

CADTH RAPID RESPONSE REPORT: REFERENCE LIST

Sugammadex for the Recovery of Neuromuscular Blockade in Adult Patients: Clinical Effectiveness and Cost-Effectiveness – A 2020 Update

Service Line:	Rapid Response Service
Version:	1.0
Publication Date:	April 20, 2020
Report Length:	8 Pages

Authors: Deba Hafizi, Suzanne McCormack

Cite As: Sugammadex for the Recovery of Neuromuscular Blockade in Adult Patients: Clinical Effectiveness and Cost-Effectiveness – A 2020 Update. Ottawa: CADTH; 2020 Apr. (CADTH rapid response report: reference list).

Disclaimer: The information in this document is intended to help Canadian health care decision-makers, health care professionals, health systems leaders, and policy-makers make well-informed decisions and thereby improve the quality of health care services. While patients and others may access this document, the document is made available for informational purposes only and no representations or warranties are made with respect to its fitness for any particular purpose. The information in this document should not be used as a substitute for professional medical advice or as a substitute for the application of clinical judgment in respect of the care of a particular patient or other professional judgment in any decision-making process. The Canadian Agency for Drugs and Technologies in Health (CADTH) does not endorse any information, drugs, therapies, treatments, products, processes, or services.

While care has been taken to ensure that the information prepared by CADTH in this document is accurate, complete, and up-to-date as at the applicable date the material was first published by CADTH, CADTH does not make any guarantees to that effect. CADTH does not guarantee and is not responsible for the quality, currency, propriety, accuracy, or reasonableness of any statements, information, or conclusions contained in any third-party materials used in preparing this document. The views and opinions of third parties published in this document do not necessarily state or reflect those of CADTH.

CADTH is not responsible for any errors, omissions, injury, loss, or damage arising from or relating to the use (or misuse) of any information, statements, or conclusions contained in or implied by the contents of this document or any of the source materials.

This document may contain links to third-party websites. CADTH does not have control over the content of such sites. Use of third-party sites is governed by the third-party website owners' own terms and conditions set out for such sites. CADTH does not make any guarantee with respect to any information contained on such third-party sites and CADTH is not responsible for any injury, loss, or damage suffered as a result of using such third-party sites. CADTH has no responsibility for the collection, use, and disclosure of personal information by third-party sites.

Subject to the aforementioned limitations, the views expressed herein do not necessarily reflect the views of Health Canada, Canada's provincial or territorial governments, other CADTH funders, or any third-party supplier of information.

This document is prepared and intended for use in the context of the Canadian health care system. The use of this document outside of Canada is done so at the user's own risk.

This disclaimer and any questions or matters of any nature arising from or relating to the content or use (or misuse) of this document will be governed by and interpreted in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein, and all proceedings shall be subject to the exclusive jurisdiction of the courts of the Province of Ontario, Canada.

The copyright and other intellectual property rights in this document are owned by CADTH and its licensors. These rights are protected by the Canadian *Copyright Act* and other national and international laws and agreements. Users are permitted to make copies of this document for non-commercial purposes only, provided it is not modified when reproduced and appropriate credit is given to CADTH and its licensors.

About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

Funding: CADTH receives funding from Canada's federal, provincial, and territorial governments, with the exception of Quebec.

Questions or requests for information about this report can be directed to requests@cadth.ca

Research Questions

1. What is the clinical effectiveness regarding the use of sugammadex for the recovery of neuromuscular blockade in adult patients?
2. What is the cost-effectiveness regarding the use of sugammadex for the recovery of neuromuscular blockade in adult patients?

Key Findings

Three randomized controlled trials and four non-randomized studies were identified regarding the use of sugammadex for the recovery of neuromuscular blockade in adult patients. Additionally, no relevant economic evaluations were identified regarding the cost-effectiveness of using sugammadex for the recovery of neuromuscular blockade in adult patients.

Methods

This report updates a literature search of a previous CADTH report. For the current report, a limited literature search was conducted by an information specialist on key resources including PubMed, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concept was sugammadex. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2019 and April 9, 2020. Duplicates from the original search⁸ were removed prior to screening. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Adult patients recovering from neuromuscular blockade (i.e., reversing the effects of the neuromuscular blockade)
Intervention	Sugammadex
Comparator	Neostigmine with or without atropine; Neostigmine with or without glycopyrrolate; No treatment (spontaneous recovery)
Outcomes	Q1: Clinical effectiveness (e.g., recovery time, time to extubation, post-operative residual paralysis); safety (e.g., renal function, bleeding); benefits/harms (e.g., pulmonary complications, re-intubation) Q2: Cost-effectiveness
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, economic evaluations

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, and systematic reviews are presented first and are followed by randomized controlled trials, non-randomized studies, and economic evaluations.

Three randomized controlled trials¹⁻³, and four non-randomized studies⁴⁻⁷ were identified regarding the use of sugammadex for the recovery of neuromuscular blockade in adult patients. No relevant health technology assessments, systematic reviews, or economic evaluations were identified.

Additional references of potential interest are provided in the appendix.

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

1. Lee YJ, Oh AY, Koo BW, et al. Postoperative residual neuromuscular blockade after reversal based on a qualitative peripheral nerve stimulator response: A randomised controlled trial. *Eur J Anaesthesiol.* 2020 Mar;37(3):196-202.
[PubMed: PM31977627](#)
2. Togioka BM, Yanez D, Aziz MF, Higgins JR, Tekkali P, Treggiari MM. Randomised controlled trial of sugammadex or neostigmine for reversal of neuromuscular block on the incidence of pulmonary complications in older adults undergoing prolonged surgery. *Br J Anaesth.* 2020 Mar 2.
[PubMed: PM32139135](#)
3. Alday E, Muñoz M, Planas A, Mata E, Alvarez C. Effects of neuromuscular block reversal with sugammadex versus neostigmine on postoperative respiratory outcomes

after major abdominal surgery: a randomized-controlled trial. *Can J Anaesth*. 2019 Nov;66(11):1328-1337.

[PubMed: PM31165457](#)

Non-Randomized Studies

4. Adams DR, Tollinche LE, Yeoh CB, et al. Short-term safety and effectiveness of sugammadex for surgical patients with end-stage renal disease: a two-centre retrospective study. *Anaesthesia*. 2020 Mar;75(3):348-352.
[PubMed: PM31721151](#)
5. Mouri H, Jo T, Matsui H, Fushimi K, Yasunaga H. Effect of Sugammadex on Postoperative Myasthenic Crisis in Myasthenia Gravis Patients: Propensity Score Analysis of a Japanese Nationwide Database. *Anesth Analg*. 2020 Feb;130(2):367-373.
[PubMed: PM31124838](#)
6. Oh TK, Ryu JH, Nam S, Oh AY. Association of neuromuscular reversal by sugammadex and neostigmine with 90-day mortality after non-cardiac surgery. *BMC Anesthesiol*. 2020 Feb 20;20(1):41.
[PubMed: PM32079528](#)
7. Krause M, McWilliams SK, Bullard KJ, et al. Neostigmine Versus Sugammadex for Reversal of Neuromuscular Blockade and Effects on Reintubation for Respiratory Failure or Newly Initiated Noninvasive Ventilation: An Interrupted Time Series Design. *Anesth Analg*. 2019 Nov 5.
[PubMed: PM31702700](#)

Economic Evaluations

No literature identified.

Appendix — Further Information

Previous CADTH Reports

8. Sugammadex for the Recovery of Neuromuscular Blockade in Adult Patients: Clinical Effectiveness and Cost-Effectiveness - An Update. (*CADTH Rapid response report: reference list*). Ottawa (ON): CADTH; 2019: <https://www.cadth.ca/sugammadex-recovery-neuromuscular-blockade-adult-patients-clinical-effectiveness-and-cost>
9. Sugammadex for the Reversal of Neuromuscular Blockade in Surgical Patients: A Review of Clinical Effectiveness and Cost-Effectiveness. (*CADTH Rapid response report: summary with critical appraisal*). Ottawa (ON): CADTH; 2019: <https://www.cadth.ca/sugammadex-reversal-neuromuscular-blockade-surgical-patients-review-clinical-effectiveness-and-cost>
10. Sugammadex for the Reversal of Rocuronium-Induced Neuromuscular Blockade in Surgical Patients: A Review of Clinical Effectiveness. (*CADTH Rapid response report: summary with critical appraisal*). Ottawa (ON): CADTH; 2019: <https://www.cadth.ca/sugammadex-reversal-rocuronium-induced-neuromuscular-blockade-surgical-patients-review-clinical>
11. Sugammadex for adults undergoing surgery: clinical and cost-effectiveness and guidelines. (*CADTH Rapid response report: reference list*). Ottawa (ON): CADTH; 2016: <https://www.cadth.ca/sugammadex-adults-undergoing-surgery-clinical-and-cost-effectiveness-and-guidelines-0>

Systematic Reviews

Upcoming Studies

12. Freundlich A, Badeaux J, Adorno M. Sugammadex versus neostigmine for postoperative nausea and vomiting in adult patients undergoing laparoscopic surgery paralyzed with rocuronium bromide: a systematic review protocol. *JBIC Database System Rev Implement Rep*. 2019 Oct;17(10):2187-2192. [PubMed: PM31453838](https://pubmed.ncbi.nlm.nih.gov/31453838/)
13. Gao WL, Dai ZL. The effect of Sugammadex on postoperative nausea and vomiting: a systematic review and meta-analysis. (CRD42019120591). *PROSPERO: International prospective register of systematic reviews*. York (GB): University of York Centre for Reviews and Dissemination; 2019: https://www.crd.york.ac.uk/prospere/display_record.php?RecordID=120591&VersionID=1242499
14. Schneider A, Elia N, Tramèr M, Czarnetzki C, Barcelos GK. Efficacy and safety of sugammadex in patients with neuromuscular disease: a systematic review. (CRD42019119924). *PROSPERO: International prospective register of systematic reviews*. York (GB): University of York Centre for Reviews and Dissemination; 2019: https://www.crd.york.ac.uk/prospere/display_record.php?RecordID=119924&VersionID=1241364

Randomized Controlled Trials

Patient Age Not Specified

15. Claroni C, Covotta M, Torregiani G, et al. Recovery from Anesthesia after Robotic-Assisted Radical Cystectomy: Two Different Reversals of Neuromuscular Blockade. *J Clin Med*. 2019 Oct 24;8(11).
[PubMed: PM31653003](#)
16. Deana C, Barbariol F, D'Inca S, Pompei L, Rocca GD. SUGAMMADEX versus neostigmine after ROCURONIUM continuous infusion in patients undergoing liver transplantation. *BMC Anesthesiol*. 2020 Mar 25;20(1):70.
[PubMed: PM32213163](#)
17. Quang TL, Thu HNT, Quoc KN, et al. Neuromuscular Blockade Agents Reversal with Sugammadex Compared to Neostigmine in the Living Kidney Donors. *Open Access Maced J Med Sci*. 2019 Dec 30;7(24):4420-4425.
[PubMed: PM32215106](#)
18. Schepens T, Janssens K, Maes S, et al. Respiratory muscle activity after spontaneous, neostigmine- or sugammadex-enhanced recovery of neuromuscular blockade: a double blind prospective randomized controlled trial. *BMC Anesthesiol*. 2019 Oct 19;19(1):187.
[PubMed: PM31629404](#)

Upcoming Trials

19. Kim NY, Koh JC, Lee KY, et al. Influence of reversal of neuromuscular blockade with sugammadex or neostigmine on postoperative quality of recovery following a single bolus dose of rocuronium: A prospective, randomized, double-blinded, controlled study. *J Clin Anesth*. 2019;57:97–102. <https://pubmed.ncbi.nlm.nih.gov/30939422>

Alternative Outcome

20. Williams WH, 3rd, Cata JP, Lasala JD, Navai N, Feng L, Gottumukkala V. Effect of reversal of deep neuromuscular block with sugammadex or moderate block by neostigmine on shoulder pain in elderly patients undergoing robotic prostatectomy. *Br J Anaesth*. 2020 Feb;124(2):164-172.
[PubMed: PM31780139](#)
21. Kim D, Ahn JH, Jung H, Choi KY, Jeong JS. Effects of neuromuscular blockade reversal on bispectral index and frontal electromyogram during steady-state desflurane anesthesia: a randomized trial. *Sci Rep*. 2019 Jul 19;9(1):10486.
[PubMed: PM31324862](#)
22. Le Guen M, Roussel C, Chazot T, Dumont GA, Liu N, Fischler M. Reversal of neuromuscular blockade with sugammadex during continuous administration of anaesthetic agents: a double-blind randomised crossover study using the bispectral index. *Anaesthesia*. 2019 Dec 5.
[PubMed: PM31808151](#)

Non-Randomized Studies

Patient Age Not Specified

23. Orihara M, Takazawa T, Horiuchi T, et al. Comparison of incidence of anaphylaxis between sugammadex and neostigmine: a retrospective multicentre observational study. *Br J Anaesth*. 2020 Feb;124(2):154-163.
[PubMed: PM31791621](#)
24. Deljou A, Schroeder DR, Ballinger BA, Sprung J, Weingarten TN. Effects of Sugammadex on Time of First Postoperative Bowel Movement: A Retrospective Analysis. *Mayo Clin Proc Innov Qual Outcomes*. 2019 Sep;3(3):294-301.
[PubMed: PM31485567](#)
25. Domenech G, Kampel MA, García Guzzo ME, Novas DS, Terrasa SA, Fornari GG. Usefulness of intra-operative neuromuscular blockade monitoring and reversal agents for postoperative residual neuromuscular blockade: a retrospective observational study. *BMC Anesthesiol*. 2019 Aug 7;19(1):143.
[PubMed: PM31390986](#)
26. Oh TK, Ji E, Na HS. The effect of neuromuscular reversal agent on postoperative pain after laparoscopic gastric cancer surgery: Comparison between the neostigmine and sugammadex. *Medicine (Baltimore)*. 2019 Jun;98(26):e16142.
[PubMed: PM31261539](#)

Review Articles

27. Lu IC, Wu SH, Wu CW. Neuromuscular blockade management for intraoperative neural monitoring. *Kaohsiung J Med Sci*. 2020 Apr;36(4):230-235.
[PubMed: PM31713975](#)
28. Yuki K, Scholl R. Should we Routinely Reverse Neuromuscular Blockade with Sugammadex in Patients with a History of Heart Transplantation? *Transl Perioper Pain Med*. 2020;7(2):185-189.
[PubMed: PM32039284](#)
29. Hawkins J, Khanna S, Argalious M. Sugammadex for Reversal of Neuromuscular Blockade: Uses and Limitations. *Curr Pharm Des*. 2019;25(19):2140-2148.
[PubMed: PM31272347](#)