**Supplemental Digital Content 4: Question 1d, (Query 4). What is the succinylcholine administration rate in medical/oral surgical/dental offices that sedate or anesthetize patients?**

Studies included in qualitative synthesis  
(n = 1)

Records remaining after non-human, non-English abstracts, and duplicates removed (n= 25)

(n = )

Additional records identified through other sources (OVID, Cochrane, Google, West Law) (n=24)

Records identified through PubMed database searching  
(n = 1)

## Included

## Eligibility

## Screening

## Identification

Full-text articles assessed for eligibility  
(n =25)

Full-text articles excluded no data on sux use frequency

(n=24)

(n = 28)

**Summary:** There are regulatory mandates for succinylcholine (**sux**) availability, and, in some cases, dantrolene is also mandated. However, literature search revealed only one unblinded, prospective study that provided succinylcholine use rates in an office-based environment. This single site study of healthy pediatric patients anesthetized by a dedicated anesthetic team with a total iv anesthetic and managed by laryngeal mask airway for adenotonsillectomy measured laryngospasm treatment with succinylcholine. Over a 5-year period, 10/1,126 patients experienced a decrease in SpO2 to <90%due to laryngospasm and 9/1,126 (0.8%) required sux. No patient developed malignant hyperthermia (**MH**). **16**

Databases that were searched included OVID, PubMed, EMBASE, Google, and West Law. West Law is a legal database. Reference numbers one, three, five, six, thirteen, and 15 were obtained from Google. References number four and seven were found in Ovid. The remainder were found on West Law. Additional searches revealed the following: PubMed: 0 matches, EMBASE: 7 matches. Cochrane Library of Databases: 0 matches.

One of the first reports of the routine use of sux in an office-based practice was a case report in the Journal of the American Dental Society of Anesthesiology in 1959. It described a technique of continuous “drip” of a 0.1% solution of sux for muscle relaxation in addition to inhalation of nitrous oxide 75% with oxygen 25%, meperidine, and thiopental. After intravenous access is obtained, either scopolamine or atropine 0.4mg is injected followed by meperidine and thiopental. The succinylcholine infusion is started and the endotracheal tube is inserted. The sux infusion is adjusted to obtain the optimal relaxation to proceed for the dental or oral surgery procedure. **1** This article appeared before the first publication describing MH and significantly before office-based surgery or anesthesia regulations were instituted.

Since then and despite the significant office-based anesthesia and surgery regulations, the literature is silent on the adverse effects of the use of sux in the office-based environment. Mandates to its availability are only sporadically mentioned including state regulatory issues and specialty organizations. Numerous searches were made including OVID, Google Scholar, and West Law. West Law is a database for regulatory issues and is used routinely by attorneys for current case law with the ability to refer to existing, new, or pending state action.

From the American Society of Anesthesiology publication on office based anesthesia in 2008 (2nd and latest edition), sux was only mentioned in reference to MH in a PDF of an MH Poster. **2** The American Association of Oral and Maxillofacial Surgeons (**AAOMS**) in their latest (2012) Office Anesthesia Evaluation Manual mentions sux is an available medication. **3** It also requires the availability of dantrolene if triggering agents are maintained on site per MHAUS recommendations. **3,4**

The American Association for Accreditation of Ambulatory Surgical Facilities (**AAAASF**) frequently accredits office-based plastic surgery and similar practices. AAAASF fails to mention sux in one of their manuals. **5** The AAAASF’s Surgical Standards and Checklist Version 14.5 specifically addresses the topic by stating the following: “**500.023.005** If the depolarizing muscle relaxant succinylcholine is present only for use in emergency airway rescue, the facility must document a protocol to manage the possibility of malignant hyperthermia (MH) following its use.” The organization specifically mandates that the facility’s medical director send a written request for the use of sux without the availability of dantrolene along with their written protocol. The implied intent is to obviate the need for dantrolene just because a triggering agent is present for emergencies only. **6**

The Society for Ambulatory Anesthesia in conjunction with the Committee on Ambulatory Surgical Care of the American Society of Anesthesiologists recently published their concerns of the frequency of the a malignant hyperthermia episode vs an episode of laryngospasm. Their analysis is that the use of sux to break laryngospasm is more likely to occur without the risk of MH after one of these events. Consequently dantrolene is not required to be omnipresent. On the other hand, the authors recommended that known MH susceptible patients have their procedures performed in facilities that only have dantrolene. Additionally, they should have the capability to rapidly transfer patients to a facility that can rapidly assist the care of patient with a MH. **7** This policy matches the policy of the AAAASF.

State regulations in a number of jurisdictions have specifically mentioned the availability of sux including Connecticut, Florida, Massachusetts, Minnesota, Missouri, New Jersey, South Dakota, and Tennessee in their regulatory procedures. However, dantrolene is not necessarily mentioned except in Florida (detailed in dantrolene quantity,) Massachusetts (dantrolene availability but not quantity,) and Tennessee (dantrolene availability and quantity. As an example, the Florida Codes are quite detailed and are quoted here. **8 9 10 11 12 13 14 15**

“*Florida Administrative Code r. 64B5-14.008* Requirements for General Anesthesia or Deep Sedation: Operatory, Recovery Room, Equipment, Medicinal Drugs, Emergency Protocols, Records, and Continuous Monitoring: General Anesthesia Permit applicants and permit holders shall comply with the following requirements at each location where anesthesia procedures are performed. The requirements shall be met and equipment permanently maintained and available at each location. (5) Medicinal Drugs: The following drugs or type of drugs with a current shelf life must be maintained and easily accessible from the operatory and recovery room: (n) A muscle relaxant (e.g. Succinylcholine); *Florida Administrative Code r. 64B5-14.009,* 64B5-14.009 Conscious Sedation Requirements: Operatory, Recovery Room, Equipment, Medicinal Drugs, Emergency Protocols, Records, and Continuous Monitoring. (5) Medicinal Drugs: The following drugs or type of drugs with a current shelf life must be maintained and easily accessible from the operatory and recovery room: (n) A muscle relaxant (e.g. Succinylcholine); *Florida Administrative Code r. 64B5-14.010: 64B5-14.010*. Pediatric Conscious Sedation Requirements: Operatory; Recovery Room, Equipment, Medicinal Drugs, Emergency Protocols, Records, and Continuous Monitoring. (5) Medicinal Drugs: The following drugs or type of drugs with a current shelf life must be maintained and easily accessible from the operatory and recovery room: (n) A muscle relaxant (e.g., Succinylcholine); *Florida Administrative Code r. 64B8-9.009. 64B8-9.009* Standard of Care for Office Surgery. (b) Standards for Level III Office Surgery. In addition to the standards for Level II Office Surgery, the surgeon must comply with the following: 3. Equipment and Supplies Required. a. Equipment and Medication, including at least 720 mg of dantrolene on site (if halogenated anesthetics or succinylcholine are utilized), and monitored post-anesthetic recovery must be available in the office. *Florida Administrative Code. r. 64B15-14.007. 64B15-14.007*. Standard of Care for Office Surgery. (b) Standards for Level III Office Surgery. In addition to the standards for Level II Office Surgery, the surgeon must comply with the following: 3. Equipment and Supplies Required. a. Equipment and medication, including at least 720 mg of dantrolene on site, (if halogenated anesthetics or succinylcholine are utilized) and monitored post-anesthesia recovery must be available in the office.

The use of sux in the office-based environment was restricted to emergency use only in the one publication that used it and without adverse outcome. This particular publication was concerned with the use of a laryngeal mask airway for adenotonsillectomy in the office-based environment. Of the 1126 patients below the age of 16, only 10 required the use of sux to break laryngospasm and without adverse events with respect to malignant hyperthermia. **16** Another publication describes a similar technique for oral and maxillofacial surgery without the need for sux and consequently no need for dantrolene availability. **17**

In summary, there are regulatory mandates for the availability of sux. In some cases, dantrolene is also required. However, based upon an extensive search, there is little available in the literature. Databases that were searched included OVID, PubMed, EMBASE, Google, and West Law. West Law is a legal data base. Reference numbers one, three, five, six, thirteen, and fifteen were obtained from Google. Reference number four and seven were found in Ovid. The remainder were found on West Law. Additional searches revealed the following: PubMed: 0 matches, EMBASE: 7 matches. Cochrane Library of Databases: 0 matches.

The search from EMBASE revealed similar mandates or highly suggested availability of sux for rescue/laryngospasm. They also inferred that its avoidance by using other means to break laryngospasm would reduce the likely need for MH is the patient triggered. **18 19 20 21**  In the last reference, the availability of sux for treatment of laryngospasm and the American Association of Oral and Maxillofacial Surgeons’ requirement that dantrolene be available per MHAUS is strongly questioned. **22**

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