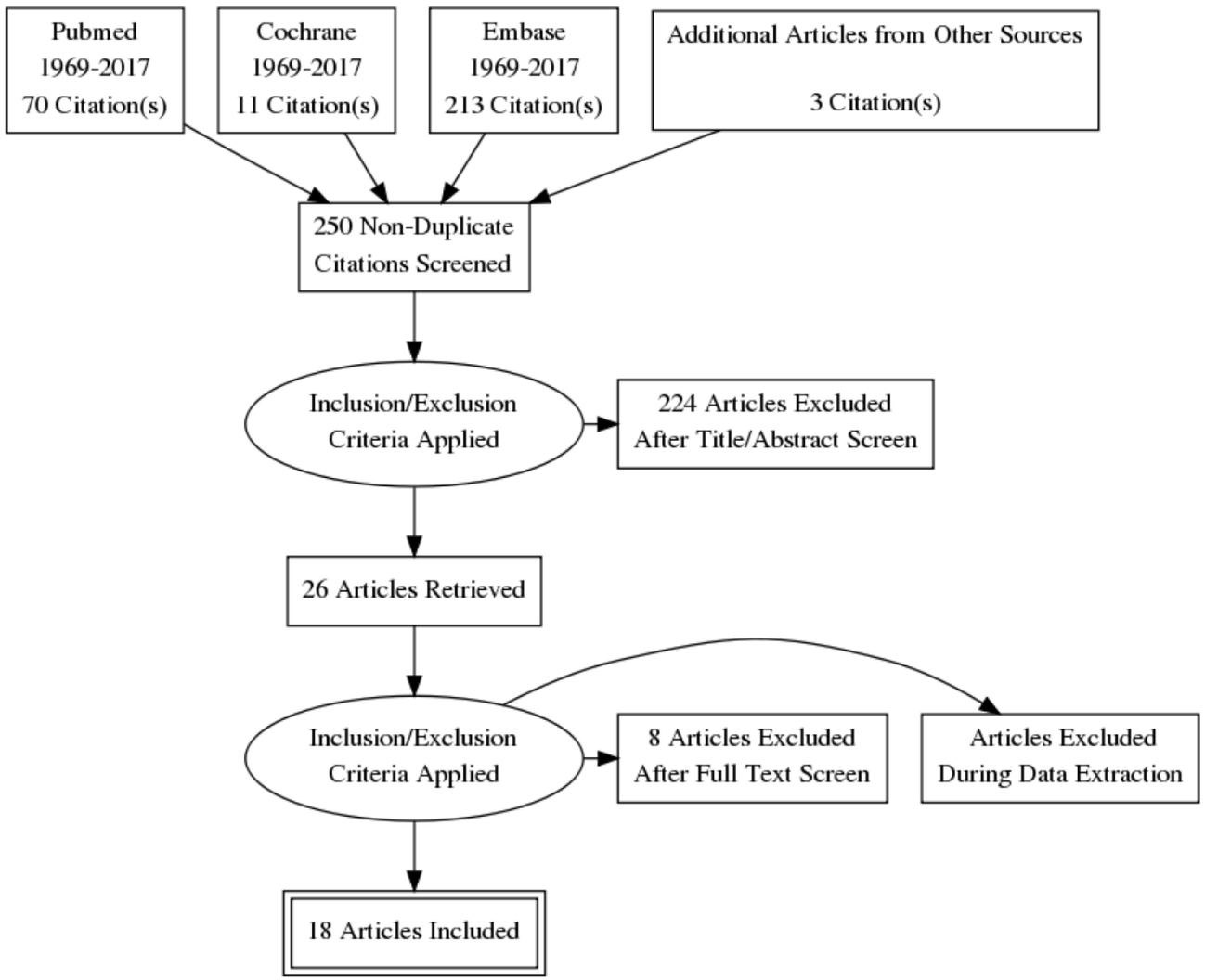
Supplemental Digital Content 5. Question 1e, (Query 5): How often is succinylcholine (sux) administered in perioperative and periprocedural settings for "airway rescue"?



Summary: Eighteen studies reported succinylcholine use in 0.02-90% of individuals requiring "airway rescue" for predominantly laryngospasm. A large US retrospective quality improvement study in a single institution examined 21,452 pediatric cases in which 21 laryngospasm episodes were reported; 38% (n=8) required succinylcholine. (Reference 2) An Australian Incident Monitoring Study examined 189 laryngospasm events; 15% (n=29) required succinylcholine. (Reference 3) Most reviewed studies demonstrated reporting bias with possible underreporting. Seven studies reported succinylcholine doses that varied significantly: 0.1mg/kg (n=2), (Reference 10), 0.25 mg/kg (n=1) (Reference 16), 0.5mg/kg (n=45) (References 8, 14), and 1 mg/kg (n=8) (References 5,13,18).

Article Identifier	**Dataset Identity**	**Findings**	**LOE**	**Bias**	**Comments**
1. Sengupta, Janmejoy, Mohua Sengupta, and Tulsi Nag. "Agents for facilitation of laryngeal mask airway insertion: A comparative study between thiopentone sodium and propofol." Annals of African medicine 13.3 (2014): 124-129.	Randomized trial	13% (4/30) of thiopentone group required sux as "rescue"	2	Sux for facilitation of LMA insertion seems extreme. Very small sample size – only 30 per group.	High % of patients needed sux to have LMA placed after thiopentone, sux given as "rescue" as defined by authors. Sux dose 25mg. All adult patients. (mean weight 57kg)
2. Burgoyne, Laura L., and Doralina L. Anghelescu. "Intervention steps for treating laryngospasm in pediatric patients." Pediatric Anesthesia 18.4 (2008): 297-302.	Retrospective QI data	38% (8/21) of patients with laryngospasm treated with sux	4	21 cases of laryngospasm in 21,452 cases. Laryngospasm seems significantly underreported	Paper was cited by SAMBA statement, where SAMBA quotes 25-50% of laryngospasm patients get sux. Dose of sux not reported
3. Visvanathan, T., et al. "Crisis management during anaesthesia: laryngospasm." Quality and safety in health care 14.3 (2005): e3-e3.	Retrospective	15% (29/189) of laryngospasm patients got sux without intubation	4	Sux use may have been underreported, as use was only reported for patients not intubated, if intubated may have also received sux	43% of patients with laryngospasm were re-intubated which seems high. No consistent dose of sux used – this was looking at cases reported to a National database (Australia).
4. Gravningsbråten, R., B. Nicklasson, and J. Raeder. "Safety of laryngeal mask airway and short-stay practice in office-based adenotonsillectomy." Acta Anaesthesiologica	Prospective collection, case series	0.9% (10/1126) patients had laryngospasm and drop of SaO_2. 90% (9/10) with larygnospasm got	4	Sux given for drop of SaO2 <90% which was assumed to be laryngospasm – no ETT no mention if conservative measures or deepening of the anesthetic	No dose of sux stated

Scandinavica 53.2 (2009): 218-222.		sux for this drop 0.8% (9/1,126) of patients overall		attempted first	
5. Ranieri D, Neubauer AG, RanieriDM, doNascimento P. "The use of disposable laryngeal mask airway for adenotonsillectomy. Rev Bras Anestesiol. 2012.Nov-Dev; 62(6):788-97	Prospective, randomized	2.5% (5/204) patients had laryngospasm, treated with 1mg/kg sux	2	Laryngospasm defined as paradoxical breathing without actual ventilation, rapid reduction in SpO_2. Treatment 100% $O_{2,}$, airway pressurization, 0.04mg/kg atropine, 1mg/kg sux	Best description of laryngospasm and treatment given. 1mg/kg sux
6. Annigeri, Rashmi, et al. "A retrospective analysis on anesthetic management during rigid bronchoscopy in children with foreign body aspiration: Propofol and sevoflurane with controlled ventilation." Anesth Essays Res. 2017 Oct-Dec; 11(4): 871–874	Retrospective review	All patient received 1mg/kg sux for intubation. Repeat dose 0.5mg/kg required during procedure. 2 patients received 3 additional doses. 45 received 2 additional doses of sux. (only 50 children total in study – so all children got extra sux) only 4% (2/50) children had "laryngospasm"	4	All children got additional doses of sux for the procedure. But only 2/50 had "laryngospasm" so it is unclear why the other children got more sux.	1mg/kg initial dose of sux, then 0.5mg/kg for additional doses as needed
7. Orestes MI, et al. "Incidence of laryngospasm and bronchospasm in pediatric adenotonsillectomy." Laryngoscope. 2012.Feb;122(2):425-8.	Chart review	11/682 children (1.6%) had laryngospasm. 4/11 with laryngospasm got sux (no dose listed) 0.6% (4/682) received	4	Chart review. So possible incidence of laryngospasm was higher.	No dose of sux reported

		sux for laryngospasm.			
8. Roshi, R. et al. “Gentle chest compression relieves extubation laryngospasm in children.” Journal of anesthesia. Dec 2010; 24(6): 854-7	Prospective non randomized	1,226 children, 98 children with laryngospasm, 44 with succinylcholine (0.5mg/kg) 3.6% (44/1,226) of total patients received sux	3	Not randomized, difficult to blind the assessors as it would be obvious that chest compressions were happening	0.5mg/kg succinylcholine dose
9. Afshan, G. et al. “Is there a role of a small dose of propofol in the treatment of laryngeal spasm?” Paediatr Anaesth. 2002. Sep;12(7):625-8.	Prospective	Laryngospasm in 20/752 children, 3/20 treated with sux after positive pressure ventilation and propofol failed to relieve laryngospasm. 0.4% (3/752) sux for laryngospasm	3	Study was meant to look at propofol use in breaking laryngospasm	No dose of sux reported
10. Chung, DC. “A very small dose of suxamethonium relieves laryngospasm.” Anaesthesia. 1993 Mar;48(3);229-30.	Case series	2 patients, three episodes of visualized laryngospasm that were treated with 0.1mg/kg of sux. Spontaneous ventilation maintained.	4	Significant reporting bias with only 2 patients and 3 laryngospasm events	0.1 mg/kg dose of sux for 2 patients with 3 episodes of laryngospasm
11. Hung, CW, et al. “Anesthetic complications during general anesthesia without intravenous access in pediatric ophthalmologic clinic: assessment of 5216 cases.” Minerva Anestesiologica.2017. July	Retrospective chart review	3/5216 cases had laryngospasm. 0.02% (1/5216) cases got succinylcholine.	3	Retrospective review – laryngospasm may have been under reported, but still only 1 got sux. No dose given.	No dose of sux reported

83(7):712-9		Only 512 patients – repeated exams			
12. Drake-Brockman, Thomas. Et al. "The effect of endotracheal tubes versus laryngeal mask airways on perioperative respiratory adverse events in infants: a randomized controlled trial." The Lancet. 2017. Volume 389. Issue 10070. 701-8.	Prospective randomized trial	65/181 infants had airway event. 0.6% (2/181) required succinylcholine.	2	Randomized to LMA or ETT, but then placement could not be blinded. Laryngospasm could have been underreported.	No dose of sux reported
13. Savran-Karadeniz, Meltem et al. "Does magnesium sulfate affect the incidence of respiratory complications in children undergoing esophageal dilation? An observational pilot study."Signa Vitae 2016; 12(1):91-95	Prospective pilot study	13/60 patients had laryngospasm. 3.3% (2/60) got succinylcholine	3	? randomized? Anesthesiologists caring for patients were blinded to treatment. But doesn't say that the patients were randomly assigned.	1mg/kg succinylcholine
14. Khatiwada, S. et al. Adverse Events in Children Receiving General anaesthesia with laryngeal Mask Airway Insertion. J Nepal Med Assoc. 2015;53(198):77-82	Prospective study	11/242 children had laryngospasm. 0.4% (1/242) required succinylcholine in a dose of 0.5mg/kg to break spasm.	3	All children had LMA, not changing or comparing treatment groups, just monitoring all complications of LMA anesthesia.	0.5mg/kg succinylcholine
15. Lalwani, Kirk. Et al. "The laryngeal mask airway for pediatric adenotonsillectoy: Predictors of failure and complications." Internat Journal of Pediatric Otorhinolaryngology. 2013 77(1) 25-28	Retrospective chart review	24/124 had laryngospasm, 9.7% (12/124) required succinylcholine to break spasm.	4	Retrospective and self report, laryngospasm may have been underreported, but all sux administration should be recorded.	No dose of sux reported

16. Sheta, Saad. Et al. “Evaluation of “no touch” extubation technique on airway-related complications during emergence from general anesthesia.” Saudi Journal of Anesthesia. 2011.5 125-131	Randomized prospective study	3/60 with laryngospasm. 1.7% (1/60) treated with sux. at a dose of 0.25mg/kg	3	Small study.	0.25mg/kg sux
17. Bhananker, Sanjay. Et al. “Anesthesia-Related Cardiac Arrest in Children: Update from the Pediatric Perioperative Cardiac Arrest Registry.”2007.105(2). 344-50	Retrospective review of registry data	11 cases of laryngospasm out of 397 reports of cardiac arrest. 6 got sux (4 IV, 2 IM) 1.5% (6/397) received sux during cardiac arrest presumed secondary to laryngospasm	4	Reporting bias – this registry depends on institutions reporting cases. Also only cases of “arrest” were reported. Mild laryngospasm or sux administration could easily be underreported	No dose of sux reported
18. Batra, Yatindra Kumar. Et al. “The efficacy of a subhypnotic dose of propofol in preventing laryngospasm following tonsillectomy and adenoidectomy in children” Pediatric Anesthesia. 2005. 15(12). 1094-1097	Prospective randomized study	16/160 cases of laryngospasm. 1 got sux for treatment in a dose of 1mg/kg. Less laryngospasm reported in propofol group 0.6% (1/160) required sux for laryngospasm	2	Study designed to look at laryngospasm and effect of small (0.5mg/kg) propofol dose. Less laryngospasm seen in propofol group	1mg/kg sux