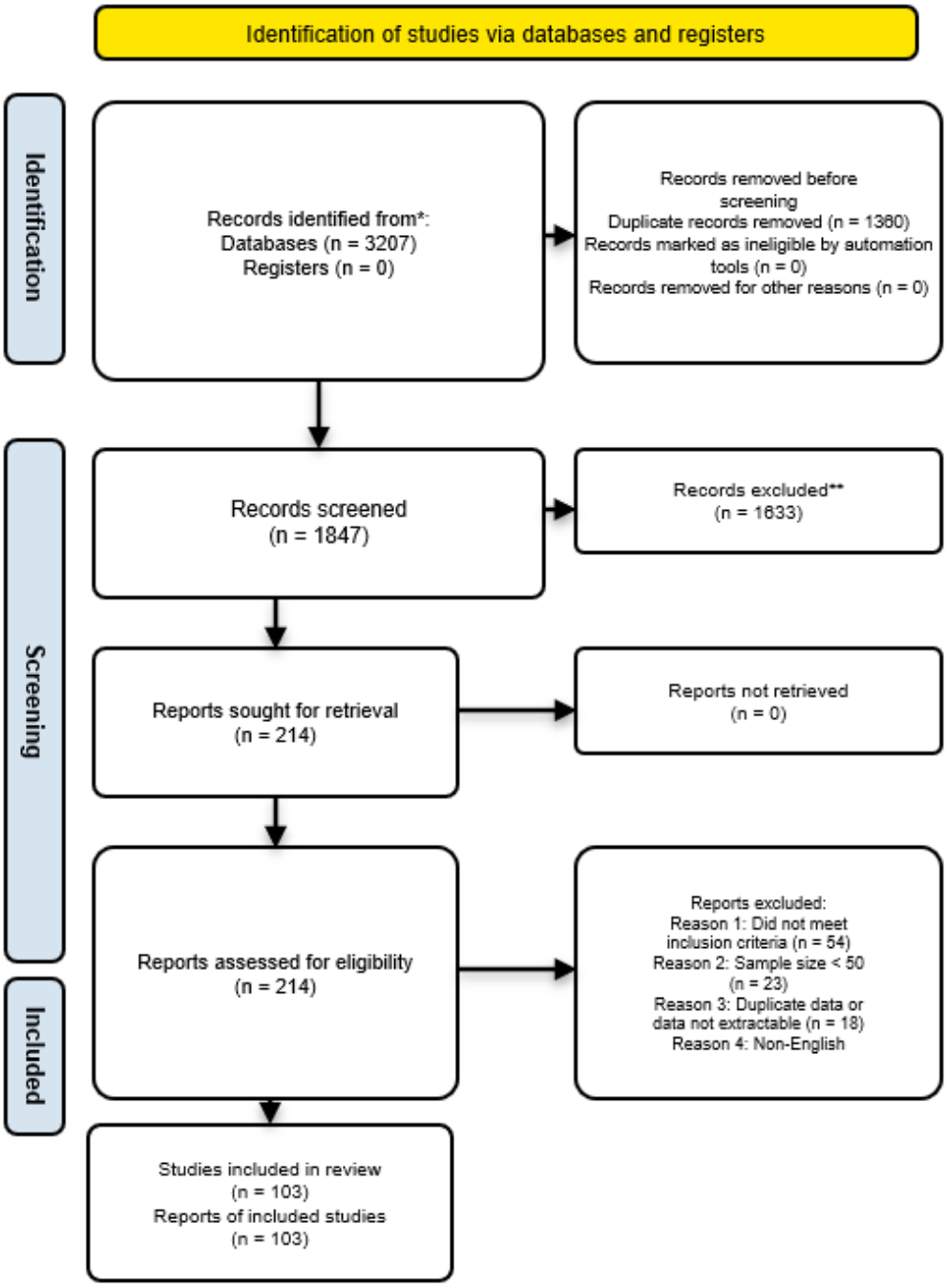


Supplementary Figure 1 PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only.

*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

** If automation tools were used, indicate how many records were excluded by

a human and how many were excluded by automation tools.

Supplementary Table 1 Full search strategy for MEDLINE (via PubMed)

Database: MEDLINE (via PubMed)**Search date:** July 2026**Time span:** January 2000 – July 2026

Search line	Query	Results
#1	"colorectal surgery"[MeSH] OR "colonic surgery"[MeSH] OR "rectal surgery"[MeSH] OR colorectal[tiab] OR colonic[tiab] OR rectal[tiab] OR colon[tiab] OR rectum[tiab]	387,421
#2	"Enhanced Recovery After Surgery"[MeSH] OR ERAS[tiab] OR "fast track"[tiab] OR "fast-track"[tiab] OR "enhanced recovery"[tiab] OR "accelerated recovery"[tiab] OR "rapid recovery"[tiab]	18,763
#3	"Guideline Adherence"[MeSH] OR "Patient Compliance"[MeSH] OR compliance[tiab] OR adherence[tiab] OR non-compliance[tiab] OR non-adherence[tiab] OR "protocol deviation"[tiab] OR "protocol deviations"[tiab] OR "protocol completion"[tiab]	1,045,892

Search line	Query	Results
#4	"Frailty"[MeSH] OR frail[tiab] OR "aged"[MeSH] OR elderly[tiab] OR "obesity"[MeSH] OR obese[tiab] OR "comorbidity"[MeSH] OR comorbid[tiab] OR "socioeconomic factors"[MeSH] OR socioeconomic[tiab] OR "healthcare disparities"[MeSH] OR disparity[tiab] OR disparities[tiab] OR "high risk"[tiab] OR "high-risk"[tiab]	5,214,336
#5	#1 AND #2 AND #3 AND #4	2,103
#6	#5 Filters: Publication date from 2000/01/01 to 2026/07/31	1,942
#7	#6 Filters: English language	1,847

Additional search strategies:

Database	Search strategy	Results (after deduplication)
EMBASE	Same concepts adapted to Emtree terms and Ovid syntax; limits: 2000–2026, English	1,226
PsycINFO	Same concepts adapted to APA Thesaurus terms; limits: 2000–2026, English	134

Total records identified across all databases (after deduplication): 1,847

Notes:

MeSH: Medical Subject Headings.tiab: title/abstract field search.[MeSH]: indexed MeSH term.The search strategy was developed collaboratively by all authors, with input from a medical librarian at The First Hospital of Harbin.

Hand-searching of reference lists of included articles and relevant systematic reviews was performed to identify additional studies

not captured by the electronic searches.

Grey literature, conference abstracts, and non-English publications were excluded at the full-text screening stage.

Supplementary Table 2 Detailed quality assessment of included studies

Abbreviations: NOS, Newcastle-Ottawa Scale; RoB, Risk of Bias; RCT, randomised controlled trial; CASP, Critical Appraisal Skills Programme; NA, not applicable.

Part 1. Randomised controlled trials (*n* = 8)

Quality assessment tool: Cochrane Risk of Bias tool (RoB 2.0)

Study (first author, year)	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported result**	**Overall RoB**
Varadhan 2010 (Ref 4)	Low	Low	Low	Low	Some concerns	Low
Greco 2014	Low	Low	Low	Low	Low	Low

Study (first author, year)	Randomisation process	Deviations from intended interventions	Missing outcome data	Measurement of the outcome	Selection of the reported result	Overall RoB
(Ref 5)						
Zhuang 2013 (Ref 6)	Low	Some concerns	Low	Low	Low	Some concerns
Nicholson 2014 (Ref 28)	Low	Low	Low	Low	Low	Low
Greer 2018 (Ref 3)	Low	Low	Low	Low	Some concerns	Some concerns
Zhu 2026 (Ref 11)	Low	Low	Low	Low	Low	Low
Hajibandeh	Some concerns	Low	Low	Low	Low	Some

Study (first author, year)	Randomisation process	Deviations from intended interventions	Missing outcome data	Measurement of the outcome	Selection of the reported result	Overall RoB
2020 (Ref 96)						concerns
Slim 2023 (Ref 61)	Low	Low	Low	Low	Low	Low

Part 2. Prospective multicentre cohort studies (*n* = 12)

Quality assessment tool: Newcastle-Ottawa Scale (NOS) for cohort studies (maximum 9 stars)

Study (first author, year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total NOS score
Gustafsson 2011 (Ref 7)	4	2	3	9

Study (first author, year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total NOS score
Aarts 2019 (Ref 8)	4	2	3	9
Catarci 2021 (iCral2, Ref 29)	4	2	2	8
Catarci 2022 (iCral2/3, Ref 30)	4	2	3	9
Pisarska 2016 (Ref 37)	3	1	3	7
Hartman 2021 (Ref 38)	3	2	2	7
Hawkins 2019 (Ref 32)	4	1	3	8
Ren 2023 (Ref 13)	3	2	3	8
Deslarzes 2025 (Ref 14)	3	2	2	7
Antoniv 2025 (Ref 15)	4	2	3	9

Study (first author, year)	**Selection (max 4)**	**Comparability (max 2)**	**Outcome (max 3)**	**Total NOS score**
Bertocchi 2025 (Ref 12)	3	2	2	7
Alshiakh 2026 (Ref 36)	3	2	3	8

Part 3. Single-centre retrospective cohort studies (*n* = 23)

Quality assessment tool: Newcastle-Ottawa Scale (NOS) for cohort studies (maximum 9 stars)

Study (first author, year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total NOS score
Roulin 2017 (Ref 24)	3	1	2	6
Wahl 2018 (Ref 40)	3	2	3	8
Leeds 2017 (Ref 16)	3	2	2	7

Study (first author, year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total NOS score
Smith 2023 (Ref 41)	3	1	2	6
Gustafsson 2016 (Ref 31)	3	2	3	8
Schiesser 2020 (Ref 33)	3	1	2	6
Chappell 2019 (Ref 34)	2	1	2	5
Dixon 2018 (Ref 35)	2	1	2	5
Godbole 2019 (Ref 39)	3	2	3	8
Theiss 2022 (Ref 54)	3	1	2	6
Azap 2024 (Ref 55)	3	2	2	7
Smith BP 2023 (Ref 17)	3	1	2	6

Study (first author, year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total NOS score
Levene 2020 (Ref 42)	3	1	2	6
Pearsall 2015 (Ref 82)	3	2	2	7
Neumayer 2017 (Ref 43)	2	1	2	5
Thorn 2016 (Ref 77)	3	1	2	6
Ahmed 2012 (Ref 103)	2	1	2	5
Stone 2016 (Ref 79)	2	1	2	5
Yoon 2025 (Ref 22)	3	2	2	7
Bashir 2021 (Ref 62)	3	1	2	6
Ssentongo 2020 (Ref 63)	3	1	2	6

Study (first author, year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total NOS score
Riad 2023 (Ref 65)	3	1	2	6
Helmreich 2000 (Ref 88)	2	1	2	5

Part 4. Registry analyses (*n* = 7)

Quality assessment tool: Newcastle-Ottawa Scale (NOS) for cohort studies (maximum 9 stars)

Study (first author, year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total NOS score
Hsu 2021 (Ref 9)	4	2	3	9
Van Spall 2007 (Ref 10)	4	2	3	9
Bevan 2006 (Ref 51)	3	1	2	6

Study (first author, year)	Selection (max 4)	Comparability (max 2)	Outcome (max 3)	Total NOS score
Barbash 2020 (Ref 52)	3	2	3	8
Rhee 2021 (Ref 46)	3	2	2	7
Mannion 2012 (Ref 53)	3	1	2	6
Dwan 2013 (Ref 92)	3	1	2	6

Part 5. Qualitative studies (*n* = 4)

Quality assessment tool: CASP Qualitative Checklist (10 items)

Study (first author, year)	Clear aims	Appropriate methodology	Appropriate design	Appropriate recruitment	Appropriate data collection	Reflexivity	Ethical approval	Rigorous analysis	Clear findings	Value of research
Levene 2020 (Ref 42)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pearsall 2015 (Ref 82)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Study (first author, year)	Clear aims	Appropriate methodology	Appropriate design	Appropriate recruitment	Appropriate data collection	Reflexivity	Ethical approval	Rigorous analysis	Clear findings	Value of research
Braun & Clarke 2006 (Ref 83)	Yes	Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes	Yes
Dixon-Woo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Study (first author, year)	Clear aims	Appropriate methodology	Appropriate design	Appropriate recruitment	Appropriate data collection	Reflexivity	Ethical approval	Rigorous analysis	Clear findings	Value of research
ds 2011 (Ref 97)										

Part 6. Cognitive psychology and safety science literature (*n* = 8)

Quality assessment tool: Not applicable (indirect evidence; included for hypothesis-generating purposes only)

Study (first author, year)	Source discipline	Relevance to ERAS audit	Evidence type
Parasuraman 2010 (Ref 67)	Human factors	Automation bias	Theoretical framework
Lyell 2017 (Ref 68)	Health informatics	Automation bias in healthcare	Systematic review
Reason 2000 (Ref 69)	Safety science	Human error	Theoretical framework
Weick & Sutcliffe 2007 (Ref 70)	Organisational behaviour	High-reliability organisations	Theoretical framework
Goddard 2012 (Ref 71)	Health informatics	Automation bias	Systematic review
Mamede 2007 (Ref 72)	Cognitive psychology	Clinical reasoning	Experimental study
Sibbald 2013 (Ref 73)	Cognitive psychology	Checklists and reasoning	Experimental study
Hollnagel 2015 (Ref 48)	Safety science	Safety-II framework	White paper / theoretical

Study (first author, year)	Source discipline	Relevance to ERAS audit	Evidence type
			framework

Notes:

NOS scores of 7–9 are considered high quality; 4–6 are considered moderate quality; 0–3 are considered low quality.

RoB 2.0 overall rating: "Low" indicates low risk of bias; "Some concerns" indicates moderate risk of bias; "High" indicates high risk of bias.

CASP Qualitative Checklist: "Yes" indicates the criterion was met; "No" indicates it was not met; "Can't tell" indicates insufficient information.

Cognitive psychology and safety science literature were not formally quality-assessed using clinical epidemiology tools because these publications serve a hypothesis-generating, conceptual function rather than providing empirical evidence on Enhanced recovery after surgery outcomes. Their inclusion is explicitly labelled as indirect and hypothesis-generating in the main text.