

Retrospective Study of Utilizing Advanced Practice Providers as Interventional Pulmonology Proceduralists at Stanford Hospital

Daphne Lee, PA-S2, BS; Mitchell J. Barnett, Pharm.D., MS; Eric J. Ip, Pharm.D., APh, BCPS, CSCS, CDCES, FCSHP; Clair Kuriakose MBA, PA-C, FACHE

Stanford Master of Science in Physician Assistant Studies

BACKGROUND

- Advanced Practice Providers (APPs) operate in a range of care settings, serving as primary care providers, surgical assistants, and proceduralists. The Physician Associate (PA) profession was established to enhance patient access to care during physician shortages.
- Some primary reasons for hiring APPs include improving access to care (often measured by wait times), increasing continuity of care, and enhancing patient throughput.
- However, there is a notable gap in the research concerning the utilization of APPs, including PAs, in subspecialty settings, particularly as proceduralists.
- In August 2023, an Interventional Pulmonology (IP) team of APPs was launched at Stanford Hospital with the objective of reducing wait times and improving patient satisfaction.

OBJECTIVES

- To evaluate the effects of incorporating APPs on patient wait times, follow-up care, and the volume of procedures performed in patients referred for outpatient thoracentesis.

METHODS

- Retrospective chart review of patients referred for thoracentesis at Stanford Chest Clinic.
- Study periods: July 2022–Feb 2023 vs. August 2023–March 2024 (separated by a 5-month washout period).
- Exclusions: Patients without referrals, patients with repeat visits.
- Demographics: age, sex, cultural identity, and insurance type.
- Primary outcomes: wait time (days from referral to procedure) and patient follow-up within 6 months post-procedure (yes/no).
- Analysis: General Linear Model (GLM) with Gamma distribution (log link) to adjust for skewed wait time; logistic regression for 6-month follow-up.
- Analyses performed using SAS OnDemand for Academics (Cary, NC).
- Study approved by Stanford University IRB (eProtocol 75217).

RESULTS

Table 1. Unadjusted Results

Variable		Pre-APP (n = 64)	Post-APP (n = 82)	P value
Waiting Time (Days)	Mean \pm SD, Median	20.4 \pm 27.5, 11.5	11.0 \pm 8.6, 8.0	0.011
Follow up within 6 months	Yes, n (%)	40 (62.5%)	67 (82.7%)	0.007

Table 2. Model Predicting Reduction in Wait Time Days*

Variable		Parameter Estimate	95% Confidence Limits	p-value
Time Period (Referent=Pre)	Post	-9.1	(-12.0 - -4.9)	<0.001
Age (in years)		0.2	(-1.8 - 0.4)	0.641
Sex (Referent=Male)	Female	-1.6	(-6.5 - 5.3)	0.621
Insurance Type (Referent=Public insurance)	None	-0.8	-5.5 - 30.8	0.993
	Private	-1.8	-7.3 - 6.5	0.646
Cultural Identity (Referent =non-Hispanic/non-Latino)	Hispanic/Latino	6.3	-2.7 - 19.8	0.190

*Adjusting for age, sex, cultural identity, and insurance type

Table 3. Model Results Predicting Follow Up Within 6 Months*

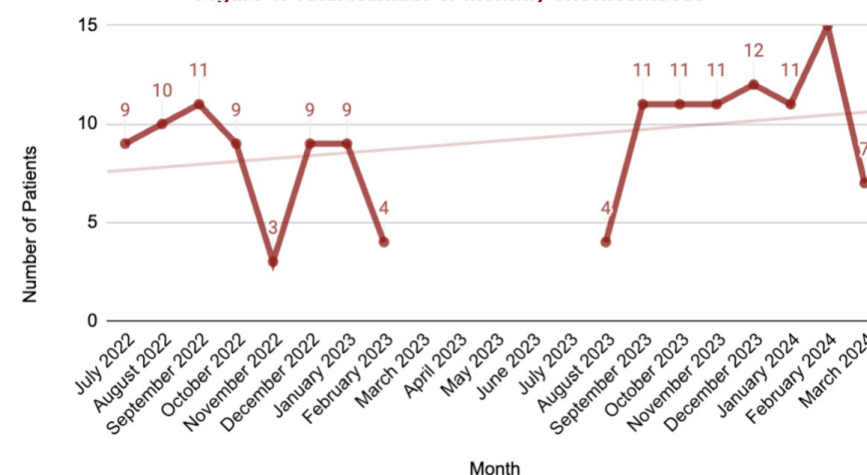
Variable		Odds Ratio	95% Confidence Limits	p-value
Time Period (Referent=Pre)	Post	3.1	(1.4 - 6.9)	0.007
Age (in years)		1.0	(1.0 - 1.1)	0.344
Sex (Referent=Male)	Female	1.2	(0.6 - 2.7)	0.637
Insurance Type (Referent=Public insurance)	None	0.1	(0.0 - 1.4)	0.087
	Private	1.6	(0.6 - 4.4)	0.383
Cultural Identity (Referent =non-Hispanic/non-Latino)	Hispanic/Latino	1.2	(0.4 - 3.6)	0.812

*Adjusting for age, sex, cultural identity, and insurance type

C statistic=0.683; Hosmer-Lemeshow=4.90, p=0.7679

- Final analytical cohort (n=146 patients).
- In unadjusted results, post-APP utilization period showed significantly reduced waiting time (11.0 days vs. 20.4 days, p=0.011) and a higher percentage of patients with follow-up (82.7% vs. 62.5%, p=0.007). (Table 1)
- These findings remained after adjusting for patient level factors, with an estimated reduction in wait time of 9.1 days seen in the post-APP utilization period relative to the pre-APP utilization period. (Table 2)
- In adjusted logistic regression models, patients in the post-APP utilization period were 3.1 times more likely to have a follow-up appointment within 6 months compared to those in the pre-APP utilization period. (Table 3)
- There was a 28.1% increase in average total monthly thoracentesis procedural volume after utilization of APPs to perform procedures. (Figure 1)

Figure 1. Total Number of Monthly Thoracenteses



DISCUSSION

- After adjusting for patient factors, wait times for thoracentesis were significantly reduced following utilization of APPs in IP procedures.
- In addition, patients in the post-APP utilization period were more likely to have follow-up appointments within 6 months post-procedure.
- Lastly, there was an upward trend in number of thoracentesis procedures performed post-APP utilization.
- Limitations include retrospective study design, skewed wait times in pre-period, single-site, and incomplete accounting of seasonal effects.

CONCLUSION

- APPs may improve access to IP care by decreasing wait times, improving follow-up rates, and increasing quantity of procedures performed.
- Stakeholders may consider expanding the usage of APPs as IP proceduralists at other institutions and in other subspecialty areas.
- Additional research should be performed at other institutions and for other subspecialties. Patient satisfaction and cost comparisons (APPs vs. physicians as proceduralists) should also be examined.