Sugammadex vs. Neostigmine/glycopyrrolate a Pharmacoeconomic Analysis: Retrospective Chart Review

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Introduction

- Neuromuscular blocking agents optimizes conditions for tracheal intubation and enhances surgery
- **Neostigmine**, the traditional reversal agent, is:
  - ineffective at reversing deep levels of blockade and is neither rapid or predictable
- **Sugammadex**, a newer reversal agent:
  - rapidly terminates profound and superficial blocks
  - associated with less incidences of postoperative residual neuromuscular blockade
- **Cost concerns** remain a **major barrier** to the widespread use of sugammadex despite its superiority. Studies show, as many as **40%** of anesthesia providers implement self-imposed limitation on their use of sugammadex secondary to cost
- The **purpose** of this project is to ascertain the cost-effectiveness of sugammadex versus neostigmine by comparing who leaves the OR and PACU faster. Emphasis on acquisition costs with little concern for indirect savings is misguided

Background & Significance

- Pharmacoeconomics studies compare the costs of different drugs to costs saved by hospitals secondary to effective treatment and/or prevention of complications
- **To demonstrate cost-effectiveness**: (1) sugammadex must yield faster recovery times when compared to neostigmine and (2) any time saved is converted to productive activities
- At the implementation facility the:
  - OR time is estimated to be about *$30 per-minute*. PACU time is estimated to be about *$21 per-minute*
  - Sugammadex costs about *$173.50* (500 mg per 5 mL vial)
  - Neostigmine cost about *$19* (4 mg per 4 mL prefilled syringe) + glycopyrrolate *$4.63* (0.4 mg/ 2 mL vial)

Methodology

DESIGN:
- Pre-intervention data collection: (May 2018 – December 2018)
- Presentation of pre-intervention data + pre-survey
- Post-intervention data collection: (August – October 2019)
- Final PowerPoint presentation with post-survey

ANALYSIS:
- *Independent variables*: (1) reversal agent, either Neostigmine or Sugammadex; (2) ASA classification
- *Dependent variables*: (1) OR time; (2) PACU time

RESULTS:
- *Phase I Results*: Mean duration time is shorter for the sugammadex group:
  - OR → 16.55 minute difference (p-value of .049). ASA III-IV patients → 20.51 minute difference
  - PACU → 23.01 minute difference. ASA III-IV patients → 22.35 minute difference
- *Phase II Results*: Mean duration time is not shorter for sugammadex group, only when accounting for ASA status
  - OR →ASA IV patients → 38 minute difference (p-value .04)
  - PACU → no minute difference (p-value .851)

  Survey Results: No statistical difference in pre vs post survey mean scores (Z = -.988[b]), p = .323

Results

ASSOCIATED Costs	NEOSTIGMINE/ GLYCOPYRROLATE	SUGAMMADEX
OR cost/minute: $30	16.55 mins x $30 = $496.50	-16.55 mins
PACU cost/minute: $21	23.01 x $21 = $483.21	-23.01 mins
Drug Cost:	$24	$173.50
Total:	Add **$1003.71** to every case where Neostigmine/ Glycopyrrolate was the chosen reversal agent	Deduct **$806.21** to every case where Sugammadex was the chosen reversal agent

Discussion & Implications

- Respiratory complications is the **2nd** most common type of postoperative complication
- This study challenges the idea that neostigmine is ideal in every clinical situation
- Results & literature suggests that sugammadex may be more ideal in ASA III & IV patients, for example, patients with preexisting respiratory, cardiovascular, or neuromuscular disease

Limitations

- Heterogeneity across cases were considerable
- Facility acquired smaller vials/dosages of sugammadex and converted to a different electronic medical record during project which could impact data
- Lack of data on the rate of residual neuromuscular blockade, because monitoring of neuromuscular conduction was not analyzed

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