

# Incidence, Risk Factors and Health Related Outcomes of Aspiration in Lung Transplant Recipients.

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## BACKGROUND:

- Lung transplantation (LT) is the definitive treatment for end-stage lung disease with 5-year survival rates currently only 54%.<sup>1,2</sup>
- A major cause of lung rejection and mortality is chronic lung allograft dysfunction (CLAD) in LT recipients.<sup>3</sup>
- A recent expert panel identified aspiration as a highly relevant pathologic process which may contribute to CLAD.<sup>4</sup>
- Despite the known risk for aspiration in LT patients,<sup>5-7</sup> pre- and postoperative aspiration profiles, risk factors and associated outcomes have not yet been fully elucidated.

## AIMS:

- Determine the prevalence of swallowing safety impairment before and after lung transplantation.
- Establish the incidence (new cases) of swallowing safety impairment following lung transplantation procedures.
- Identify risk factors for development of postoperative aspiration.
- Determine the impact of aspiration on health-related outcomes.

## METHODS:

### Procedures:

- A single site retrospective chart review of consecutive patients undergoing LT and videofluoroscopic swallow studies (VFSS) between 11/2017 and 6/2020 was performed.
- Epic electronic medical records were reviewed with relevant data extracted and entered into a secure REDCap<sup>8</sup> database.
- The validated Penetration Aspiration Scale (PAS)<sup>9</sup> was extracted from clinical VFSS files to index swallowing safety classifications: *Safe*: PAS 1-2 *Penetration*: PAS 2-5 *Aspiration*: PAS  $\geq$ 6.

**Table 1. Penetration Aspiration Scale.**

Score	Definition	Category
1	Material does not enter airway.	Safe
2	Material enters airway, remains about VF, is ejected from airway.	
3	Material enters airway, remains above VF, not ejected from airway.	Penetration
4	Material enters airway, contacts VF, is ejected from airway.	
5	Material enters airway, contacts VF, is not ejected from airway.	Aspiration
6	Material enters airway, passes below VF, is ejected.	
7	Material enters airway, passes below VF, not ejected despite effort.	
8	Material enters airway, passes below VF, no effort made to eject.	

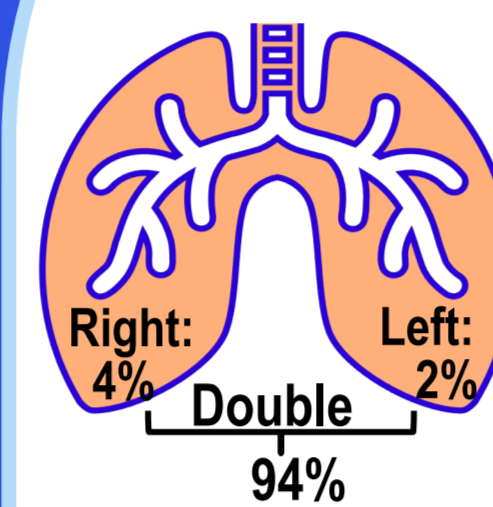
### Statistical Analyses:

- Univariate*: T-test, one-way ANOVA, chi-square, odds ratio.
- Multivariable*: Backward elimination regression modeling.

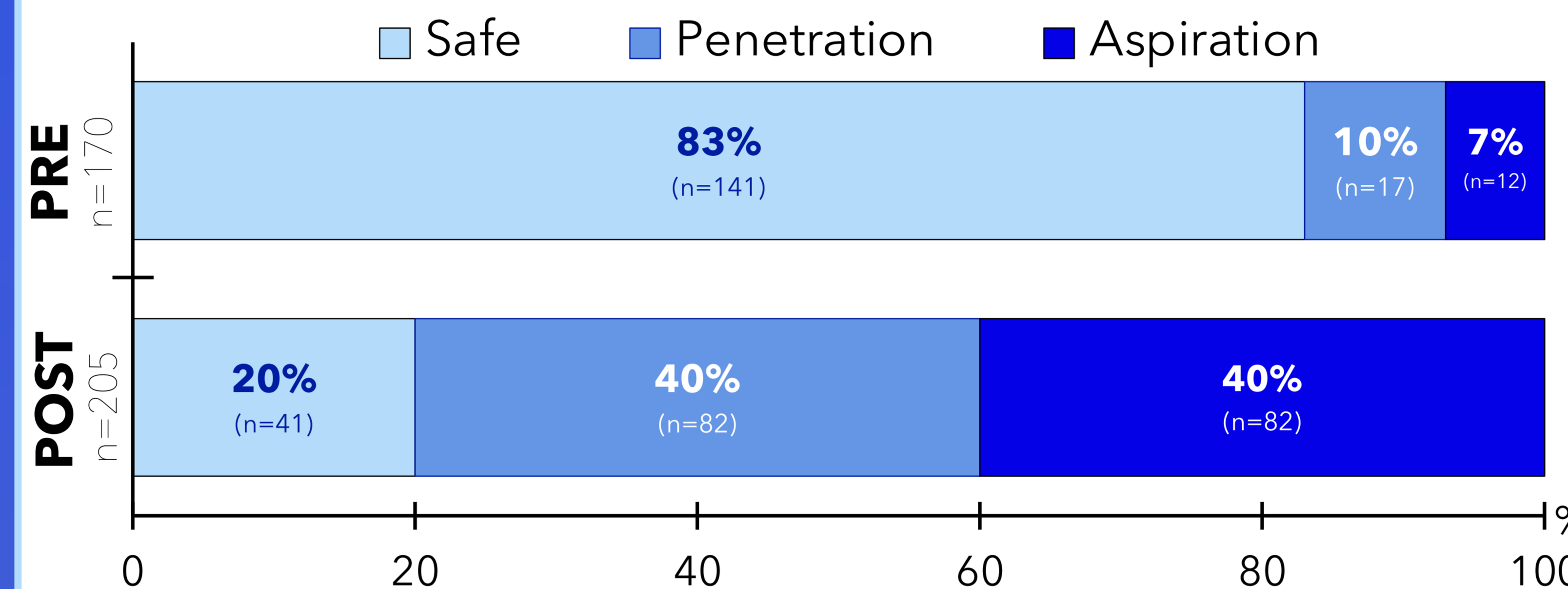
## RESULTS:

**Table 2. Videofluoroscopy exams performed across time points.**

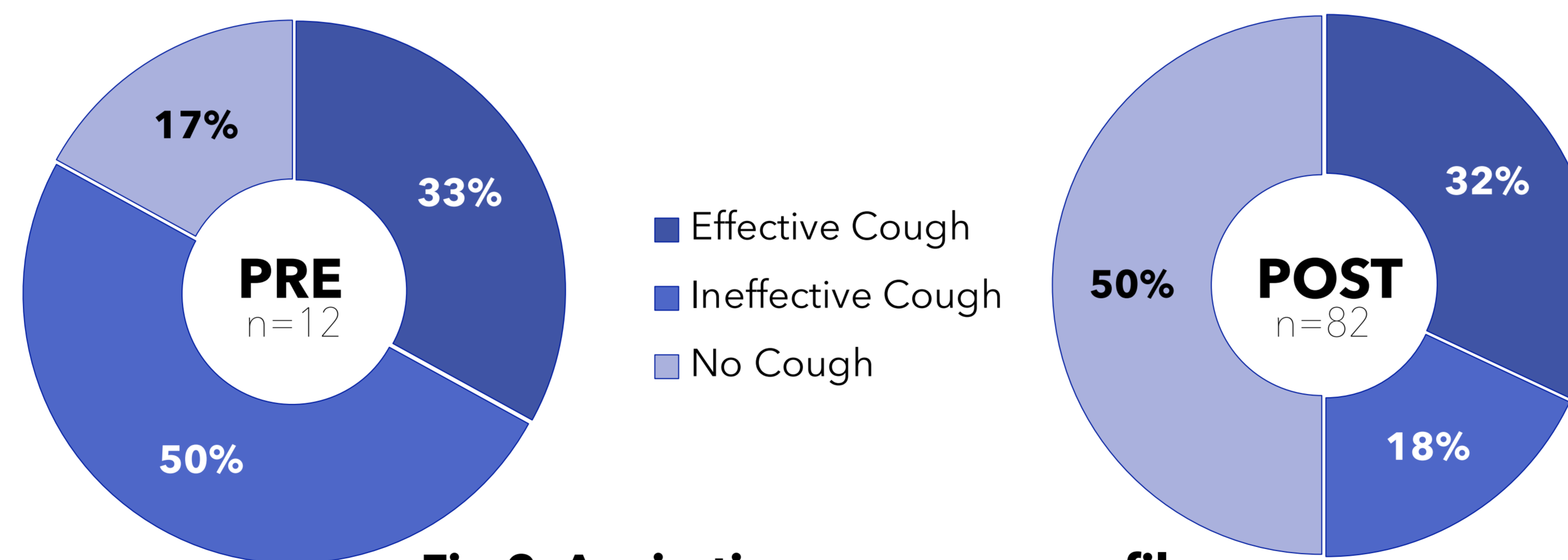
VFSS Completed:	LT Patients:	Aim:
Preoperative:	<b>N=170</b>	1) Pre-Op' Prevalence
Postoperative:	<b>N=205</b>	1) Post-Op' Prevalence
Pre & Postoperative:	<b>N=170</b>	2) Post-Op' Incidence



**Aim 1. Prevalence of Swallowing Impairment Before & After LT:**



**Fig 1. Safety classification frequency distribution profiles in patients undergoing VFSS at pre- and postoperative time points.**



**Fig 2. Aspiration response profiles.**

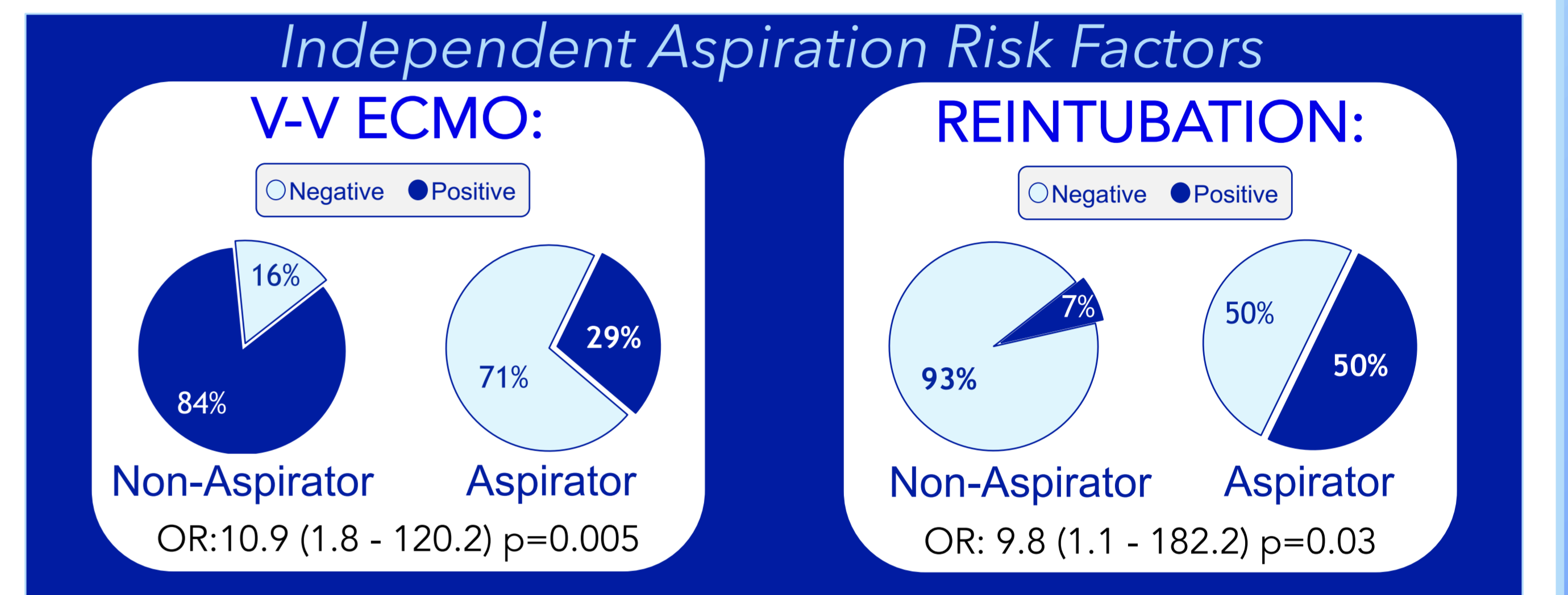
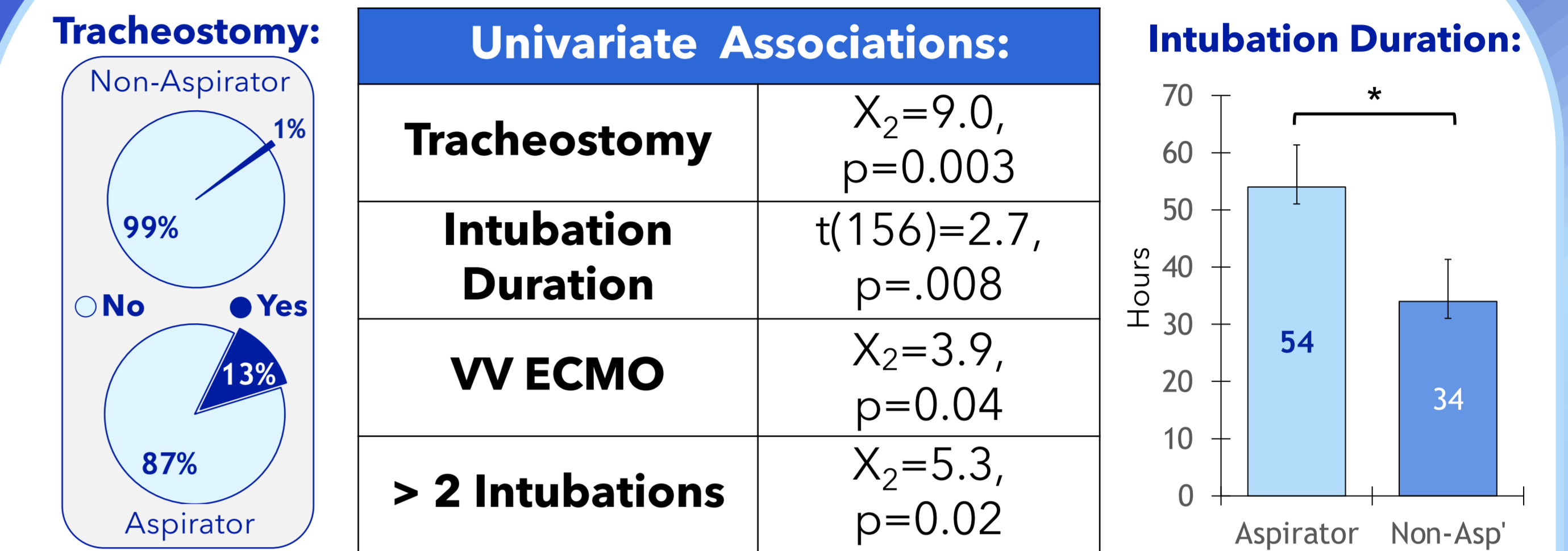
**Aim 2. Incidence of Postoperative Swallowing Safety Impairment:**

**Table 3. No associations existed between aspiration status at pre- and postoperative times points in patients receiving pre & post LT VFSS,  $X^2=1.3$ ,  $p=0.26$ .**

		Post-Op'		
		Non-Aspirator	Aspirator	
Pre-Op'	Non-Aspirator	92	66	n=158
	Aspirator	5	7	n=12
		n=97	n=73	n=170

Incident Cases

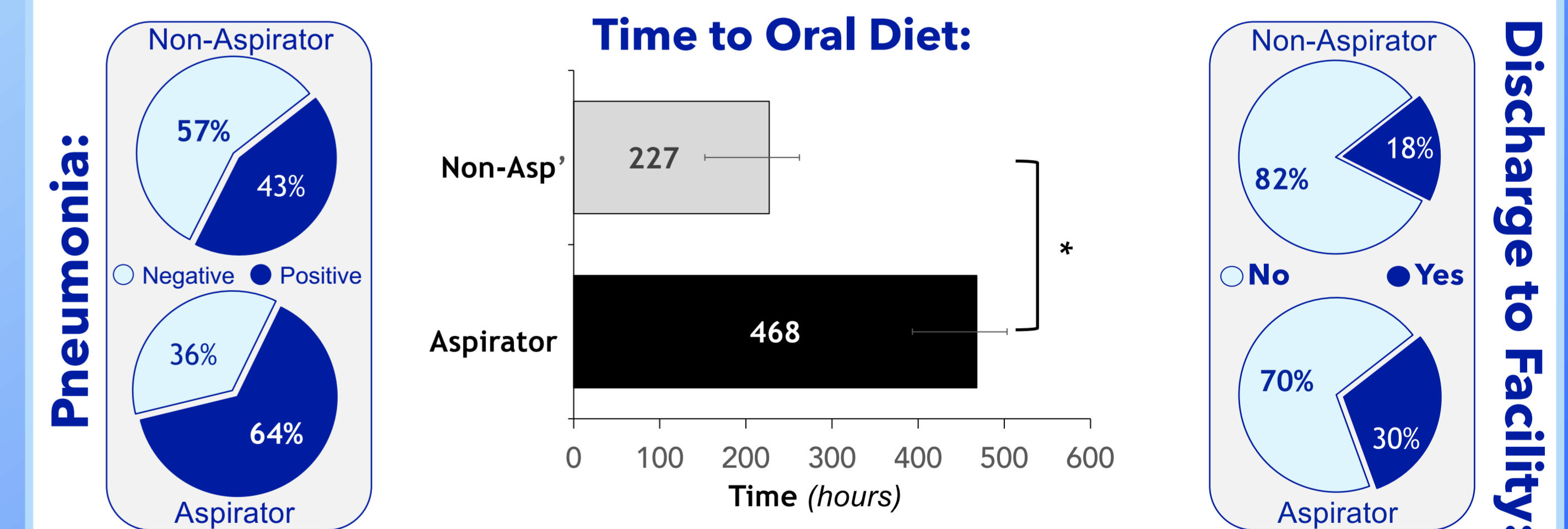
**Aim 3. Aspiration Risk Factors:**



**Aim 4. Health Related Outcomes:**

Compared to non-aspirating LT patients, aspirators demonstrated:

- 2.4 (95% CI: 1.3-4.2) times higher odds of developing pneumonia compared to non-aspirators,  $X^2=8.9$ ,  $p=0.003$ .
- 2.0 (95% CI: 1.0-3.9) times higher odds of discharge to a dependent care setting,  $X^2= 4.3$ ,  $p=0.04$ .
- 10 day longer wait time to resume a regular diet,  $t(138)= -3.2$ ,  $p=0.002$ .



## CONCLUSIONS:

- In this cohort of LT patients, pre-existing impairments in swallowing safety were relatively low. Following lung transplantation, however, 4 of every 5 patients demonstrated safety impairments.
- Identified contributing risk factors highlight the need for close monitoring of LT patients on VV-ECMO and those who have been reintubated following postoperative extubation.
- Aspiration was associated with inferior patient outcomes, highlighting the importance of timely and accurate identification of dysphagia with instrumental examination.