

Anesthesiologist Electronic Documentation Patterns Before and After Implementation of a Sophisticated Computerized Physician Order Entry (CPOE) Configuration

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May 21st, 2018

Abstract 22
IRB Approved

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Disclosure

- Madison Murphy
- Potential conflicts of interest: None
- Sponsorship: None
- Proprietary information of research may be subject to different interpretations
- Speaker's presentation is educational in nature and speaker agrees to abide by the non-commercialism guidelines provided

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Learning Objectives

- To identify the FDA-labeled medications used in the reversal of non-depolarizing neuromuscular blockade after surgery
- To advocate for the implementation of an advanced computerized order entry strategy to improve compliance with approved usage criteria, medication charting, and/or documentation of usage rationale

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Background

- Sugammadex is FDA-labeled for reversal of neuromuscular blockade in surgery
- Limited utilization of sugammadex was undertaken prior to formulary addition
 - Sugammadex Pilot from 12/1/16 to 5/1/17
 - Pilot resulted in recommendations for fixed-dosing and specific criteria for use

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Background

- Added to formulary with specific restrictions
 - Reversal of recurrence of paralysis after neostigmine and glycopyrrolate post operatively
 - Reversal of profound neuromuscular blockade following short case or aborted case
 - Reversal in patient at high risk for experiencing resistance to neostigmine reversal

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Neuromuscular Blockade (NMB)

- Clinical use of neuromuscular blockade:
 - Facilitate endotracheal intubation
 - Use may reduce incidence of post-intubation hoarseness and airway injury
 - Improve surgical conditions
 - Reduce patient movement, muscle tone, and breathing or coughing against the ventilator

Renew JR, Naguib M, Brill SJ. Clinical use of neuromuscular blocking agents in anesthesia. Post TW, ed. UpToDate. Waltham, MA: UpToDate Inc. <http://www.uptodate.com>. Accessed on March 15, 2018.

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NMB Reversal Agents

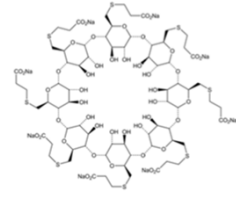
- Acetylcholinesterase inhibitors
 - Neostigmine and edrophonium
 - Limitations:
 - Indirect mechanism of reversal, undesirable autonomic responses, limited and unpredictable efficacy
 - Used in combination with anticholinergic agents
 - Glycopyrrolate or atropine
- Sugammadex

Hristovska AM. Cochrane Database Syst Rev 2017; 8:CD012763.
 Renew JR, Naguib M, Bruil SJ. Clinical use of neuromuscular blocking agents in anesthesia. Post TW, ed. UpToDate. Waltham, MA: UpToDate Inc. <http://www.uptodate.com>. Accessed on March 15, 2018.

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Sugammadex (Bridion™)

- Modified gamma cyclodextrin
- Complexes with rocuronium and vecuronium neuromuscular blockers
- Mild affinity for other steroidal compounds (e.g. hormonal contraceptives)
- Average Wholesale Price \$114 per 2 mL vial



Bridion [package insert]. Whitehouse Station, NJ: Merck & Co., Inc.; 2017.
 Sugammadex. Lexi-Drugs. LexiComp. Wolters Kluwer Health, Inc. Riverwoods, IL. Available at <http://online.lexi.com>. Accessed January 30, 2018.

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Sugammadex Cochrane Review

- Compared the efficacy and safety of sugammadex versus neostigmine
- Sugammadex 2 mg/kg: 10.22 minutes faster
- Sugammadex 4 mg/kg: 45.78 minutes faster
- Sugammadex had 40% fewer adverse events
 - Bradycardia, post-operative nausea and vomiting, overall signs of postoperative residual paralysis

Hristovska AM. Cochrane Database Syst Rev 2017; 8:CD012763.

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Computerized Physician Order Entry

- CPOE implemented to remind anesthesiologists of approved scenarios for sugammadex use
- CPOE configuration to assist with:
 - Medication charting
 - Documentation of rationale for use
 - Documentation of post-operative education of women of childbearing age

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Sugammadex Configuration

Product:	SUGAMMADEX SODIUM 200 MG/2ML IV SOLN	<input type="checkbox"/> Patient supplied	<input type="checkbox"/> doses
	<input type="checkbox"/> Self Administered		
Dr. Assoc.:	Click to associate diagnoses		
Indication:	<input type="checkbox"/> Rescue therapy <input type="checkbox"/> Surgery terminated prematurely or short case <input type="checkbox"/> Inadequate neostigmine reversal <input type="checkbox"/> Suspected anaphylaxis to rocuronium/vecuronium <input type="checkbox"/> Contraindication to neostigmine <input type="checkbox"/> Other		

Discharge Summary Notification

Instructions for After Discharge

Sugammadex Notification

MESSAGE to all female patients of child-bearing age who received sugammadex:
 You received a drug called sugammadex (Brand name Bridion) to reverse the effects of anesthesia medications used during your surgery or procedure.
 As a result, birth control pills and other hormone-based birth control (such as patches, rings, injections, or IUDs) may not work as well to prevent pregnancy.
 You are advised to use a non-hormonal form of birth control, like a condom or spermicidal jelly, as a backup for 7 days after receiving sugammadex in addition to continuing your hormone-based birth control as prescribed.

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Computerized Physician Order Entry

- Benefits of CPOE:
 - Prompts warnings on drug interactions or allergies
 - Provides accurate, current medication information
 - Reduces long-term healthcare costs
 - Effectively reduces rate of medication errors
 - Improves communication between the physicians and the pharmacists

Fact Sheet: Computerized Physician Order Entry, Leapfrog Hospital Survey.
<http://www.leapfroggroup.org/sites/default/files/Files/CPOE%20Fact%20Sheet.pdf>. Updated April 1, 2016.
 Accessed January 30, 2018.

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Computerized Physician Order Entry

- CPOE can provide feedback and suggestions to physicians when entering orders
 - Display medication costs and laboratory results
 - Display guidelines for medication use
 - Identify nonformulary medications
- One analysis found computerized guidelines increased use of recommended medication

Teich JM, Arch Intern Med. 2000; 160:2741-2747

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The Primary Objective

- Compare the differences in documentation patterns before and after CPOE configuration
- Documentation patterns to be assessed:
 - Indication for sugammadex utilization
 - Discipline of person documenting
 - Completion of sugammadex dose charting
 - Documentation of post-operative education

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INTEGRIS Baptist Medical Center

- Located in Oklahoma City, Oklahoma
- 511-bed tertiary care facility
- Approximately 250 surgeries/week scheduled



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Methods

- Recruitment involved use of automated dispensing cabinet retrieval records
- Pre-configuration: 6/15/17 to 9/15/17
- Post-configuration: 11/15/17 to 1/15/18
- Data collected for retrospective review:
 - Patient demographics, weight-based dose, procedure, admission status, anesthesia duration, indication, dose, post-operative education

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Demographics

	Pre-Configuration (N = 192)	Post-Configuration (N=156)	P-Value
Age (years) Mean ± SD	58.1 ± 16.9	57 ± 16.8	P = 0.96
Gender N (%)	Female – 113 (58.9%) Male – 79 (41.1%)	Female – 86 (55.1%) Male – 70 (44.9%)	P = 0.48
Weight (kg) Mean ± SD	91.4 ± 29.4	95.5 ± 27. 2	P = 0.18

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Sugammadex Documented

	Pre-Configuration (N = 169)	Post-Configuration (N = 138)	P-Value
Sugammadex dose (mg) Mean ± SD	190.2 ± 44.4	194.6 ± 24.8	P = 0.27
Weight-based dose (mg/kg) Mean ± SD	2.2 ± 0.7	2.2 ± 0.6	P = 0.3

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Duration of Anesthesia

	Pre-Configuration (N = 192)	Post-Configuration (N=156)	P-Value
Mean ± SD (minutes)	114 ± 65	124 ± 78	0.22
Range (minutes)	27-498	41-556	N/A

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Results

	Pre-Configuration (N = 192)	Post-Configuration (N = 156)	P-Value
Indication Documentation N (%)	0 (0)	3 (1.9)	P = 0.049
Absence of Dose Documentation N (%)	23 (12)	18 (11.5)	P = 0.69
	Pre-Configuration (N = 17)	Post-Configuration (N = 25)	P-Value
Post-Operative Education Documentation N (%)	0 (0)	22 (88)	P < 0.000001

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Conclusion

- CPOE configuration significantly improved:
 - Post-operative education documentation
 - Indication documentation
- Results not as clinically relevant as expected
- Further evaluation will be required due to an unanticipated alteration in the configuration that occurred during data collection process

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Self-Assessment Question

Which of the following is not FDA-labeled for the reversal of non-depolarizing neuromuscular blockade?

- Neostigmine
- Physostigmine
- Sugammadex
- Edrophonium

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Self-Assessment Question

If a health system implements a computerized order entry configuration, what is a potential benefit(s) that could occur after implementation?

- Improvement in communication between physicians and pharmacists
- Elimination of surveillance of the configuration after go-live
- Reduction in the rate of medication errors
- A and C

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