

Table S1. Representative studies and evidence sources underpinning the narrative synthesis.

Domain	Author (Year)	Study design	Population	Perioperative intervention / factor evaluated	Main outcome(s)	Principal findings
Infection Prevention	Morris et al. (2025)	Cohort study	Orthopedic and CS patients	Timing of antibiotic prophylaxis	SSI	Appropriate timing of antibiotic prophylaxis was associated with lower SSI rates. Delayed or excessively early antibiotic administration increased the risk of SSI.
	de Jonge et al. (2017)	SR and meta-analysis	54,552 surgical patients	Timing of antibiotic prophylaxis	SSI	Adequate cefazolin exposure was associated with lower rates of sternal SSI. Implementation of a multimodal prevention bundle improved adherence to infection prevention practices. Multimodal SSI prevention strategies demonstrated the strongest evidence for reducing
	Zelenitsky et al. (2018)	Prospective cohort study	Adult CS patients	Cefazolin prophylaxis	Sternal SSI	
	Andrade et al. (2019)	Observational study	CS patients	SSI prevention bundle	SSI	
	Rogers et al. (2024)	Cochrane SR	Adult CS patients	SSI prevention strategies	SSI	

					postoperative infections. No significant difference was observed between the two antiseptic strategies. Chlorhexidine- and povidone-iodine-based antiseptic preparations demonstrated comparable efficacy. Alcohol-based antiseptic preparations were associated with lower SSI rates than aqueous preparations. Hair clipping was associated with lower SSI risk than shaving. Bundle implementation on reduced postoperative infection rates. Long-term implementation of preventive measures maintained reduced SSI rates over a
Boisson et al. (2024)	RCT	Adult CS patients	Chlorhexidine-alcohol versus povidone-iodine-alcohol	Surgical site infection	
Widmer et al. (2024)	RCT	Surgical patients	Skin antiseptics	SSI	
Yang et al. (2024)	SR and meta-analysis	Surgical patients	Skin antiseptics solutions	SSI	
Tanner & Melen (2021)	Cochrane SR	Surgical patients	Hair removal methods	Surgical site infection	
Qaddumi et al. (2025)	Cohort study	CS patients	SSI prevention bundle	Surgical site infection	
Conoscenti et al. (2025)	Cohort study	CS patients	Long-term infection prevention program	SSI	

Physiologic al Optimizati on	Pérez-Granda et al. (2025)	RCT	CS patients	Postoperative dressing strategies	SSI, mediastinitis	10-year period. NPWT benefited selected high-risk patients. Active warming effectively maintained perioperative normothermia and reduced hypothermia-related complications. Perioperative hypothermia was associated with prolonged ICU stay. Perioperative hypothermia was associated with an increased risk of SSI. Maintenance of normothermia reduced intraoperative blood loss. Hyperglycemia was associated with increased postoperative infection risk. Improved perioperative glycemic control reduced
	Poveda et al. (2020)	SR and meta-analysis	Surgical patients	Active warming interventions	Normothermia, SSI	
	Wang et al. (2023)	Observational study	CABG patients	Perioperative hypothermia	ICU LOS	
	Chen et al. (2025)	Meta-analysis	Surgical patients	Perioperative hypothermia	SSI	
	Yi et al. (2018)	RCT	Major surgery patients	Intraoperative warming	Blood loss	
	Järvelä et al. (2018)	Cohort study	CS patients	Postoperative hyperglycemia	Postoperative infection	
	Jin et al. (2020)	SR and meta-analysis	CS patients	Glycemic control strategies	DSWI, atrial fibrillation	

						selected postoperative complications. Greater glycemic variability was associated with increased postoperative mortality. Low preoperative hemoglobin independently predicted anemia-related postoperative complications. Contemporary guidelines support multidisciplinary PBM strategies to reduce unnecessary transfusions and improve perioperative outcomes. The review supports implementation of multidisciplinary PBM strategies
	Yao et al. (2025)	Retrospective cohort study	CS patients	Glycemic variability	Mortality	Low preoperative hemoglobin independently predicted anemia-related postoperative complications. Contemporary guidelines support multidisciplinary PBM strategies to reduce unnecessary transfusions and improve perioperative outcomes. The review supports implementation of multidisciplinary PBM strategies
	Kattou et al. (2022)	Retrospective cohort study	Adult CS patients	Preoperative anemia	Transfusion, postoperative complications	Contemporary guidelines support multidisciplinary PBM strategies to reduce unnecessary transfusions and improve perioperative outcomes. The review supports implementation of multidisciplinary PBM strategies
	Casselmann et al. (2025)	Clinical guideline synthesis	Adult CS patients	PBM	Morbidity, transfusion	Checklist implementation improved patient safety and reduced postoperative
	Rancati et al. (2021)	Narrative review	CS patients	PBM	Transfusion-related outcomes	
Patient Safety Measures	Qaiser et al. (2024)	SR	Surgical patients	WHO Surgical Safety Checklist	Complications, mortality	

Organizational and Human Factors	Emond et al. (2022)	Cluster-randomized multicenter trial	Surgical patients	Guideline adherence	Mortality, complications	complications. Greater adherence to evidence-based perioperative guidelines was associated with improved clinical outcomes. ERAS pathways were associated with shorter hospital stay and improved postoperative recovery. Structured communication, teamwork, and standardized handovers were recommended to improve patient safety. Communication-focused interventions consistently improved teamwork processes in operating room settings. Psychological safety promoted speaking up and facilitated
	Zhang et al. (2022)	SR	Adult CS patients	Enhanced Recovery After Surgery (ERAS) pathways	LOS, recovery	
	Wahr et al. (2013)	American Heart Association Scientific Statement	Cardiac operating room teams	Team communication and patient safety	Safety processes	
	Ghanmi et al. (2024)	Scoping review	Operating room teams	Teamwork interventions	Team performance	
	Vikan et al. (2024)	Qualitative study	Operating room professionals	Psychological safety	Team functioning	

					safer perioperative processes. Greater familiarity among operative team members was associated with improved safety and procedural efficiency. Proposed a standardized framework for evaluating technical and non-technical performance. Advocated strengthening surgeon-perfusionist collaboration to promote patient safety and organizational culture. High workload negatively affected team performance. Reviewed evidence suggesting that burnout may negatively influence perioperative performance and patient safety.
Bauer et al. (2024)	Multicenter observational study	CS teams	Operative team familiarity	Safety, procedural efficiency	
Likosky et al. (2021)	Mixed-methods study protocol	CS teams	Assessment of technical and non-technical skills	Surgical quality	
Shann & Sundt (2025)	Perspective article	CS teams	Perfusionist-surgeon collaboration	Safety culture	
Totonchilar et al. (2024)	Multicenter cross-sectional study	Surgical team members	Workload	Team performance	
Hueto Madrid et al. (2025)	Narrative review	Operating room personnel	Burnout	Patient safety	

Bong et al. (2025)	Cross-sectional study	Perioperative healthcare professionals	Safety culture	Patient safety perceptions	A positive safety culture was associated with more favorable perceptions of patient safety. Knowledge gaps and implementation barriers regarding perioperative guidelines were identified among cardiac nurses.
Balachandran et al. (2025)	Cross-sectional study	Cardiac nurses	Knowledge of perioperative guidelines	Protocol adherence	
