Clinical Impact of Bronchoscopy in Pediatric and Young Adult Oncology Patients with Suspected Respiratory Infections

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Background

- Respiratory infections are a significant cause of morbidity and mortality in pediatric and young adult patients with malignancy
- Bronchoscopy with bronchoalveolar lavage (BAL) is frequently utilized in hopes of guiding treatment, but the procedure is not without risks
- Information on which patients would most benefit from bronchoscopy with BAL would be beneficial

Objectives

- Report the diagnostic yield and adverse event rate of bronchoscopy with BAL in pediatric and young adult oncology patients with suspected respiratory infections
- Identify factors associated with positive and negative clinical impact from bronchoscopy with BAL to identify the optimal patient

Methods

All patients with a cancer diagnosis and BAL labs at eq 1CCHMC from 2013 to 2022

Excluded patients:

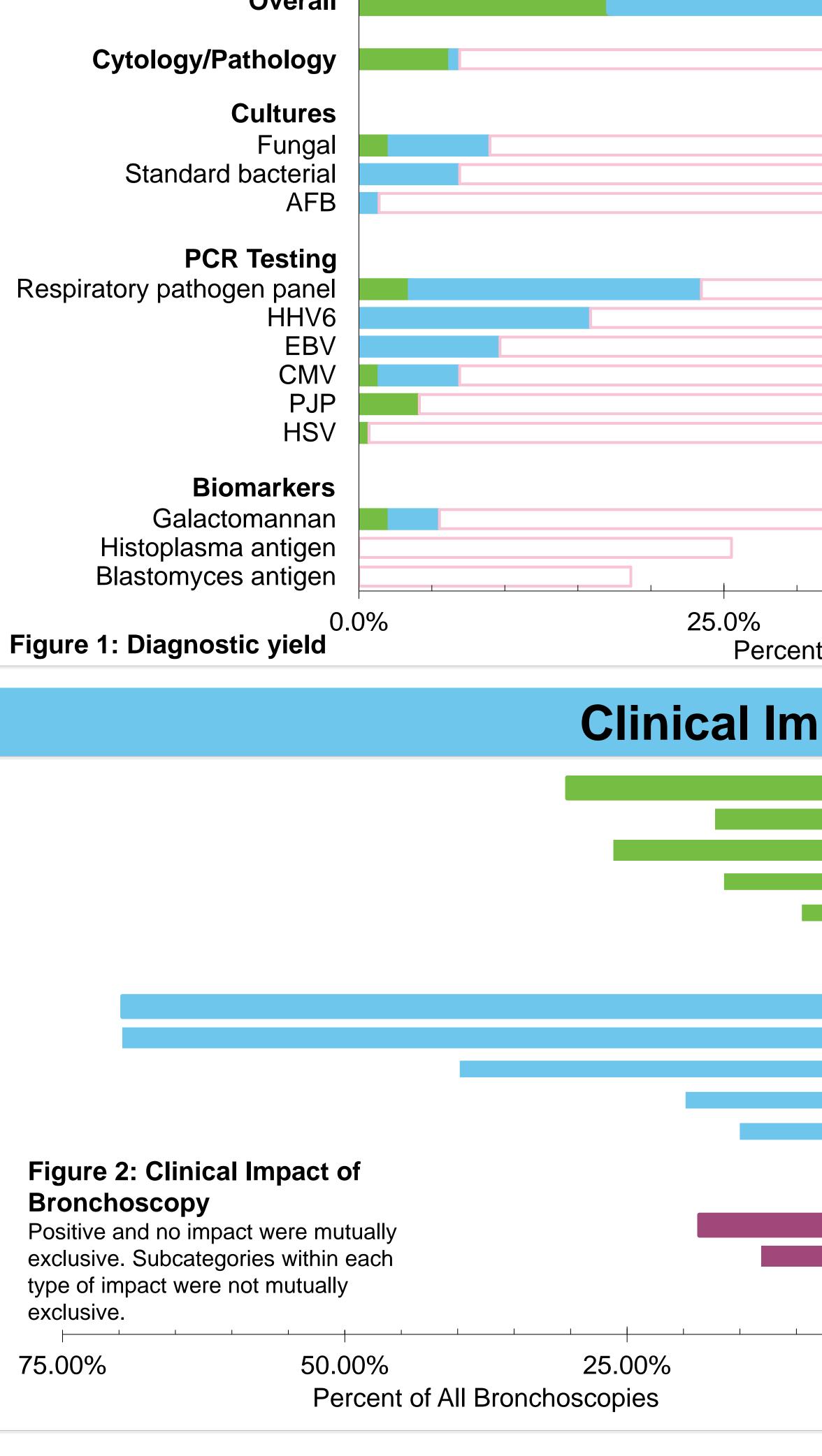
- With cystic fibrosis
- Preparing for or post hematopoietic stem cell transplant (HSCT)
- That had not received chemotherapy in the last six months (unless new cancer diagnosis)
- Excluded bronchoscopies:
- If a prior bronchoscopy in the previous four weeks met inclusion criteria
- Not performed due to infectious concerns
- Performed to follow up on previous diagnosis

Identified bronchoscopies that led to positive clinical impact, no clinical impact or negative clinical impact

Mixed-effects logistic regression to identify factors associated with positive and negative clinical impact

Adverse Events	
Table 2. Procedural Complications	%
Any procedural complication	13.1%
Required persistent (> 6 hours) increase in respiratory support (non-ventilator)	6.2%
Required escalation to mechanical ventilation	5.5%
Required ICU admission	4.8%
Required persistent (> 6 hours) increase in ventilator settings	2.8%
Bleeding	0.7%

Bits Floor (n, %) 95 (65.5%) iancer diagnosis ICU (n, %) 95 (65.5%) ALL (n, %) 52 (35.9%) Outpatient (n, %) 37 (22.4%) AML and other leukemias (n, %) 42 (29.0%) Required respiratory support 59 (40.7%) Lymphoma (n, %) 20 (13.8%) Intubated on ventilator (n, %) 33 (22.8%) Solid Tumor (n, %) 27 (18.6%) Nasal Cannula (n, %) 24 (16.6%) CNS Tumor (n, %) 4 (2.8%) CPAP or BiPAP (n, %) 21 (14.%) Invespiratory symptoms present 60 (41.4%) ANC (median, IQR) 750 (20-1980) Cough (n, %) 53 (36.6%) Platelets (median, IQR) 78 (54-172) Increased work of breathing (n, %) 11 (7.6%) Antibiotic duration in days (median, IQR) 0.5 (0.0-4.1) ever (n, %) 64 (44.1%) Overall 0.5 (0.0-4.1) 0.5 (0.0-4.1) ever (n, %) 64 (44.1%) 64 (44.1%) 0.5 (0.0-4.1) 0.5 (0.0-4.1) ever (n, %) 64 (44.1%) 0.5 (0.0-4.1) 0.5 (0.0-4.1) 0.5 (0.0-4.1) Cluitures Fungal Cluitures			Patient	t Cohort	
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Any respiratory symptoms present 60 (41.4%) Cough (n, %) 53 (36.6%) Increased work of breathing (n, %) 11 (7.6%) Shortness of breath (n, %) 8 (5.5%) ever (n, %) 64 (44.1%) Diagnostic Yield Cytology/Pathology Cultures Fungal Standard bacterial AFB PCR Testing Respiratory pathogen panel HHV6 EBV CMV PJP HSV Biomarkers Galactomannan Histoplasma antigen	Solid Tumor (n, %)		27 (18.6%)	Nasal Cannula (n, %)	24 (16.6%)
Cough (n, %) 53 (36.6%) Platelets (median, IQR) 78 (54-172) Increased work of breathing (n, %) 11 (7.6%) Antibiotic duration in days (median, IQR) 6.3 (2.5-15.0) Shortness of breath (n, %) 8 (5.5%) Antifungal duration in days (median, IQR) 0.5 (0.0-4.1) ever (n, %) 64 (44.1%) Overall 0.5 (0.0-4.1) Diagnostic Yield Utressed work of breathing (n, %) 11 (7.6%) Antifungal duration in days (median, IQR) 6.3 (2.5-15.0) Antifungal duration in days (median, IQR) 0.5 (0.0-4.1) ever (n, %) 64 (44.1%) Diagnostic Yield Overall Cultures Fungal Standard bacterial AFB AFB EBV EBV EBV CMV PJP HSV Clinically Significant Positives Biomarkers Clinically Significant Positives Not Significant Positives	CNS Tumor (n, %)		4 (2.8%)	CPAP or BiPAP (n, %)	2 (1.4%)
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Blastomyces antigen	Cytology/Pathology Cultures Fungal Standard bacterial AFB PCR Testing NHV6 EBV CMV PJP HSV			Clinically Sign	



50.0%

Percent of All Bronchoscopies

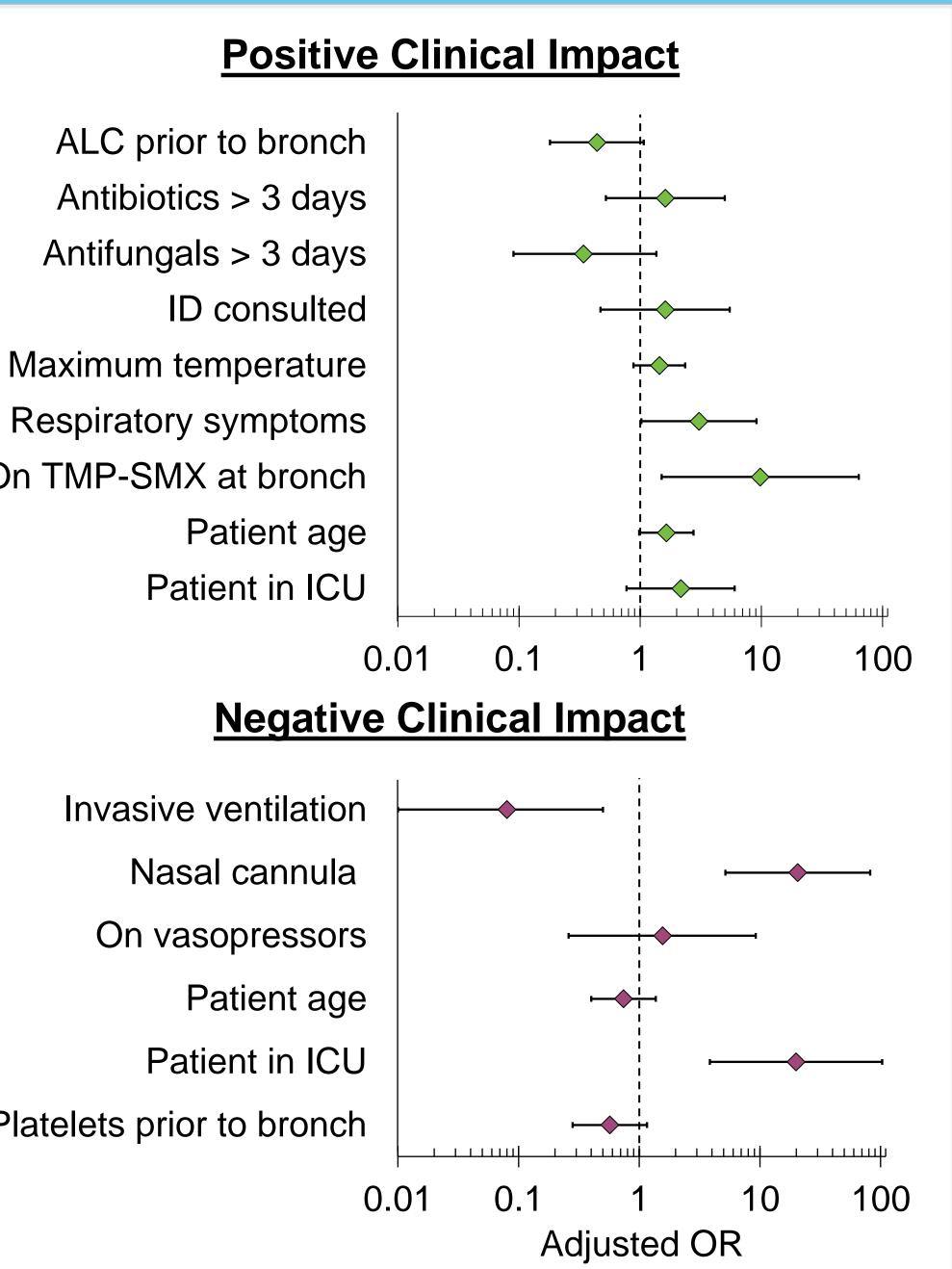
pact		b
	 Total with positive impact(s) New diagnosis that explained symptoms Change in management from De-escalation of antimicrobials Initiation of appropriate antimicrobials Initiation of chemotherapy 	 P e fc F
	 Total with no impact(s) No positive change in management With no organism identified Despite new organism identified With previously known organism identified Patient died prior to results 	
0.00	 Total with negative impact(s) Procedural complication Missed diagnosis Unnecessary treatment 	

75.0%

Mixed-Effects Model

Cincinnati

Children's



igure 3: Mixed-effects multivariable logistic regression nodel that accounted for sex and oncologic diagnosis

Conclusions

- The diagnostic yield of bronchoscopy with BAL was 58% while 30% had a positive impact and 19% had a negative impact
- Patients with concern for PJP and those with respiratory symptoms benefit most from pronchoscopy with BAL
 - atients requiring non-invasive respiratory support, especially those in the ICU, are at the highest risk or negative outcomes after bronchoscopy PCR testing and biomarkers provide the most linically significant diagnoses in this patients requent pretreated with antimicrobials ⁻urther research is needed to better identify the
 - ptimal patients for bronchoscopy

Additional Materials



