Systematic Review	153 tonsillectomy patients	n/a	n/a	n/a	The available evidence suggests that patients undergoing tonsillectomy with cryoanalgesia experience less average postoperative pain without additional complications.	
317	Tanaka A, Al-Rstum Z, Leonard SD et al. Intraoperative intercostal nerve cryoanalgesia improves pain control after descending and thoracoabdominal aortic aneurysm repairs. <i>Ann Thorac Surg</i> . 2020;109(1):249–254.	Quasi-experimental	Aortic aneurysm repair	cryoneurolysis n=26	Standard care n=98 (paravertebral block)	Pain scores and opioid use	cryoanalgesia improved pain control and reduced narcotic use after descending and thoracoabdominal aortic aneurysm repairs compared with those who only received paravertebral block.	I/B
318	Cha PI, Min JG, Patil A, Choi J, Kothary NN, Forrester JD. Efficacy of intercostal cryoneurolysis as an analgesic adjunct for chest wall pain after surgery or trauma: systematic review. <i>Trauma Surg Acute Care Open</i> . 2021;6(1):e000690.	Systematic Review	23 studies, 570 patients undergoing cryoneurolysis	n/a	n/a	n/a	There is overall low-quality evidence supporting intercostal cryoneurolysis as an analgesic adjunct for chest wall pain. A majority of studies demonstrated decreased inpatient narcotic use with intercostal cryoneurolysis compared with conventional pain modalities and may also lead to decreased LOS.	

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
319	Verret M, Lauzier F, Zarychanski R et al. Perioperative use of gabapentinoids for the management of postoperative acute pain: a systematic review and meta-analysis. <i>Anesthesiology</i> . 2020;133(2):265–279.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	RCTs n=281 trials with, 24,682 participants that used gabapentinoids in adult patients undergoing surgery. Primary outcome was the intensity of postoperative acute pain and secondary outcomes included the intensity of postoperative subacute pain, incidence of postoperative chronic pain, cumulative opioid use, persistent opioid use, LOS, and adverse events. The study concluded that there was no clinically significant analgesic effect for the use of gabapentinoids and no effect on the prevention of postoperative chronic pain and a greater risk of adverse events, the researchers concluded that the routine use of gabapentinoids were not supported.	IA
320	Gill C, Giuliano K. Gabapentinoids and acetaminophen as adjuvants for managing postoperative pain. <i>AANA J</i> . 2022;90(3):181–187.	Systematic Review	n/a	n/a	n/a	n/a	Review looked at the effectiveness of gabapentinoids and acetaminophen in postoperative pain, found that these are useful in decreasing pain but the dosing or dosing regimen is not yet well understood.	IA
321	Hungerford M, Neubauer P, Ciotola J, Littleton K, Boner A, Chang L. Liposomal bupivacaine vs ropivacaine for adductor canal blocks in total knee arthroplasty: a prospective randomized trial. <i>J Arthroplasty</i> . 2021;36(12):3915–3921.	RCT	46-experimental group, 54 in standard treatment group	liposomal bupivacaine injection	Ropivacaine	Pain, morphine use, LOS	No statistically significant difference, no difference in pain relief	IA
322	Byrnes KG, Sahebally SM, Burke JP. Effect of liposomal bupivacaine on opioid requirements and length of stay in colorectal enhanced recovery pathways: a systematic review and network meta-analysis. <i>Colorectal Dis</i> . 2021;23(3):603–613.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Although LB-based interventions were associated with reduced postoperative morphine requirements and length of stay in this network meta-analysis, the confidence in these estimates was graded as very low. Further well-executed trials are required before LB can be recommended as a first-line agent.	IA
323	Li Y, Shen Z, Wang H, Feng T, Xia Y. Efficacy of liposomal bupivacaine for pain control in shoulder surgery: a systematic review and meta-analysis. <i>J Shoulder Elbow Surg</i> . 2022;31(9):1957–1968.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Provides evidence indicating that LB is similar to non-LB agents in terms of overall pain relief and opioid requirements. The duration of hospital stay and complication rates were also similar in the 2 groups. Future well-designed and adequately powered randomized controlled studies are needed to confirm our results and to be able to recommend LB for various types of shoulder operations	IA
324	Brindle ME, Heiss K, Scott MJ, Herndon CA, Ljungqvist O. Embracing change: the era for pediatric ERAS is here. <i>Pediatr Surg Int</i> . 2019;35(6):631–634.	Expert Opinion	n/a	n/a	n/a	n/a	An overview of the potential for ERAS in pediatric patients and the first World Congress in Pediatric ERAS is discussed.	VA
325	Zhang H, Zhao Y, Du Y, Yang Y, Zhang J, Wang S. Early mobilization can reduce the incidence of surgical site infections in patients undergoing spinal fusion surgery: a nested case-control study. <i>Am J Infect Control</i> . 2024;52(6):644–649.	Nonexperimental	Patients who underwent spinal surgery who experienced a SSI were matched with an equal number of controls who did not experience a SSI.	n/a	n/a	The influence of early mobilization on SSI rates.	Early mobilization within 36 hours following spinal fusion surgery significantly reduces the risk of SSI.	IIIB
326	Jasmin M, Zuraida E, Jaata J, Syam Y, Mulhaeriah. Enhanced recovery after surgery protocol: evaluation of the effectiveness of early mobilization in postoperative laparotomy patients: a case study. <i>Int J Caring Sci</i> . 2023;16(1):212–217.	Case Report	One hospital, laparotomy patients	n/a	n/a	n/a	Findings from this case study indicate that early mobilization interventions in postoperative laparotomy patients are very beneficial in decreasing LoS and recovery of intestinal motility.	VA
327	Koyuncu F, Iygun E. The effect of mobilization protocol on mobilization start time and patient care outcomes in patients undergoing abdominal surgery. <i>J Clin Nurs</i> . 2022;31(9-10):1298–1308.	Quasi-experimental	Patients undergoing major abdominal surgery	Mobilization protocol n=21	No protocol n=21	Start of mobilization, maintenance of mobilization, patient care outcomes	Patients receiving the mobilization protocol started mobilizing earlier, had higher total mobilization time shorter LOS and had higher sleep and satisfaction scores.	IIIB
328	Paul M, Smart TF, Doleman B et al. A systematic review of the impact of postoperative aerobic exercise training in patients undergoing surgery for intra-abdominal cancers. <i>Tech Coloproctol</i> . 2023;27(12):1169–1181.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Postoperative exercise confers benefits in improving aerobic function post surgery and can be safely delivered in various formats (home-based or group/supervised	IIA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
329	Millan M, Renau-Escrig AI. Minimizing the impact of colorectal surgery in the older patient. The role of enhanced recovery programs in older patients. <i>Eur J Surg Oncol</i> . 2020;46(3):338–343.	Expert Opinion	n/a	n/a	n/a	n/a	The older population and ERAS is discussed including frailty and risk scores.	VA
329	Rajan N, Duggan EW, Abdelmalak BB et al. Society for Ambulatory Anesthesia updated consensus statement on perioperative blood glucose management in adult patients with diabetes mellitus undergoing ambulatory surgery. <i>Anesth Analg</i> . 2024;139(3):459–477.	Consensus	n/a	n/a	n/a	n/a	Consensus from the Society for Ambulatory Anesthesia on perioperative blood glucose management in adult patients with DM undergoing ambulatory surgery.	IVA
330	Liu B, Liu S, Zheng T et al. Neurosurgical enhanced recovery after surgery ERAS for geriatric patients undergoing elective craniotomy: a review. <i>Medicine (Baltimore)</i> . 2022;101(33):e30043.	Literature Review	n/a	n/a	n/a	n/a	ERAS components for geriatric patients undergoing elective craniotomy recommendations.	VA
331	Tan P, Huo M, Zhou X, Zhao B. The safety and effectiveness of enhanced recovery after surgery in older patients undergoing orthopedic surgery: a systematic review and meta-analysis. <i>Arch Orthop Trauma Surg</i> . 2023;143(11):6535–6545.	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	Identifying ERAS components that are beneficial to older adults may improve outcomes.	IIA
332	Boon K, Bislinghi G, D'Hoore A, Boon N, Wolthuis AM. Do older patients (> 80 years) also benefit from ERAS after colorectal resection? A safety and feasibility study. <i>Aging Clin Exp Res</i> . 2021;33(5):1345–1352.	Quasi-experimental	Geriatric patients over 80 undergoing colorectal resection	ERAS group n=45	Non-ERAS group n=106	Short term complication rate, LOS, 30-day mortality and readmission rate	No difference in complication rate, 30-day mortality or readmission rate. Having a laparoscopic approach was associated with a shorter LOS.	IIB
333	Ljungqvist O, de Boer HD. Enhanced recovery after surgery and elderly patients: advances. <i>Anesthesiol Clin</i> . 2023;41(3):647–655.	Expert Opinion	n/a	n/a	n/a	n/a	2023 Update on ERAS and the advances in elderly patients.	VA
334	Ljungqvist O, Hubner M. Enhanced recovery after surgery-ERAS-principles, practice and feasibility in the elderly. <i>Aging Clin Exp Res</i> . 2018;30(3):249–252.	Expert Opinion	n/a	n/a	n/a	n/a	ERAS in older patients is discussed.	VA
335	Depalma N, Cassini D, Grieco M et al. Feasibility of a tailored ERAS programme in octogenarian patients undergoing minimally invasive surgery for colorectal cancer. <i>Aging Clin Exp Res</i> . 2020;32(2):265–273.	Nonexperimental	162 patients > 80 years undergoing minimally invasive surgery for colorectal cancer under an ERAS protocol.	n/a	n/a	Outcomes of an ERAS program	The minimal invasive nature of the laparoscopic approach together with a multimodal analgesia therapy, the early resumption to oral diet and mobilisation could minimize the surgical stress and play an essential role in order to reduce medical morbidity in high-risk patients	IIIA
336	Zhu R, Yang F, Li C, Zhu H, Lin L, Zhao X. Effect of enhanced recovery after surgery on the prognosis of patients with hip fractures: a systematic review and meta-analysis. <i>J Trauma Nurs</i> . 2023;30(5):271–281.	Systematic Review w/ Meta-	n/a	n/a	n/a	n/a	ERAS protocols are associated with reduced LOS, complication rate and delirium rate in hip fracture patients.	IA
337	Devereaux PJ, Sessler DI. Cardiac complications in patients undergoing major noncardiac surgery. <i>N Engl J Med</i> . 2015;373(23):2258–2269.	Expert Opinion	n/a	n/a	n/a	n/a	A review about the epidemiology and mechanisms of perioperative cardiac complications, preoperative methods of predicting those complications, perioperative cardiac interventions and postoperative monitoring.	VA
338	Duceppe E, Parlow J, MacDonald P et al. Canadian Cardiovascular Society guidelines on perioperative cardiac risk assessment and management for patients who undergo noncardiac surgery. <i>Can J Cardiol</i> . 2017;33(1):17–32.	Guideline	n/a	n/a	n/a	n/a	Guidelines for the assessment and management of perioperative cardiac risk for patients undergoing non-cardiac surgery.	IVA
339	Writing Committee for the VISION Study Investigators; Devereaux PH, Biccari BM et al. Association of postoperative high-sensitivity troponin levels with myocardial injury and 30-day mortality among patients undergoing noncardiac surgery. <i>JAMA[JAMA and JAMA Network Journals Full Text]</i> . 2017;317(16):1642–1651.	Nonexperimental	21842 patients undergoing inpatient non-cardiac surgery	n/a	n/a	If there were high sensitivity troponin thresholds associated with risk of death.	Among patients undergoing noncardiac surgery, peak postoperative high sensitivity troponin levels during the first 3 days after surgery was significantly associated with 30-day mortality. Elevated troponin without an ischemic feature was also associated with 30-day mortality.	IIIA
340	Smilowitz NR, Redel-Traub G, Hausvater A et al. Myocardial injury after noncardiac surgery: a systematic review and meta-analysis. <i>Cardiol Rev</i> . 2019;27(6):267–273.	Systematic Review w/ Meta-Analysis	169 studies reporting outcomes of 530,867 surgeries	n/a	n/a	n/a	MINS occurs frequently in clinical practice but is most common in CV disease and its risk factors and is associated with increased short and long term mortality. Additional research is needed to define prevention strategies to prevent MINS and treat patients with this diagnosis.	IIIA
341	Ruetzler K, Smilowitz NR, Berger JS et al. Diagnosis and management of patients with myocardial injury after noncardiac surgery: a scientific statement from the American Heart Association. <i>Circulation</i> . 2021;144(19):e287–e305.	Expert Opinion	n/a	n/a	n/a	n/a	A Scientific statement by the American Heart Association that offers a clinical perspective and definition of MINS including epidemiology, pathophysiology, prediction, surveillance, prevention, prognosis, management and directions for future research.	VA
342	Olotu C, Weimann A, Bahrs C, Schwenk W, Scherer M, Kiefmann R. The perioperative care of older patients. <i>Dtsch Arztebl Int</i> . 2019;116(5):63–69.	Literature Review	n/a	n/a	n/a	n/a	The perioperative care of elderly patients is discussed including recommendations for prehab, pre-op, intra-op and post-op.	VA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
343	Mate K, Fulmer T, Pelton L et al. Evidence for the 4Ms: interactions and outcomes across the care continuum. <i>J Aging Health</i> . 2021;33(7-8):469-481.	Literature Review	n/a	n/a	n/a	n/a	Geriatric experts and health care system executives in collaboration with IHI developed the 4Ms framework that reduces cognitive load of providers and improves the reliability of evidence-based care for older adults so all clinicians and health care workers can engage in age-friendly care.	VA
344	Amin SR, Mahdy EW. Can vena cava ultrasound-guided volume repletion prevent general induced hypotension in elderly patients? A mini-fluid challenge. <i>Ain-Shams Journal of Anesthesiology</i> . 2022;14(8):1-8.	RCT	88 patients above 60 years of age with ASA classification of I, II, or III	Received fluid bolus before anesthesia induction n=44	Did not receive a fluid bolus n=44	The effectiveness of IVC ultrasonography in predicting hypotension	VC ultrasonography may be helpful in the prediction of preoperative hypovolemia in elderly patients in the form of high IVC-CI and low dIVCmax. The incidence of hypotension was lower in patients who received fluid infusion before IGA.	
345	Staheli B, Rondeau B. <i>Anesthetic Considerations in the Geriatric Population</i> . Treasure Island, FL: StatPearls Publishing; 2024.	Expert Opinion	n/a	n/a	n/a	n/a	Reviews the evaluation and treatment of geriatric patients and highlights the role of the interprofessional team in managing these patients while undergoing anesthesia.	VA
346	Brindle ME, McDiarmid C, Short K et al. Consensus guidelines for perioperative care in neonatal intestinal surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. <i>World J Surg</i> . 2020;44(8):2482-2492.	Systematic Review	n/a	n/a	n/a	n/a	ERAS recommendations for neonatal intestinal surgery.	IIIA
347	Rove KO, Edney JC, Brockel MA. Enhanced recovery after surgery in children: promising, evidence-based multidisciplinary care. <i>Paediatr Anaesth</i> . 2018;28(6):482-492.	Literature Review	n/a	n/a	n/a	n/a	Reviews history and elements of ERAS protocols for children and offers strategies of implementation and ideas for future research.	VA
348	Uday Bhaskar MNS, Sundararajan L. Feasibility of enhanced recovery after surgery in pediatric colostomy reversal. <i>J Indian Assoc Pediatr Surg</i> . 2023;28(4):319-324.	Quasi-experimental	13 ERAS peds patients and 35 traditional care	ERAS protocol	non-ERAS protocol	LOS, complications, readmissions	LOS decreased in ERAS group, less complications	IIB
349	Su Y, Xu L, Hu J, Musha J, Lin S. Meta-analysis of enhanced recovery after surgery protocols for the perioperative management of pediatric colorectal surgery. <i>J Pediatr Surg</i> . 2023;58(9):1686-1693.	Systematic Review	n/a	n/a	n/a	n/a	Demonstrated the beneficial role of ERAS in pediatric colorectal patients accelerating rehab, shortening LOS, and decreasing in-hospital costs.	IIA
350	Kitchin S, Raman VT, Javens T, Jatana KR. Enhanced recovery after surgery: a quality improvement approach. <i>Otolaryngol Clin North Am</i> . 2022;55(6):1271-1285.	Literature Review	n/a	n/a	n/a	n/a	ERAS protocols among the peds population is reviewed.	VA
351	Derderian SC, Rove KO. Enhanced recovery after surgery among adolescents undergoing bariatric surgery. <i>Semin Pediatr Surg</i> . 2020;29(1):150885.	Expert Opinion	n/a	n/a	n/a	n/a	ERAS in pediatric bariatric surgery is discussed.	VA
352	Felder L, Cao CD, Konys C et al. Enhanced recovery after surgery protocol to improve racial and ethnic disparities in postcesarean pain management. <i>Am J Perinatol</i> . 2022;39(13):1375-1382.	Quasi-experimental	Women who underwent a C-section	ERAS protocol n=100	Non-ERAS protocol n=100	Pain scores	A standardized ERAS protocol for postcesarean pain decreases opioid use and may improve some racial disparities in postcesarean pain control.	IIA
353	Thurston KL, Zhang SJ, Wilbanks BA, Billings R, Aroke EN. A systematic review of race, sex, and socioeconomic status differences in postoperative pain and pain management. <i>J Perianesth Nurs</i> . 2023;38(3):504-515.	Systematic Review	n/a	n/a	n/a	n/a	Racial minorities, lower socioeconomic status and those who self identify as women experience worse postoperative pain than white patients. Standardization of care may help to reduce this disparity.	IIIA
354	Lee MH, Li B, Feridooni T et al. Racial and ethnic differences in presentation severity and postoperative outcomes in vascular surgery. <i>J Vasc Surg</i> . 2023;77(4):1274-1288.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	There were significant racial differences in presentation severity and postoperative outcomes. Black, hispanic and indigenous patients were found to have an increased risk of AAA all cause mortality and more likely to experience postop stroke/TIA, amputation and graft thrombosis compared to white patients.	IIIA
355	Khan IS, Huang E, Maeder-York W et al. Racial disparities in outcomes after spine surgery: a systematic review and meta-analysis. <i>World Neurosurg</i> . 2022;157:e232-e244.	Systematic Review w/ Meta-Analysis	n/a	n/a	n/a	n/a	Black patients have a significantly higher risk of unfavorable outcomes after spine surgery compared with white patients. Further work in understanding the reasons for these disparities will help develop strategies to narrow the gap among the racial groups.	IIIA
356	Riepen DW, Gelvez D, Collett GA, Nakonezny P, Estrera KA, Huo MH. Standardized total knee arthroplasty pathway improves outcomes in minority patients. <i>Am J Manag Care</i> . 2021;27(5):e152-e156.	Quasi-experimental	Minority and indigent patients undergoing total knee arthroplasty	ERAS pathway n=182	Non-ERAS pathway n=144	LOS, PCA use, blood transfusion, postop hemoglobin, complications and discharge disposition	ERAS pathway patients had shorter LOS, decreased PCA use, increased discharge to home, fewer blood transfusions, higher postoperative hemoglobin	IIA
357	Marques IC, Wahl TS, Chu DI. Enhanced recovery after surgery and surgical disparities. <i>Surg Clin North Am</i> . 2018;98(6):1223-1232.	Expert Opinion	n/a	n/a	n/a	n/a	Disparities in surgical care are discussed and how ERAS can address these disparities.	VA
358	Liu JY, Wick EC. Enhanced recovery after surgery and effects on quality metrics. <i>Surg Clin North Am</i> . 2018;98(6):1119-1127.	Expert Opinion	n/a	n/a	n/a	n/a	ERAS quality metrics are discussed.	VA

AORN Guideline for Implementation of Enhanced Recovery After Surgery
Evidence Table

REFERENCE #	CITATION	EVIDENCE TYPE	SAMPLE SIZE/ POPULATION	INTERVENTION(S)	CONTROL/ COMPARISON	OUTCOME MEASURE(S)	CONCLUSION(S)	CONSENSUS SCORE
359	Khalil S, Kossl K, Pasik S, Brodman M, Ascher-Walsh C. Quality metrics in minimally invasive gynecologic surgery. <i>Curr Opin Obstet Gynecol</i> . 2021;33(4):305–310.	Expert Opinion	n/a	n/a	n/a	n/a	Quality metrics of ERAS are discussed.	VA
360	Implementation Guide. Agency for Healthcare Research and Quality. Accessed September 3, 2024. https://www.ahrq.gov/hai/tools/ambulatory-surgery/sections/implementation/implementation-guide.html	Expert Opinion	n/a	n/a	n/a	n/a	ERAS implementation guide AHRQ	VA
361	Dong Y, Zhang Y, Jin C. Comprehensive economic evaluation of enhanced recovery after surgery in hepatectomy. <i>Int J Equity Health</i> . 2021;20(1):245.	Literature Review	n/a	n/a	n/a	n/a	ERAS significantly reduced the economic burden of disease on patients (\$8935.02 vs \$10,470.02). The hospital received an incremental benefit in ERAS (the incremental benefit cost ratio value is 1.09), and the total social cost was reduced (\$5958.67 vs \$6725.80). Capital flow diagram analysis demonstrated that the average daily cost per capita in the ERAS group increased (\$669.51 vs \$589.98), whereas the benefits depended on the reduction of hospital stay and productivity loss.	VA
362	Lee L, Feldman LS. Enhanced recovery after surgery: economic impact and value. <i>Surg Clin North Am</i> . 2018;98(6):1137–1148.	Literature Review	n/a	n/a	n/a	n/a	ERAS significantly reduced the economic burden of disease on patients (\$8935.02 vs \$10,470.02). The hospital received an incremental benefit in ERAS (the incremental benefit cost ratio value is 1.09), and the total social cost was reduced (\$5958.67 vs \$6725.80). Capital flow diagram analysis demonstrated that the average daily cost per capita in the ERAS group increased (\$669.51 vs \$589.98), whereas the benefits depended on the reduction of hospital stay and productivity loss.	VA
363	Abola RE, Bennett-Guerrero E, Kent ML et al. American Society for Enhanced Recovery and Perioperative Quality Initiative joint consensus statement on patient-reported outcomes in an enhanced recovery pathway. <i>Anesth Analg</i> . 2018;126(6):1874–1882.	Consensus	n/a	n/a	n/a	n/a	Recommendations for patient reported outcomes.	
364	Bikhchandani J. Enhanced recovery after surgery and its effects on patient reported outcomes. <i>Surg Clin North Am</i> . 2018;98(6):1129–1135.	Expert Opinion	n/a	n/a	n/a	n/a	Tools that can be used to measure patient outcomes is described.	VA
365	Bull C, Teede H, Watson D, Callander EJ. Selecting and implementing patient-reported outcome and experience measures to assess health system performance. <i>JAMA Health Forum</i> . 2022;3(4):e220326.	Expert Opinion	n/a	n/a	n/a	n/a	This is a guide to select and implement patient reported outcome and experience measures to assess health system performance.	VA
366	Doruker NC, Oden TN, Korkmaz FD. Determination of knowledge and attitudes of cardiac surgery nurses regarding the enhanced recovery after surgery protocol. <i>J Perianesth Nurs</i> . 2023;38(5):710–716.	Nonexperimental	50 cardiac surgery nurses in one hospital	n/a	n/a	Knowledge and attitudes regarding ERAS protocols	Increasing knowledge level of ERAS improved attitudes, training is important.	IIIB