Is Sterile Always Better? Postoperative Infection Rates Using Airway Carts versus Sterile Sets

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Background

- Rigid airway endoscopy is a mainstay of the otolaryngologist's armamentarium, used for diagnostic and therapeutic purposes
  - These include: laryngoscopes, bronchoscopes, telescopes, suctions, etc.
  - Deemed as semi-critical and critical by the Spaulding classification system ergo reuse requires high-level disinfection and sterilization
- August 16th, 2018: the Joint Commission (JC) mandated that semi-critical and critical otolaryngology instruments used in airway management be placed in individual sterile sets after high-level disinfection or sterilization.
- This was due to increasing concerns regarding infection transmissibility detailed by various case reports and case series investigating contamination rates of various airway instruments dating back to 1995.
- Given the JC's recent reversal of the mandate, we sought to determine if there is a relationship between the use of airway carts versus sterile sets for endoscopic airway procedures and postoperative airway infections with otolaryngologic rigid airway endoscopy.

Methodology

- **Data collection:** retrospective chart review of patients who underwent direct laryngoscopy and/or rigid bronchoscopy under care of the Department of Otolaryngology – Head and Neck Surgery
  - Mandatory sterile set usage: March 2018 through March 2019
  - Airway cart usage: December 2016 through December 2017 as well as May 2019 through February 2020
- **Exclusion criteria**: any case with a skin excision (excluding tracheostomy)
- **Definition of infection**: any newly diagnosed or presumed airway infection that required treatment with antibiotics within 30 days of surgery
- **Additional data**:
  - Demographics: age, gender, American Society of Anesthesia (ASA) class
  - Scheduled surgery duration, into operating room-to-surgery start time, case duration, surgery turnover time, and use of peri- and post-operative antibiotics
- **Data analysis:**
  - Summary analysis of baseline covariates with continuous variables summarized with means/standard deviations and categorical variables summarized with frequencies/percentages
  - Two-sample t-test for continuous variables
  - Fischer exact test for categorical variables

Results

Figure 1: A: Sterile set. B: Sterile peel-packs. C: Airway cart. D: Airway cart instrument storage.

		Airway Cart		Sterile Set		
		Count	Percentage	Count	Percentage	p-value
Gender	Female	244	40.8%	121	36.7%	0.233
	Male	354	59.2%	208	63.2%	
ASA Class	1-2	178	29.8%	104	31.6%	0.602
	3-5	420	70.2%	225	68.4%	
Perioperative Antibiotics	Yes	78	13.0%	37	11.2%	0.467
	No	520	87.0%	292	88.8%	
Postoperative Antibiotics	Yes	136	22.7%	62	18.8%	0.181
	No	462	77.3%	267	81.2%	
		Mean	Standard deviation	Mean	Standard deviation	
Age (years)		37.8	27.6	40.4	26.6	0.165

Table 1: Cohort demographics. There is no difference between the airway cart and sterile set cohorts. ASA = American Society of Anesthesiologists.

	Airway Cart		Sterile Set		
	Mean	Standard deviation	Mean	Standard deviation	p-value
Scheduled duration (min)	70.3	34.3	72.9	63.6	0.420
In room to start (min)	19.4	8.0	20.5	10.4	0.700
Case duration (min)	77.6	45.1	79.2	58.4	0.648
Turnover duration (min)	36.6	58.3	42.3	81.3	0.221

Table 2: Surgery duration metrics. There is no difference between the airway cart and sterile set cohorts.

Discussion

- There was no difference in age, gender, ASA class distribution, or the use of peri- or post-operative antibiotics (**Table 1**).
- Only one peri-operative airway infection was identified in the airway cart group, a rate of 0.17%, and 0.00% in the sterile set group, resulting in no statistical difference ($p = 0.458$)
- When accounting for all cases of each cohort, there was no difference in any of the subset divisions regarding operative time (**Table 2**).
- One airway infection: young adult chronic tracheostomy patient who underwent CO_2 laser ablation of suprastomal granulation tissue
  - Augmentin given 1 week for tracheitis and history of hospitalization for recurrent aspiration pneumonia
- Lack of difference in operative times likely reflects contribution of concomitant procedures
- Future studies:
  - Subgroup analysis of operative time divided by associated procedures
  - Cost analysis

Conclusion

- Pathogen transmission is a risk of any operative procedure
- The risk of post-operative airway infection following operative airway endoscopy is nearly non-existent
- **This risk of post-operative airway infections is not increased by storage of previously sterilized airway instruments in clean but non-sterile carts**

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