

MANAGEMENT OF SURGICAL DRAINS

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QUESTION

What is the current best practice for the management of surgical drains?

RESULTS

ONLINE RESOURCES (GREY LITERATURE)

GUIDELINES & PROCEDURES

- The Royal Children’s Hospital Melbourne. (2023). **Surgical drains (non cardiac)**. [Web link](#).
- North Metropolitan Health Service. (2023). **Wound care – drains**. [Web link](#).
- ACT Health. (n.d.) **Drain management procedure**. [Web link](#).
- Western Sydney Local Health District. (n.d.). **Surgical wounds and drains**. [Web link](#).

EBOOK CHAPTERS

- Ramesh, B.A., et al. (2023). **Suction drains**. In: *StatPearls*. [Web link](#).
- Magowan, R. et al. (2020). **Wound care – wound drains**. In: *Nursing Practice: Hospital and Home*. [Web link](#).
- Neilsen, G. (2024). **Principles of managing wound drains**. In: *Wound Care, 2nd ed.* [Web link](#).

PEER-REVIEWED LITERATURE – MOST RECENT FIRST

Articles are grouped by theme:

- Drain Removal
- Drain Measurement
- Drain Securement
- Infections
- Protocols

Each article summary contains excerpts from the abstract and an online link.

DRAIN REMOVAL

Chang, J. H., et al. (2023). **Postoperative Day 1 Drain Amylase After Pancreatoduodenectomy: Optimal Level to Predict Pancreatic Fistula**. *Journal of gastrointestinal surgery*, 27(11), 2676–2683. [Click for full-text](#).

For patients with negligible to intermediate fistula risk score, surgeons should consider utilizing DA-D1 < 720 U/L for removal of a drain on the first postoperative day.

Goldaracena, N., et al. (2022). **Early removal of drains and lines after liver transplantation to reduce the length of hospital stay and enhance recovery - A systematic review of the literature and expert panel recommendations.** *Clinical transplantation*, 36(10), e14687. [Request full-text.](#)

Based more on expert recommendation, we propose that abdominal drains, should be removed by postoperative day 5, based on quantity and fluid characteristics

Mengardo, V., et al. (2022). **Current practice on the use of prophylactic drain after gastrectomy in Italy: the Abdominal Drain in Gastrectomy (ADiGe) survey.** *Updates in surgery*, 74(6), 1839–1849. [Click for full-text.](#)

More than 60% of the surgeons surveyed remove the drain on postoperative day 4-6 after performing an assessment of the anastomosis integrity

Watanabe, N., et al. (2022). **A proposal of drain removal criteria in hepatobiliary resection.** *Journal of hepato-biliary-pancreatic sciences*, 29(9), 974–982. [Request full-text.](#)

The drains were removed on postoperative day (POD) 7 when the drainage fluid was grossly serous, biochemically normal, and negative for bacterial contamination as assessed by Gram staining.

Salvia, R., et al. (2021). **Redefining the Role of Drain Amylase Value for a Risk-Based Drain Management after Pancreaticoduodenectomy: Early Drain Removal Still Is Beneficial.** *Journal of gastrointestinal surgery*, 25(6), 1461–1470. [Click for full-text.](#)

Selective early drain removal still is associated with a reduced rate of postoperative pancreatic fistula.

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Spoletini, G., et al. (2021). **A Tiny Choledochotomy Keeps T-Tube Troubles Away. Insertion and Removal Tricks to Minimize T-Tube Related Complications in Liver Transplantation.** *HPB*, 23(Suppl 1), S428-S429. [Click for full-text.](#)

T-tubes are removed three months later as an in-patient procedure, position a temporary Nelaton drain to capture possible bile leaks and avoid biliary peritonitis. The drain is removed as bile discharge stops.

Yoon, S. J., et al. (2021). **Realistic Advantages of Early Surgical Drain Removal after Pancreatoduodenectomy: A Single-Institution Retrospective Study.** *Journal of clinical medicine*, 10(12), 2716. [Click for full-text.](#)

Although early drain removal has not been identified as apparently beneficial; this study showed that it may contribute to an early return to normal life without increasing complications.

Kamezaki, H., et al. (2020). **Safety and Efficacy of Early Tube Removal Following Percutaneous Transhepatic Gallbladder Drainage: an Observational Study.** *Surgical laparoscopy, endoscopy & percutaneous techniques*, 30(2), 164–168. [Click for full-text.](#)

The present study suggests that drainage tube removal is safe and effective when performed after a short drainage period of 7 to 10 days if the criteria for the removal of the drainage tube were met.

Scomacao, I., et al. (2020). **The use of surgical site drains in breast reconstruction: A systematic review.** *Journal of plastic, reconstructive & aesthetic surgery*, 73(4), 651–662. [Click for full-text.](#)

The majority of studies (13) agreed to remove the drain when the output was less than 30 ml/24 h. However, more studies are needed in this area.

Trudeau, M. T., et al. (2020). **Extended Experience with a Dynamic, Data-Driven Selective Drain Management Protocol in Pancreaticoduodenectomy: Progressive Risk Stratification for Better Practice.** *Journal of the American College of Surgeons*, 230(5), 809–818.e1. [Click for full-text.](#)

This extended experience validates a dynamic drain management protocol, providing a model for better drain management and individualized patient care after pancreaticoduodenectomy. This study confirms that drains can be safely omitted from negligible/low-risk patients, and moderate/high-risk patients benefit from early drain removal.

Zhao, Q., et al. (2020). **Early versus delayed removal of the pericardial drain in patients with cardiac tamponade complicating radiofrequency ablation of atrial fibrillation.** *Journal of cardiovascular electrophysiology*, 31(3), 597–603. [Request full-text.](#)

Early removal of the pericardial drain after no evidence of pericardial bleeding for at least 30 minutes in the electrophysiology laboratory is safe and associated with a better early hospital course.

DRAIN MEASUREMENT

Gerken, A. L. H., et al. (2023). **Postoperative drainage management and wound complications following resection of lower limb soft tissue tumors: a retrospective cohort study.** *Langenbeck's archives of surgery*, 408(1), 202. [Click for full-text.](#)

The aim of this study is to evaluate the incidence of postoperative wound complications and delayed or prolonged drainage treatment and to propose a standardised definition and severity grading of complex postoperative courses.

Pedrazzoli, S., et al. (2020). **Systematic review and meta-analysis of surgical drain management after the diagnosis of postoperative pancreatic fistula after pancreaticoduodenectomy: draining-tract-targeted works better than standard management.** *Langenbeck's archives of surgery*, 405(8), 1219–1231. [Click for full-text.](#)

Clinically, "draining-targeted" management of postoperative pancreatic fistula should be preferred to "standard" management.

Smith, H., et al. (2019). **Standardization of early drain removal following pancreatic resection: proposal of the "Ottawa pancreatic drain algorithm".** *Patient safety in surgery*, 13, 38. [Click for full-text.](#)

Implementing the OPDA was associated with earlier drain removal and decreased length of stay in patients undergoing distal pancreatectomy who did not develop postoperative pancreatic fistula, without increased morbidity. Standardizing drain removal may help facilitate early drain removal after pancreatic resection at other institutions.

DRAIN SECUREMENT

Noya, C., et al. (2022). **How to Secure CSF External Drainage to the Skin: Hints from an International Survey and the Current Literature.** *Turkish neurosurgery*, 32(5), 819–825. [Click for full-text.](#)

Complications associated with the securement method, such as the risk of pullout and infection, are most likely underestimated. More research is needed to implement effective guidelines in this field.

Hughes, B., et al. (2021). **What is the most reliable way to secure a surgical drain?** *British Journal of Surgery*, 108(Suppl 2). [Click for full-text.](#)

Suture material, technique and drain fixation angle had an impact on suture strength with Prolene™ outperforming Silk. We advocate using a ‘three half hitch’ technique with 3.0 Prolene™ to secure a surgical drain. It offers superior strength whilst reducing the risk of localised tissue reactions.

INFECTIONS

Yoshimura, K., et al. (2023). **Safety of early pelvic drain removal in colorectal surgery based on drainage quantity.** *BMC surgery*, 23(1), 130. [Click for full-text.](#)

The drainage quantity of negative-pressure closed suction drains diminishes shortly after surgery, regardless of the postoperative course. It is not an effective diagnostic or therapeutic drain for organ-space infections. This supports early drain removal based on drainage quantity changes in actual clinical practice.

Barbera, F., et al. (2021). **Efficacy of short-term antibiotic prophylaxis in immediate two-stage breast reconstruction after mastectomy: A retrospective monocentric study.** *Journal of plastic, reconstructive & aesthetic surgery*, 74(8), 1758–1762. [Click for full-text.](#)

Short-term single-shot perioperative antibiotic prophylaxis associated with early drain removal (within 21 days postop) represents a safe approach in terms of prevention of local infective surgical complication and allows a more effective treatment of the diagnosed infection.

Dembinski, J., et al. (2019). **Early removal of intraperitoneal drainage after pancreatoduodenectomy in patients without postoperative fistula at POD3: Results of a randomized clinical trial.** *Journal of visceral surgery*, 156(2), 103–112. [Click for full-text.](#)

Early removal of abdominal drainage does not seem to increase or decrease surgical site infection's occurrence.

Rivera-Buendía, F., et al. (2019). **Randomized Controlled Trial to Reduce Bacterial Colonization of Surgical Drains with the Use of Chlorhexidine-Coated Dressings After Breast Cancer Surgery.** *Annals of surgical oncology*, 26(12), 3883–3891. [Click for full-text.](#)

The study findings demonstrated that the use of antiseptics at the drain exit site significantly reduced bacterial colonization of the closed drainage system in breast cancer surgery. Semi-permeable occlusive chlorhexidine-impregnated dressings provide an opportunity to test simple,

safe, and low-cost interventions that may reduce drain bacterial colonization and SSI after breast surgery.

PROTOCOLS

Wang, L., et al. (2023). **New Drainage Management Following Liver Transplant Results in Fewer Postoperative Hospital Days.** *Experimental and clinical transplantation*, 21(9), 749–755. [Click for full-text.](#)

Early removal of the drain tube was conducted when the serum albumin level was >3 g/dL and nonchylous fluid drainage was <200 mL/day.

Eysenbach, L. M., et al. (2021). **Outcomes following adoption of a standardized protocol for abscess drain management in pediatric appendicitis.** *Journal of pediatric surgery*, 56(1), 43–46. [Click for full-text.](#)

Though evidence-based clinical pathways for the diagnosis and treatment of pediatric appendicitis have been established, protocols guiding management of percutaneous abscess drains are lacking. We hypothesized a drain management protocol utilizing drain output and clinical factors instead of fluoroscopic drain studies would reduce interventional radiologic procedures without adversely impacting clinical outcomes.

Padmore, G., et al. (2021). **The art and craft of biliary T-tube Use.** *The journal of trauma and acute care surgery*, 91(2), e46–e49. [Click for full-text.](#)

Essential concepts surrounding T-tube use discussed in this article include: 1. Contemporary indications for T-tube insertion (disease-, patient-, and anatomy-based); 2. Correct instrument availability (open and laparoscopic); 3. T-tube selection and mechanical preparation; 4. Atraumatic T-tube insertion and security; 5. Immediate postoperative management and meticulous T-tube care; 6. Imaging biliary T-tubes; 7. Optimal timing of T-tube removal; 8. Technical aspects of T-tube removal; 9. Management of potential T-tube inpatient complications; and 10. Management of T-tube complications in the outpatient setting.

APPENDIX

SEARCH METHODOLOGY

A systematic search was conducted for literature. The results were screened by librarians using [Covidence](#).

SEARCH LIMITS

- English-language
- Published within the last 5 years

DATABASES SEARCHED

- Medline – index of peer reviewed articles across health sciences and medicine.
- Embase – index of biomed and pharmacological peer reviewed journal articles.
- Emcare – index of nursing, allied health, critical-care medicine and more.
- Cochrane Library – collection of databases containing high-quality independent evidence.
- ProQuest Nursing & Allied Health – scholarly journals, theses, and books for nursing & AH.
- UpToDate & BMJ Best Practice – synthesised evidence for patient care.
- Grey literature – Google, Google Scholar, Trip database, Biomed Central Proceedings.

SEARCH TERMS

Concept	MeSH headings	Keywords
Surgical drains	Drainage; Suction	Surgical drain(s)(ing); Suction drain(s)(ing); Vacuum drain(s)(ing); Fixvac; Minivac; Exudrain; Jackson-Pratt; Open drain(s)(ing); Penrose; Corrugated; Yates; Percutaneous drain(s)(ing); Pigtail; Portex; T-tube
Best practice	Practice guideline; Clinical protocol; Patient Care Management; Clinical Protocols	Best practice; Standard(s)(ise)(ize); Guideline(s); Protocol(s); Pathways(s)

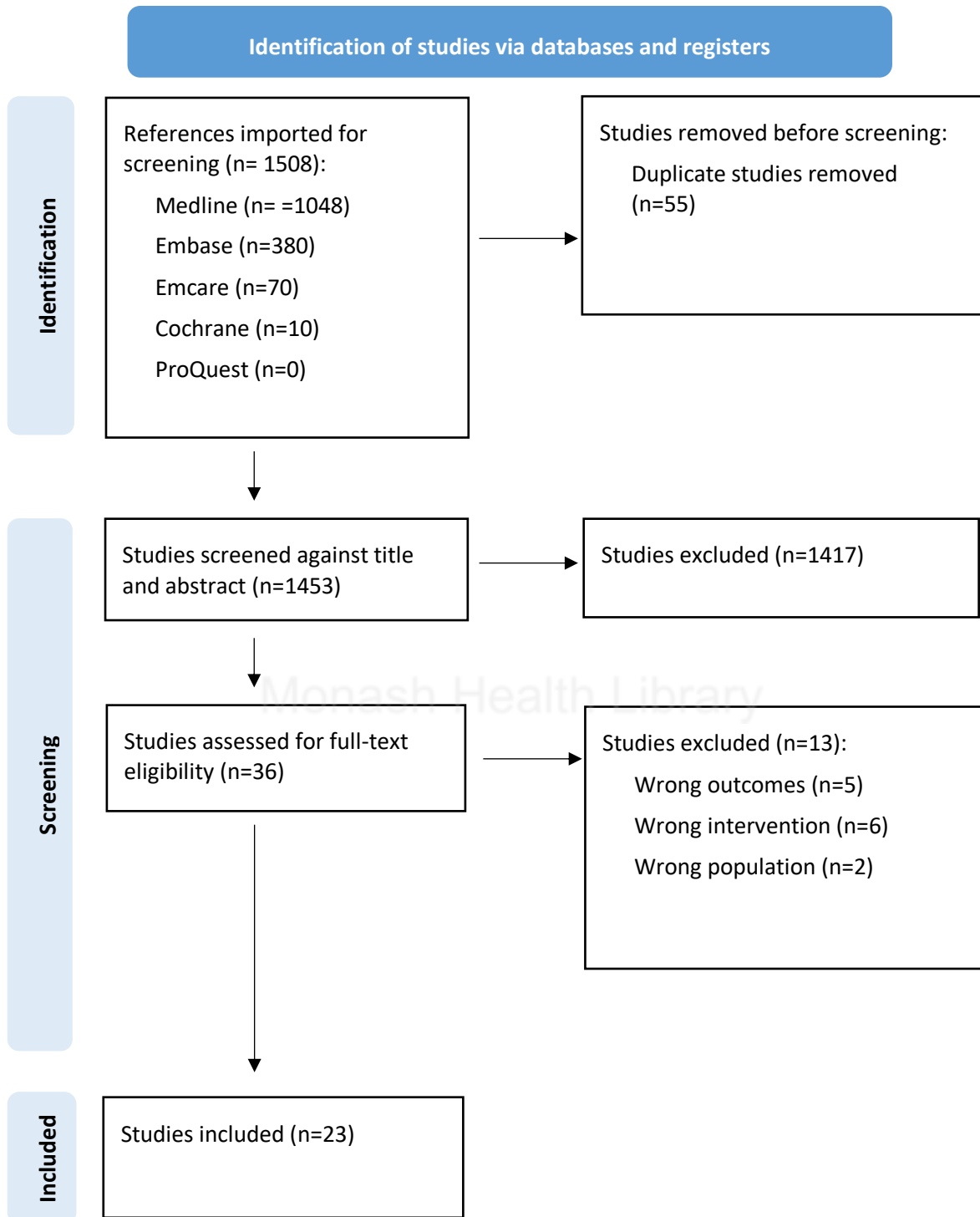
MEDLINE SEARCH STRATEGY

Ovid MEDLINE(R) ALL <1946 to December 29, 2023>

- 1 ((assess* or manage* or short* or remov* or monitor* or insert* or dislodge* or report* or document* or dress* or secure* or chang*) adj3 (surgical drain* or suction drain or vacuum drain* or fixvac or minivac or exudrain or jackson-pratt or open drain* or penrose or corrugated or yates or percutaneous drain* or pigtail or portex or t-tube)).ti. 267
- 2 Drainage/ or suction/ 59578
- 3 1 or 2 59725
- 4 (best practice or standard* or guideline* or protocol* or pathway*).ti,ab. 3903971
- 5 Practice guideline/ or clinical protocol/ or Patient Care Management/ or Clinical Protocols/ 65206
- 6 4 or 5 3930145
- 7 3 and 6 4786
- 8 limit 7 to (english language and last 5 years) 1048

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