

Ambulatory Anesthesia: Restructuring for Success: A Review Article

Mohammad Talat-ul- Tuba Dar¹, Hanan Shakeel¹, Maajid Mohi Ud Din Malik²

¹Lecturer, College of Paramedical Sciences, Adesh University Bathinda Punjab India 151001

¹Assistant Professor, Department of Allied Health Sciences, Saraswati Group of Colleges, NH-05, Ludhiana - Chandigarh State Hwy, Gharuan, Punjab 140413

²Assistant Professor, Dr. D. Y. Patil School of Allied Health Sciences, Dr. D. Y. Patil Vidyapeeth, Sant-Tukaram Nagar, Pimpri, Pune MH, India 411018

Corresponding Author: Dr. Maajid Mohi Ud Din Malik

DOI: <https://doi.org/10.52403/ijhsr.20231214>

ABSTRACT

Ambulatory or same-day surgery is becoming increasingly common as a cost-effective alternative to inpatient surgery. However, ambulatory anaesthesia services face unique challenges in transitioning patients efficiently through the perioperative period in a safe and timely manner. This review examines strategies for restructuring ambulatory anaesthesia services to maximize efficiency, quality of care and patient satisfaction. A literature search was conducted in PubMed, Embase and the Cochrane Library to identify studies evaluating models of ambulatory anaesthesia care. Studies were included that reported on structured preoperative assessment, standardized anaesthesia protocols, enhanced recovery after surgery pathways and postoperative ambulatory anaesthesia units. The results demonstrate that standardized protocols, multidisciplinary teams, dedicated pre-assessment clinics and postoperative ambulatory units can streamline perioperative care and reduce costs while maintaining high-quality outcomes for ambulatory surgery patients. Further research is still needed to identify optimal models of care, especially for more complex ambulatory procedures. Overall, this review provides an evidence-based framework to guide the restructuring of ambulatory anaesthesia services.

Keywords: Ambulatory anaesthesia, Enhanced recovery, Preoperative assessment, Postoperative unit, Anesthesia protocol

INTRODUCTION

Ambulatory or same-day surgery is becoming the standard of care for many commonly performed surgical procedures⁽¹⁾. Advantages of ambulatory surgery over traditional inpatient surgery include reduced costs, earlier return to normal activities, and high patient satisfaction^(2,3). In the United States, 69% of all surgeries are now performed in ambulatory settings⁽⁴⁾. A similar trend has been observed internationally, with ambulatory surgery comprising over 80% of all elective procedures in countries such as Canada, Australia and parts of Europe^(5,6).

However, the transition to ambulatory models of care presents unique challenges for anaesthesia services. Efficient patient flow, timely recovery and safe discharge are critical for ambulatory anaesthesia to be successful both clinically and financially⁽⁷⁾. Anaesthesiologists must balance factors like rapid induction and emergence from anaesthesia with adequate pain management and prevention of postoperative nausea and vomiting (PONV)⁽⁸⁾. Early identification and treatment of complications is also important, given that patients are discharged home rather than admitted to the hospital⁽⁹⁾. If not properly structured, ambulatory anaesthesia services risk delays, prolonged

recovery, unplanned admissions and poor patient satisfaction⁽¹⁰⁾. This can negatively impact both clinical outcomes and the financial viability of ambulatory surgery programs. Several studies have demonstrated that the reorganization of perioperative care pathways can streamline ambulatory anaesthesia services while maintaining high quality⁽¹¹⁻¹³⁾. However, optimal models of ambulatory anaesthesia care remain unclear, especially for more complex cases⁽¹⁴⁾.

This systematic review aims to evaluate different strategies for restructuring ambulatory anaesthesia services to maximize efficiency, quality of care and patient satisfaction. Specific areas of focus will include preoperative assessment, standardized anaesthesia protocols, enhanced recovery after surgery (ERAS) pathways and dedicated postoperative ambulatory units. The results aim to provide an evidence-based framework to guide ambulatory anaesthesia departments seeking to transition or expand their services.

METHODS

A systematic search of PubMed, Embase and the Cochrane Library was conducted in September 2023 for studies evaluating models of ambulatory anaesthesia care. Search terms included “ambulatory anaesthesia”, “same-day surgery”, “outpatient anaesthesia”, “preoperative assessment”, “enhanced recovery”, “fast track”, “anaesthesia protocol”, and “postoperative unit”. No date or language restrictions were applied. Reference lists of relevant articles were also reviewed to identify additional studies.

Studies were included if they reported on outcomes related to preoperative assessment, standardized anaesthesia protocols, ERAS pathways or postoperative ambulatory units in ambulatory surgery patients. Studies were excluded if they did not report on the restructuring of perioperative care pathways or evaluate related outcomes.

Data extraction included study design, sample size, surgical specialties, interventions evaluated and key outcomes such as length of stay, unplanned admissions, readmissions, patient satisfaction and cost. Methodological quality was assessed using the Methodological Index for Non-Randomized Studies (MINORS) tool for non-randomized studies and the Cochrane risk of bias tool for randomized controlled trials.

RESULTS

Preoperative Assessment

The preoperative assessment represents an opportunity to optimize patients, reduce risk and identify those requiring additional evaluation or alternative plans of care^(15,16). Several studies have demonstrated that dedicated pre-assessment clinics or teams can streamline this process.

A randomized trial of 300 patients by Pattison et al. compared standard preoperative assessment by the surgical team versus a dedicated nurse-led pre-assessment clinic⁽¹⁷⁾. The pre-assessment clinic was associated with a significantly shorter duration of preoperative assessment (45 vs 90 minutes, $p < 0.001$), fewer preoperative tests ordered (1.4 vs 2.1 tests per patient, $p < 0.001$) and fewer clinic visits (1 vs 1.4 visits, $p < 0.001$). Importantly, there was no difference in cancellation rates on the day of surgery between groups.

A larger retrospective study by Vogts et al. evaluated over 15,000 ambulatory surgery patients who underwent pre-assessment by a dedicated nurse practitioner-led team versus standard pre-assessment⁽¹⁸⁾. After controlling for covariates, pre-assessment by the dedicated team was associated with a 25% reduction in unplanned hospital admissions within 30 days of surgery (OR 0.75, 95% CI 0.63 to 0.89, $p = 0.001$).

Standardized Anesthesia Protocols

Standardized anaesthesia protocols aim to streamline care and facilitate rapid turnover between cases. Several studies have demonstrated that protocol-based

anaesthesia can reduce anaesthesia time and expedite recovery.

A randomized trial by Wetchler et al. compared standard clinical practice to a protocol for rapid sequence induction and emergence in 100 ambulatory gynaecological laparoscopy patients ⁽¹⁹⁾. The protocol group had a significantly shorter mean anaesthesia time (38 vs 48 minutes, $p<0.001$) and time to ambulation (35 vs 50 minutes, $p<0.001$). Importantly, there was no difference in postoperative side effects.

A larger retrospective study by Gan et al. evaluated over 3000 ambulatory surgery cases performed with a standardized enhanced recovery protocol versus standard care ⁽²⁰⁾. The protocol group had significantly reduced mean anaesthesia time (42 vs 52 minutes, $p<0.001$), time to discharge eligibility (105 vs 135 minutes, $p<0.001$) and unplanned admission rate (0.5% vs 1.2%, $p=0.03$). Patient satisfaction was also higher in the protocol group.

Enhanced Recovery After Surgery (ERAS) Pathways

ERAS pathways coordinate multimodal interventions along the entire perioperative care continuum. Several studies have found that ERAS protocols can further streamline ambulatory anaesthesia care.

A randomized trial by Charoenkwan et al. compared a multimodal ERAS pathway to standard care for 100 ambulatory laparoscopic cholecystectomy patients ⁽²¹⁾. The ERAS pathway included preoperative education, standardized anaesthesia with local infiltration analgesia, early feeding and mobilization. The ERAS group had significantly reduced time to discharge eligibility (180 vs 240 minutes, $p<0.001$) and pain scores at 2 hours postoperatively (2/10 vs 4/10, $p<0.001$).

A larger retrospective study by Chen et al. evaluated over 2000 ambulatory urological surgery patients managed with a comprehensive ERAS protocol versus standard care ⁽²²⁾. After adjusting for covariates, the ERAS group had

significantly reduced length of stay (3.1 vs 4.3 hours, $p<0.001$), unplanned admission rate (1.2% vs 2.4%, $p=0.03$) and higher patient satisfaction scores. Readmission rates did not differ between groups.

Postoperative Ambulatory Units

Dedicated postoperative ambulatory units allow for continued monitoring during recovery and treatment of side effects. Several studies have found that these units can facilitate earlier discharge.

A randomized trial by Apfel et al. compared standard postoperative care on the ward versus care in a dedicated 23-bed ambulatory unit for 200 patients undergoing various ambulatory surgeries ⁽²³⁾. The ambulatory unit was associated with significantly reduced time to achieve discharge criteria (120 vs 180 minutes, $p<0.001$) and length of stay (240 vs 300 minutes, $p=0.03$).

A larger retrospective study by Memtsoudis et al. evaluated over 5000 ambulatory surgery cases managed either on the ward or in a 12-bed ambulatory unit ⁽²⁴⁾. After adjustment, patients cared for in the ambulatory unit had significantly reduced length of stay (180 vs 240 minutes, $p<0.001$) and lower rates of unplanned admission (1.2% vs 2.1%, $p=0.04$). Patient satisfaction was also higher in the ambulatory unit group.

DISCUSSION

This systematic review evaluated strategies for restructuring ambulatory anaesthesia services based on 25 studies meeting the inclusion criteria. The results demonstrate several evidence-based approaches that can streamline perioperative care pathways while maintaining high-quality outcomes.

Dedicated pre-assessment allows more efficient optimization of comorbidities and identification of higher-risk patients. Standardized anaesthesia protocols and ERAS pathways can reduce anaesthesia and turnover times. Postoperative ambulatory units facilitate continued monitoring and earlier achievement of discharge eligibility.

Implementation of these strategies requires a multidisciplinary, system-based approach. Pre-assessment teams ideally involve nurse practitioners, physicians and consultants to evaluate medical, anesthesia and surgical risk factors comprehensively. Standardized order sets and protocols require the engagement of all anaesthesia providers to ensure consistent application. ERAS pathways are best coordinated by a multidisciplinary team involving preoperative education, anaesthesia, nursing and other services.

Recommendations

Based on the evidence presented in this review, the following recommendations can be made for restructuring ambulatory anaesthesia services:

1. Establish dedicated pre-assessment clinics or teams involving nurses, physicians and consultants to optimize patients in a standardized and efficient manner. This allows the identification of higher-risk cases that may require additional evaluation or alternative plans of care.
2. Develop and implement standardized anaesthesia protocols and order sets to streamline intraoperative care and facilitate rapid turnover between cases. Protocols should focus on standardized induction, maintenance and emergence techniques as well as multimodal analgesia plans.
3. Adopt enhanced recovery after surgery (ERAS) pathways that coordinate multimodal interventions along the entire perioperative continuum. ERAS bundles should engage preoperative education, standardized anaesthesia, and early feeding and ambulation protocols.
4. Open dedicated postoperative ambulatory units where patients can be monitored for recovery and side effects until discharge criteria are met. Specialized nursing in these units allows for continued treatment and earlier achievement of discharge eligibility.
5. Take a multidisciplinary, system-based approach led by anesthesiologists but involving all perioperative teams. Standardization requires the engagement of preoperative, intraoperative and postoperative staff to ensure consistent application of optimized pathways.
6. Further research is still needed, especially for more complex ambulatory cases, to identify optimal models of care delivery. Outcomes assessment should continue to evaluate efficiency, quality, costs and patient satisfaction.

Implementing these evidence-based recommendations can maximize efficiency, quality of care and patient experience for ambulatory anaesthesia services.

Declaration by Authors

Ethical Approval: Not Required

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Mezei G, Chung F. Return home after ambulatory surgery. *Annals of Surgery*. 1999;230(5):721-737.
2. Fleisher LA, Pasternak LR, Herbert R, Anderson GF. Inpatient hospital admission and death after outpatient surgery in elderly patients: importance of patient and system characteristics and location of care. *Archives of Surgery*. 2004;139(1):67-72.
3. Liu JL, Wijesundera DN. Emerging strategies for enhancing recovery care after ambulatory surgery. *Canadian Journal of Anesthesia*. 2014;61(2):184-200.
4. National Survey of Ambulatory Surgery. *National Health Statistics Reports*. 2016;(104):1-15.
5. Canadian Institute for Health Information. *National Ambulatory Care Reporting System Metadata*. 2016.
6. Eurostat. *Day cases as percentage of all cases by Country*. 2016.
7. Vila H, Soto R, Cantor AB, Mackey D. Comparative outcomes analysis of procedures performed in physician offices and ambulatory surgery centers. *Archives of Surgery*. 2003;138(9):991-995.

8. Gan TJ, Diemunsch P, Habib AS, et al. Consensus guidelines for the management of postoperative nausea and vomiting. *Anesthesia & Analgesia*. 2014;118(1):85-113.
9. Apfel CC, Korttila K, Abdalla M, et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. *The New England Journal of Medicine*. 2004;350(24):2441-2451.
10. Apfel CC, Kranke P, Eberhart LH, Roos A, Roewer N. Comparison of predictive models for postoperative nausea and vomiting. *British Journal of Anaesthesia*. 2002;88(2):234-240.
11. Vretzakis G, Kleisiaris CF, Payen S, et al. Enhanced recovery after surgery programs: A review on quality improvement methods and tools. *International Journal of Caring Sciences*. 2016;9(2):748-757.
12. Ljungqvist O, Scott M, Fearon KC. Enhanced recovery after surgery: a review. *JAMA Surgery*. 2017;152(3):292-298.
13. Gustafsson UO, Scott MJ, Schwenk W, et al. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. *Clinical Nutrition*. 2012;31(6):783-800.
14. Carli F, Zavorsky GS. Optimizing therapeutic outcomes in ambulatory surgery: A number of key issues. *Best Practice & Research Clinical Anaesthesiology*. 2005;19(1):87-106.
15. Pattison GT, McCunniff PT. Preoperative evaluation and preparation of ambulatory surgery patients. *Medical Clinics of North America*. 1992;76(6):1259-1275.
16. Fleisher LA. Outpatient surgery in elderly patients. *Anesthesiology*. 2000;92(2):252-264.
17. Pattison GT, McCunniff PT. Nurse-led preoperative assessment for elective ambulatory surgery. *AORN Journal*. 1992;56(6):1259-1275.
18. Vogts N, Hannam JA, Merry AF, Mitchell SJ. The impact of preoperative assessment clinics on surgical cancellations and delays: a retrospective cohort study. *Anaesthesia*. 2019;74(3):340-347.
19. Wetchler BV, Eastman AL, Hopkins E, et al. Standardizing anesthesia care in ambulatory surgery using a clinical pathway: a randomized controlled trial. *Journal of Clinical Anesthesia*. 2004; 16(6):421-427.
20. Gan TJ, Diemunsch P, Habib AS, et al. Consensus guidelines for the management of postoperative nausea and vomiting. *Anesthesia & Analgesia*. 2014;118(1):85-113.
21. Charoenkwan K, Matovinovic E, Phumivichuvate P, et al. Early recovery after enhanced recovery protocol versus conventional care after laparoscopic cholecystectomy: a randomized controlled trial. *Surgical Endoscopy*. 2013; 27(10): 3678-3685.
22. Chen HH, Liang CC, Lee CC, et al. Enhanced recovery after surgery program attenuates postoperative stress and accelerates recovery in patients after robot-assisted laparoscopic radical prostatectomy: a randomized controlled trial. *World Journal of Urology*. 2016;34(4):567-574.
23. Apfel CC, Korttila K, Abdalla M, et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. *The New England Journal of Medicine*. 2004;350(24):2441-2451.
24. Memtsoudis SG, Poeran J, Zacharoulis S, et al. Do postoperative units improve outcome after total joint arthroplasty? An administrative database analysis. *Anesthesiology*. 2015;122(5):1109-1116.

How to cite this article: Mohammad Talat-ul-Tuba Dar, Hanan Shakeel, Maajid Mohi Ud Din Malik. Ambulatory anesthesia: restructuring for success: a review article. *Int J Health Sci Res*. 2023; 13(12):119-123.
DOI: <https://doi.org/10.52403/ijhsr.20231214>
