CLINICAL STRATEGIES FOR Severe Asthma & Chronic Inflammatory Airway Diseases

Final Outcomes Summary
Live Symposium and Enduring Outcomes
11/27/2024-11/27/2025
Grant ID: 91152811

National Jewish Health®
Breathing Science is Life.®

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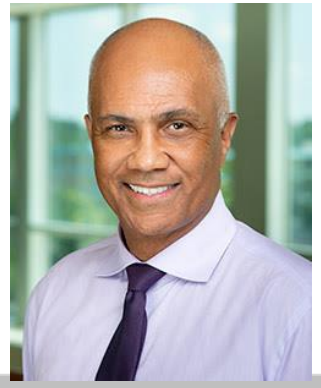
Executive Summary

Final Outcomes Summary – Online Enduring and Live Symposium



Ron Balkissoon, MD, MSc, DIH, FRCPC
Staff Physician
Division of Pulmonary, Critical Care & Sleep Medicine
Department of Medicine
National Jewish Health
Denver, Colorado

David Beuther, MD, PhD, FCCP
Chief Medical Information Officer
Professor of Medicine
Division of Pulmonary, Critical Care & Sleep Medicine
National Jewish Health
Denver, Colorado

Eileen Wang, MD, MPH
Associate Professor
Division of Allergy & Clinical Immunology
Department of Medicine
National Jewish Health
Denver, Colorado

Program Overview

This activity was presented as a live CME Satellite Symposium on October 6, 2024, during the American College of CHEST Physicians Annual Meeting (CHEST 2024) in Boston, and a studio produced recording was also endured on Healio. The program focuses on the complex and interconnected relationship between severe asthma and upper airway disease, including inflammatory pathways and biomarkers in chronic respiratory disease, current and emerging therapies for managing patients with severe asthma and comorbid upper airway disease. Special features include whiteboard animations to illustrate the upper and lower airway and the inflammatory cascade by asthma phenotype; and clinical case scenarios with interactive polling and faculty discussion. Additionally, use of the Array® technology allowed for audience engagement in the live symposium, giving attendees the option to participate in gamification, interactive polling, submit questions for faculty, and take notes directly on slides for future reference.

Learning Objectives

1. Identify the features in the pathophysiology of upper and lower airways associated with chronic inflammatory airway diseases.
2. Analyze the role of epithelial cytokines in the inflammatory pathways in severe asthma and upper airway diseases.
3. Describe appropriate biomarkers for severe asthma and upper airway diseases.
4. Assess the impact of upper airway diseases in order to personalize treatment strategies for severe asthma.

Target Audience & Accreditation

Target Audience:
Live symposium: Pulmonologists (attendees of CHEST)
Enduring activity: Pulmonologists, Allergists, Nurse Practitioners and Physician Assistants in those specialties

National Jewish Health designates the live and enduring activities for a maximum of 1.0 *AMA PRA Category 1 Credit™*.

Live activity: October 6, 2024
Boston Convention and Exhibition Center, 415 Summer St., Boston, MA 02210
Enduring activity: 11/27/2024 – 11/27/2025
https://www.healio.com/cme/pulmonology/20241120/clinical-strategies-for-severe-asthma-and-chronic-inflammatory-airway-diseases/overview

Program Features

Final Outcomes Summary – Online Enduring and Live Symposium

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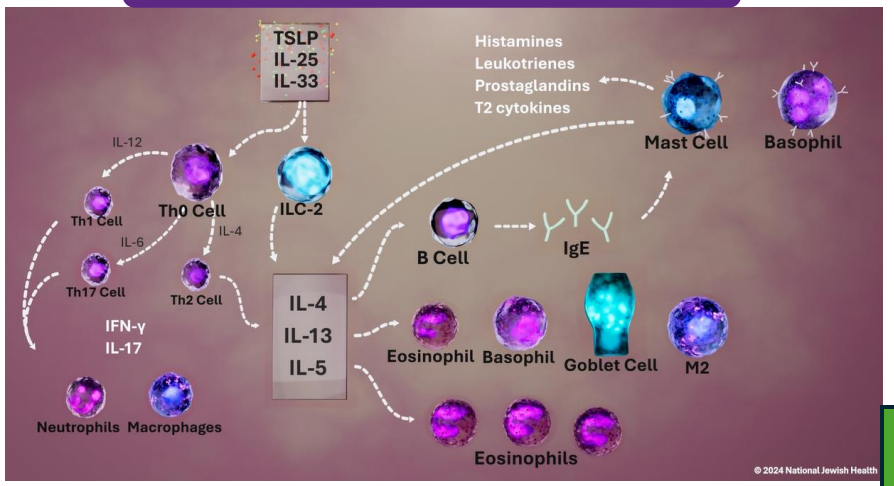
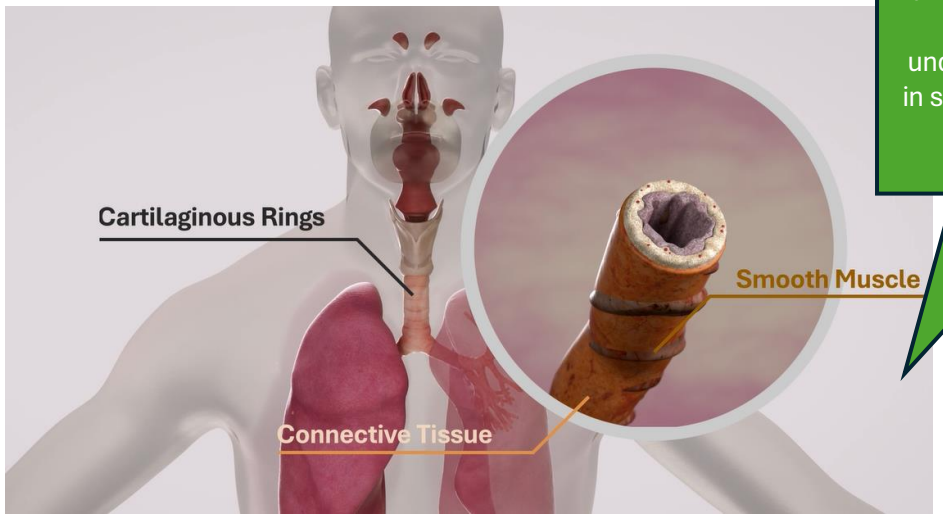
Animations





Panel discussion

86%

evaluation respondents in the live and online programs reported the animations increased their understanding of pathophysiology in severe asthma and upper airway disease.

(N= 549)

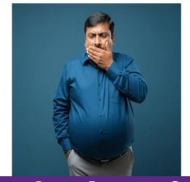
Case scenarios with interactive polling

Case 3: John M, 45-year-old male patient

Physical Examination:
- **General:** Obese male, appears tired, mild respiratory distress
- **Vitals:** BP 140/85 mmHg, HR 90 bpm, RR 20/min, SpO2 94% on room air
- **Respiratory:** Bilateral expiratory wheezes, decreased breath sounds in the lower lobes
- **Cardiovascular:** Regular rate and rhythm, no murmurs
- **Abdomen:** Mild epigastric tenderness, no hepatosplenomegaly
- **ENT:** Normal oropharynx, no nasal polyps but moderate turbinate edema and nasal congestion

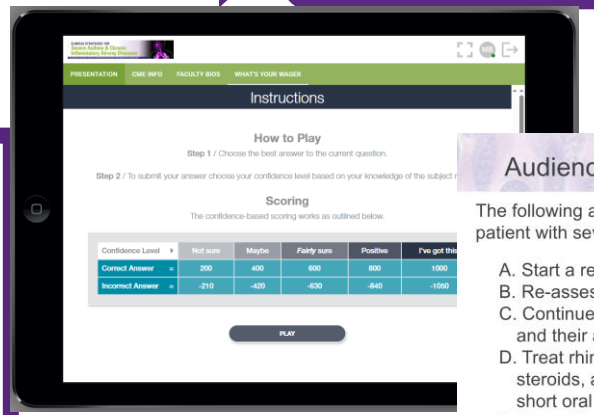
Current medication:
- High-dose ICS/LABA (fluticasone/salmeterol 500/50 mcg) 1 inh bid
- Short-acting beta-agonist (albuterol) PRN
- Low-dose theophylline
- Montelukast
- Proton pump inhibitor (omeprazole)
- ACE inhibitor (lisinopril)
- CPAP therapy for OSA

Laboratory and Diagnostic Results:
- **Spirometry:** FEV_1/FVC = 0.65, FEV1 = 60% predicted (post-BD), no significant reversibility
- **Blood Work:**
  - **Eosinophils:** 100 cells/μL (low)
  - **Total IgE:** 15 IU/mL (low)
  - **CRP:** 8 mg/L (elevated)
- **Chest X-ray:** Hyperinflation, no focal consolidation
- **FeNO:** 10 ppb (low)
- **Sleep Study:** Moderate obstructive sleep apnea, AHI 25 events/hour
- **Sputum Culture:** Negative for bacterial pathogens, no eosinophils, predominantly neutrophilic inflammation



Audience Engagement via the Array® Platform (Live Symposium)

- Gamification
- Interactive polling
- Save and take notes on slides
- Submit questions for expert faculty



Audience Response Question

The following are possible next steps in the management of this patient with severe asthma. Which of these actions are *inappropriate*?

A. Start a respiratory biologic.
B. Re-assess and optimize treatment of sleep apnea and GERD.
C. Continue current management plan. They have severe disease, and their asthma control is about as good as it is going to get.
D. Treat rhinitis more consistently and aggressively with intranasal steroids, and get them off oxymetazoline, possibly even with a short oral steroid burst.
E. Try adding a long-acting inhaled muscarinic antagonist (LAMA).

Audience Generation

Final Outcomes Summary – Online Enduring and Live Symposium

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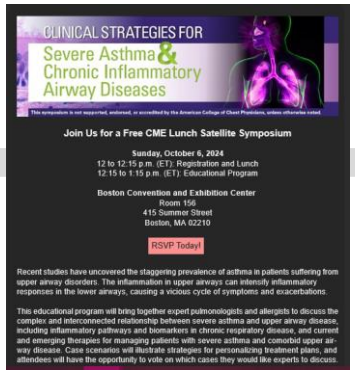
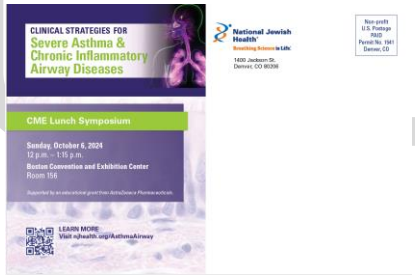
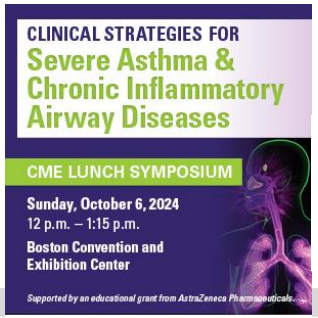
Personalized targeting tools across numerous tactics reach HCPs by leveraging demographic data (such as location, profession, specialty) and behavioral data (such as learner participation history, areas of interest).

Personalized emails sent to CHEST registrants & National Jewish Health Faculty





Brochure mailed to CHEST registrants



Digital and print ads on CHEST website and Welcome Back Edition magazine

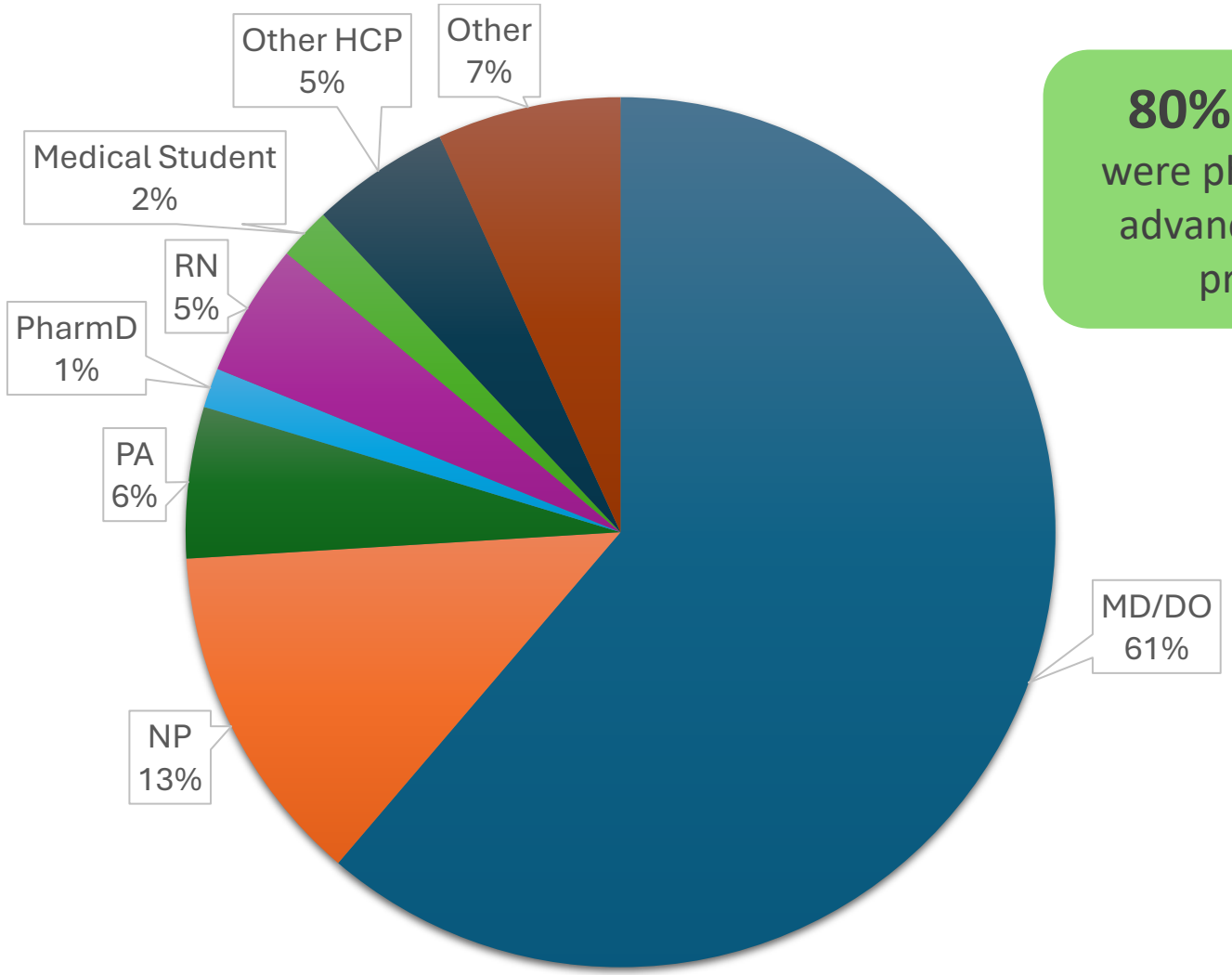
Dedicated landing page on National Jewish Health website and on Healio platform

Social media ads and posts

Featured Industry Event Listing on CHESTDailyNews.org

Overall Program Impact

Final Outcomes Summary – Online Enduring and Live Symposium



80% of learners were physicians and advanced practice providers

Degree	Total
MD/DO	915
NP	191
PA	84
PharmD	22
RN	74
Medical student	29
Other HCP	77
Other	102
Total Learners	**1,494**

350 learners in the live activity
1,144 learners in the online enduring activity

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Program Insights

Final Outcomes Summary – Online Enduring and Live Symposium

- **Persistent knowledge gaps remain around epithelial cytokines and inflammatory pathways.**
  - **59%** of post-test takers in the live symposium (N=44) and **31%** of post-test takers in the online enduring activity (N=526) could not correctly identify the role of epithelial cytokines post-activity, highlighting the complexity of the topic and the need for continued education.

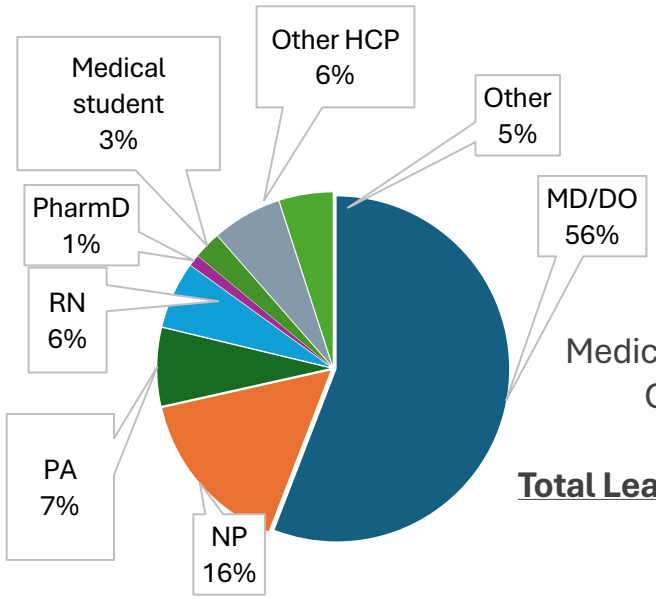
- **Confidence improved significantly, yet a subset of learners continue to report uncertainty.**
  - While overall relative confidence gain was **77%**, an average of **24%** of evaluation respondents in the online enduring activity (N=504) reported not feeling confident with regard to the learning objectives after the activity, suggesting an opportunity for more education to improve competence among healthcare providers on the pathophysiology and management of comorbid upper and lower airway disease.

- **Primary care clinicians may represent a critical audience for future education**, accounting for 50% of learners in the online enduring activity. The primary care audience may benefit from practical, referral-focused education that supports early recognition, biomarker use, and timely referral for patients with severe asthma and comorbid airway disease.

Educational Impact Summary

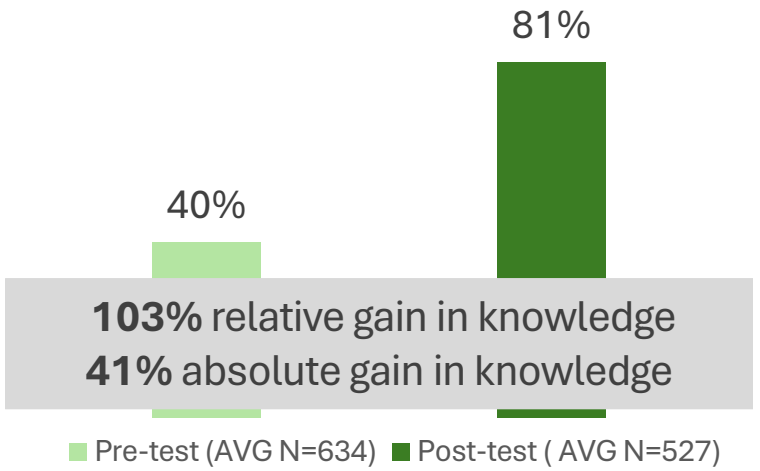
Final Outcomes Summary – Online Enduring

Participation



MD/DO=639
NP=179
PA=83
PharmD=12
RN=71
Medical student=29
Other HCP=74
Other=57
Total Learners = 1,144

Learning Gain Across Objectives



Evaluation

Met their educational needs **(86%)**

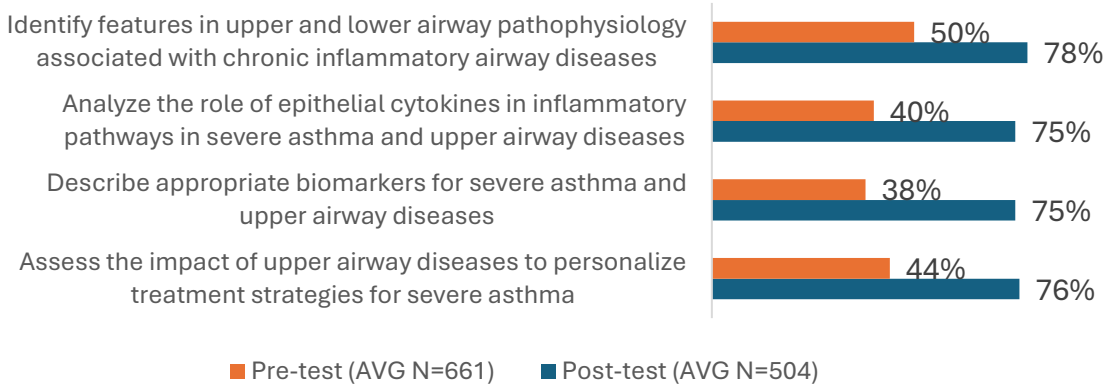
Reinforced or improved current skills **(85%)**

Improved ability to treat patients **(81%)**

N=506

Confidence Across Objectives

(somewhat to very confident)



Potential Impact To 159,984 Patient Visits This Year

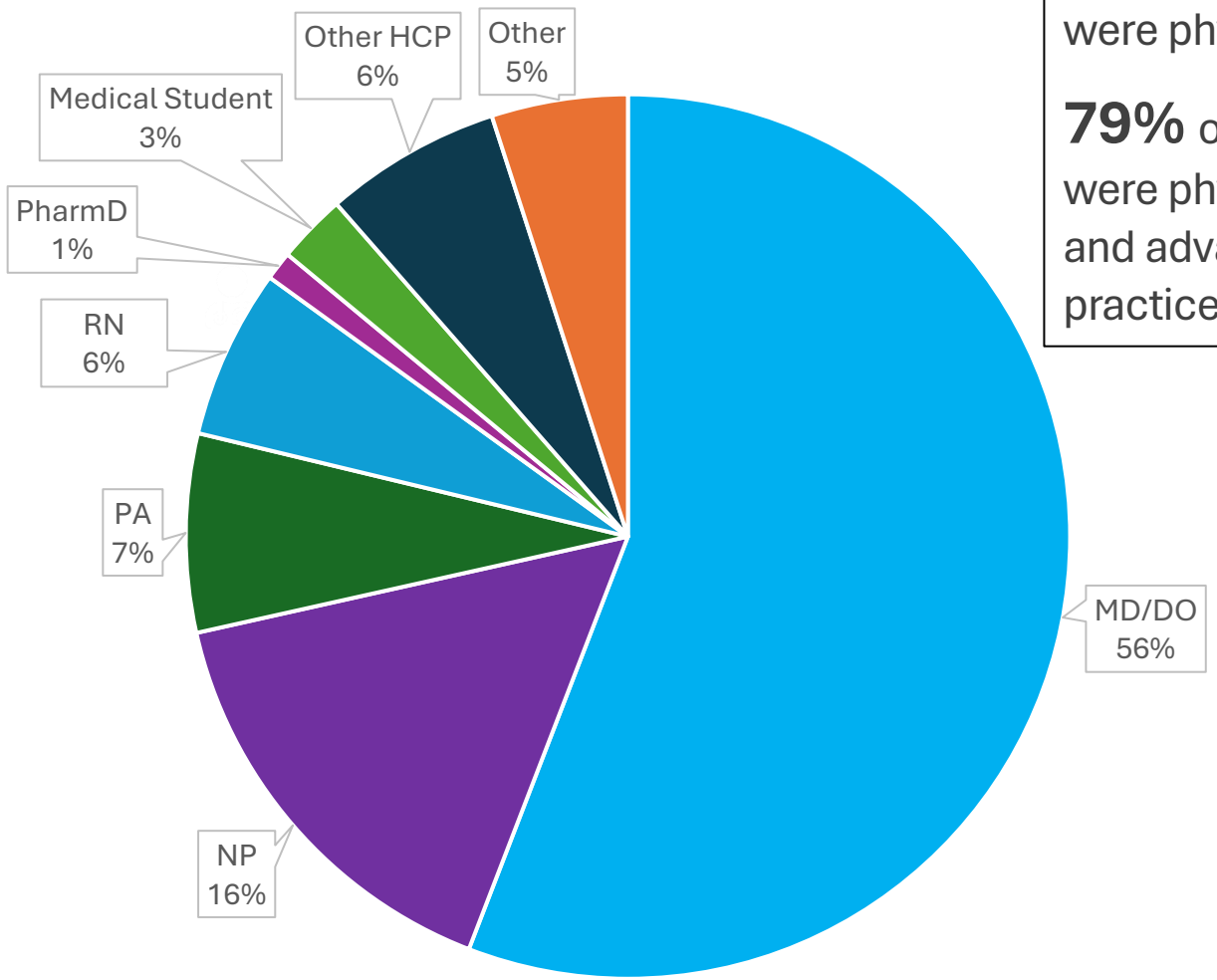
93%

N=407

Evaluation respondents intend to make changes to practice as a result of the activity

Level (1) Outcomes: Participation (Degree)

Final Outcomes Summary – Online Enduring



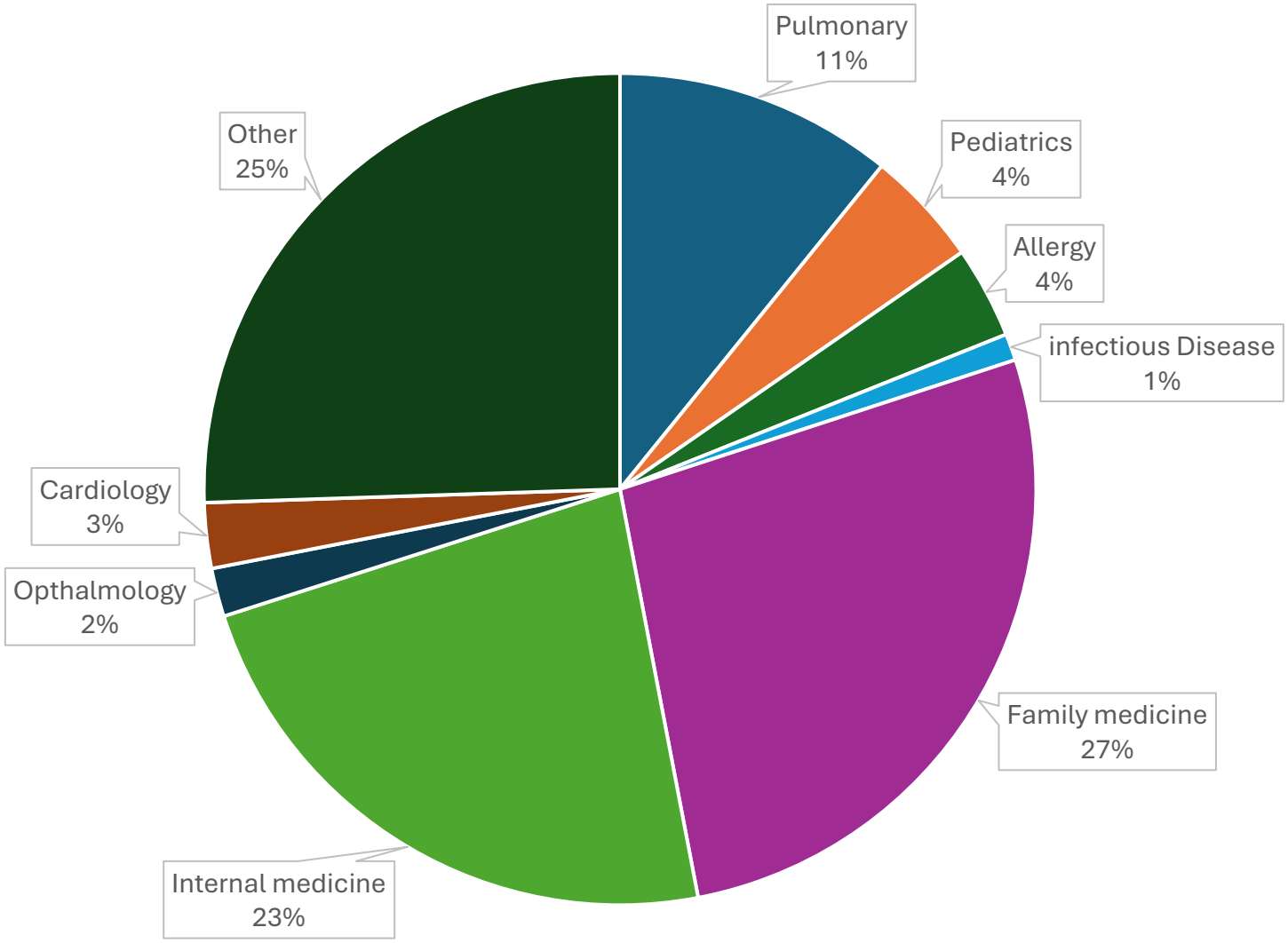
56% of learners were physicians

79% of learners were physicians and advanced practice providers

Degree	Total
MD/DO	639
NP	179
PA	83
RN	71
PharmD	12
Medical student	29
Other HCP	74
Other	57
Total Learners	**1,144**

Level (1) Outcomes: Participation (Specialty)

Final Outcomes Summary – Online Enduring

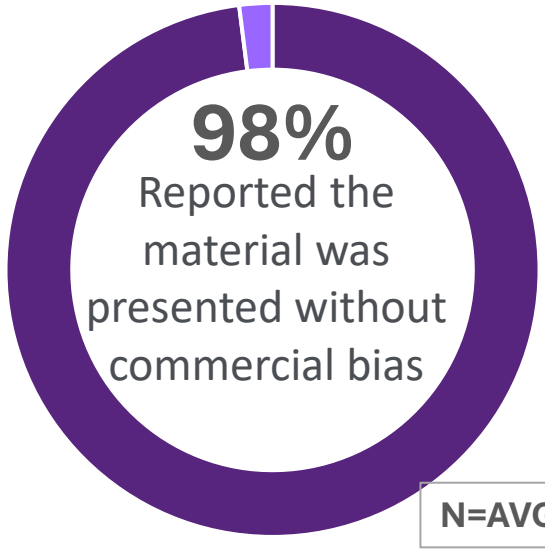


Specialty	Total
Pulmonary	125
Pediatrics	48
Allergy/Immunology	49
Infectious Disease	11
Family Medicine/General Practice	303
Internal Medicine	250
Ophthalmology	21
Cardiology	27
Other	310
Total Learners	**1,144**

Level (2) Outcomes: Satisfaction

Final Outcomes Summary – Online Enduring

Evaluation Respondents reported they "Strongly Agree" or "Agree" that the activity:



Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Online Enduring

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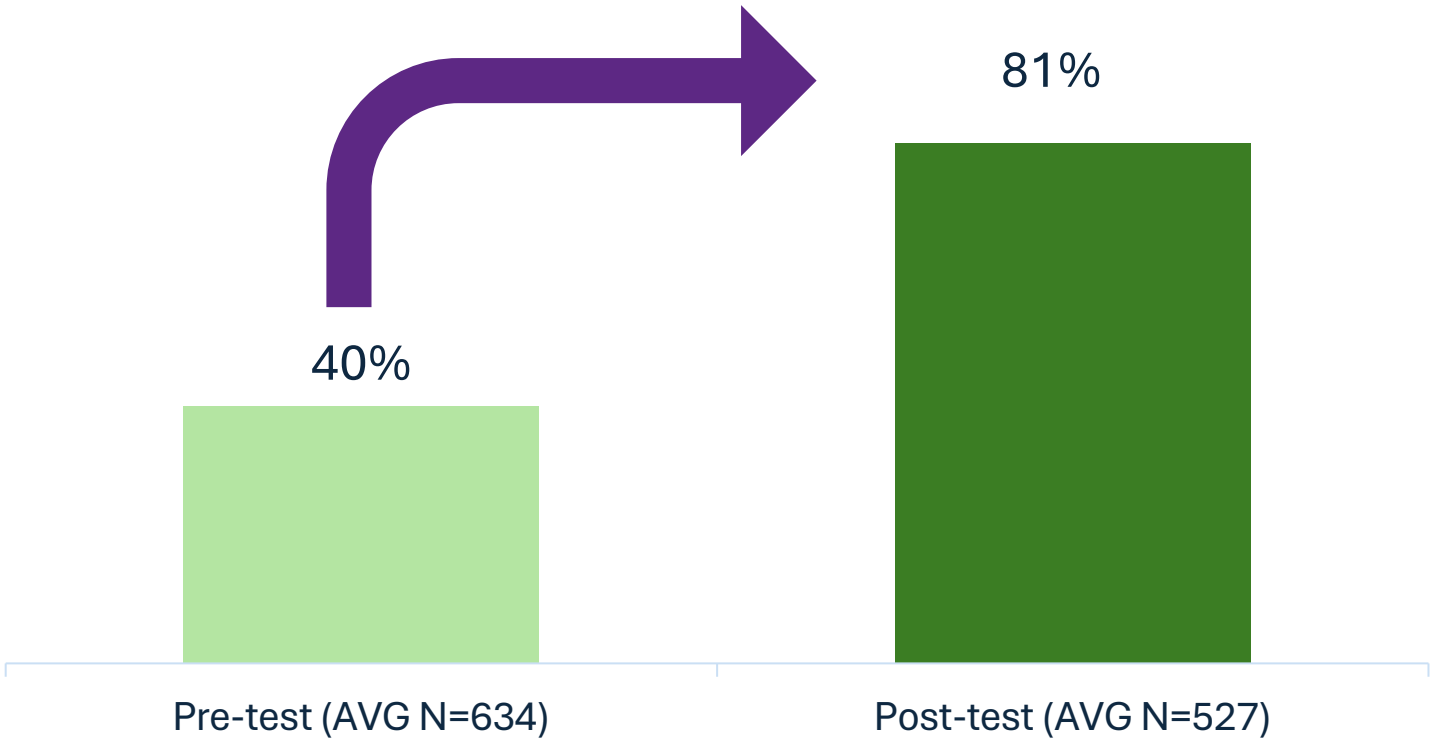
Overall Knowledge Gain Across Learning Objectives



103% Overall Relative Knowledge Gain

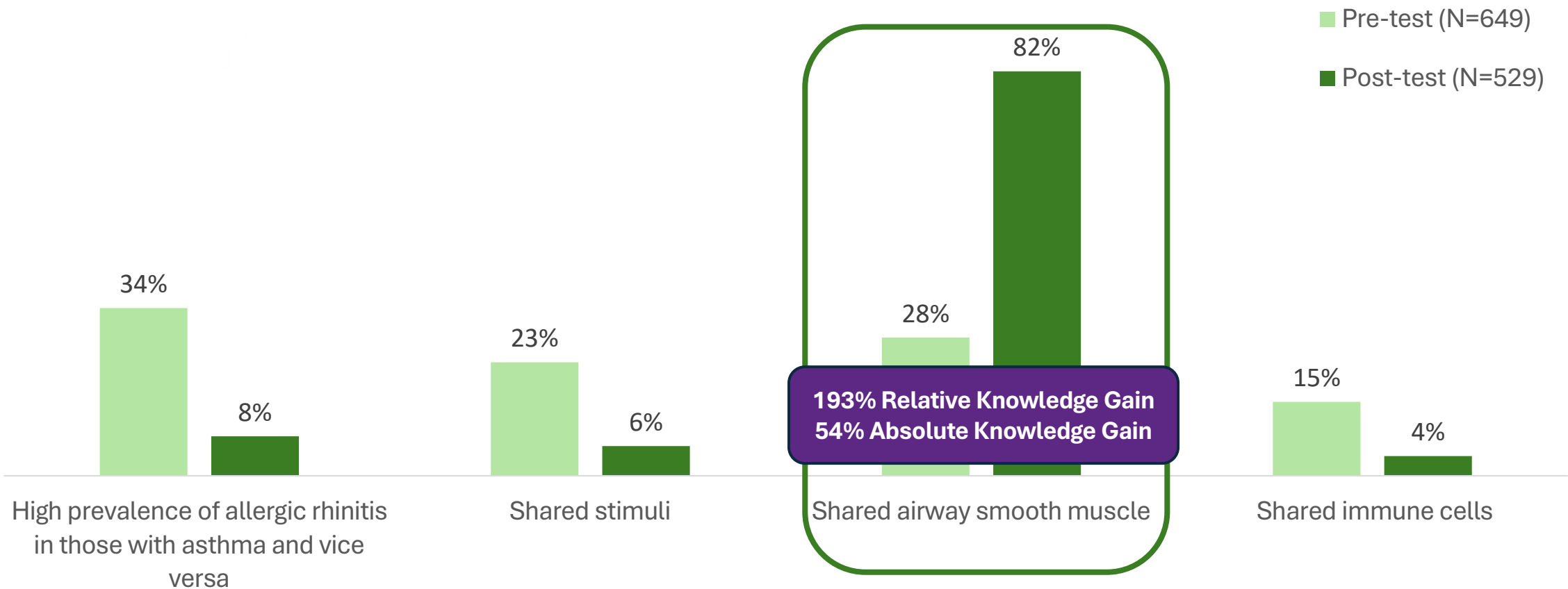
41% Overall Absolute Knowledge Gain

Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Online Enduring

Learning Objective: *Identify the features in the pathophysiology of upper and lower airways associated with chronic inflammatory airway diseases.*

Question 1: The unified airway concept is based on all of the following evidence EXCEPT:

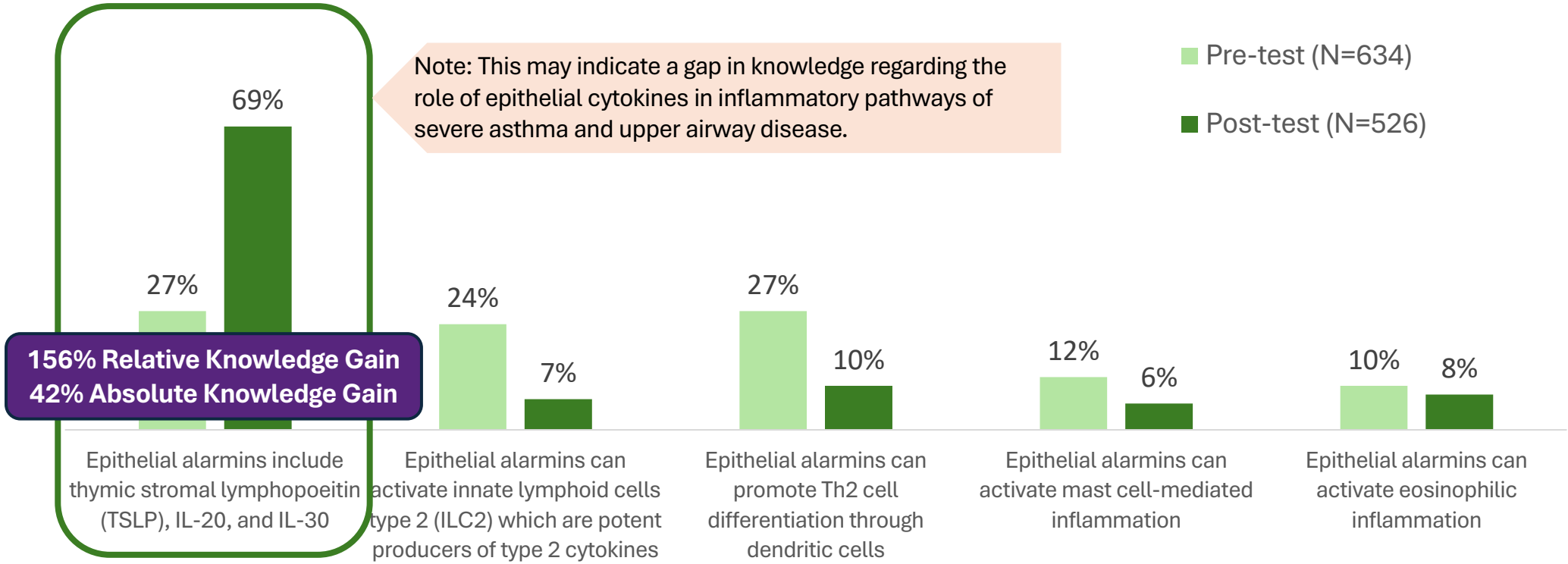


Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Online Enduring

Learning Objective: *Analyze the role of epithelial cytokines in the inflammatory pathways in severe asthma and upper airway diseases.*

Question 2: Which of the following statements regarding epithelial alarmins is NOT true?

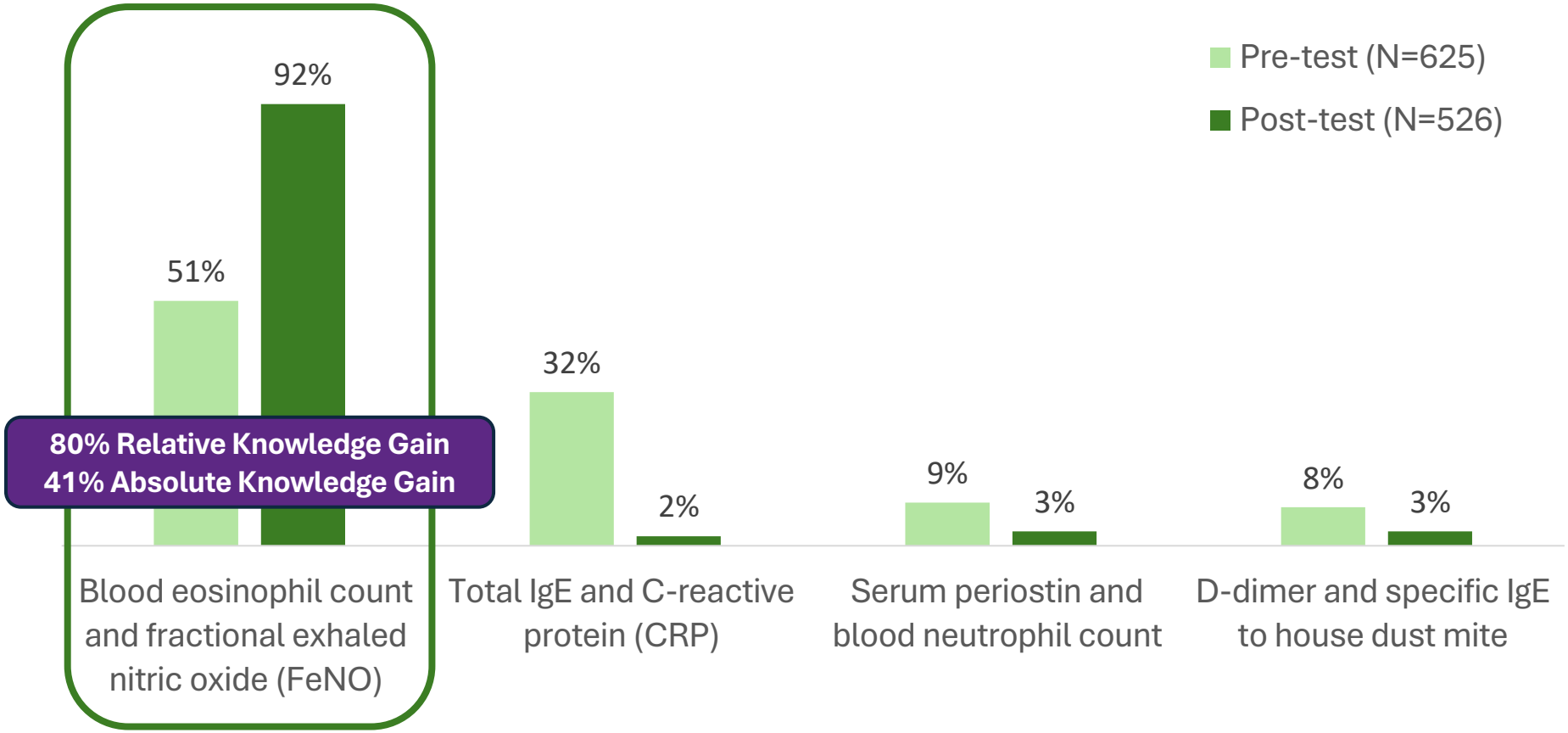


Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Online Enduring

Learning Objective: *Describe appropriate biomarkers for severe asthma and upper airway diseases.*

Question 3: A 45-year-old male with a history of severe asthma presents with worsening shortness of breath, nasal congestion, and anosmia (loss of smell) over the past 6 months. He has frequent exacerbations despite high-dose inhaled corticosteroids and long-acting beta-agonists. Physical examination reveals nasal polyps. His symptoms are not well-controlled, and his physician suspects an overlap between severe asthma and chronic rhinosinusitis with nasal polyps. Which of the following combinations of biomarkers would be most appropriate to test in order to guide treatment for this patient's condition?

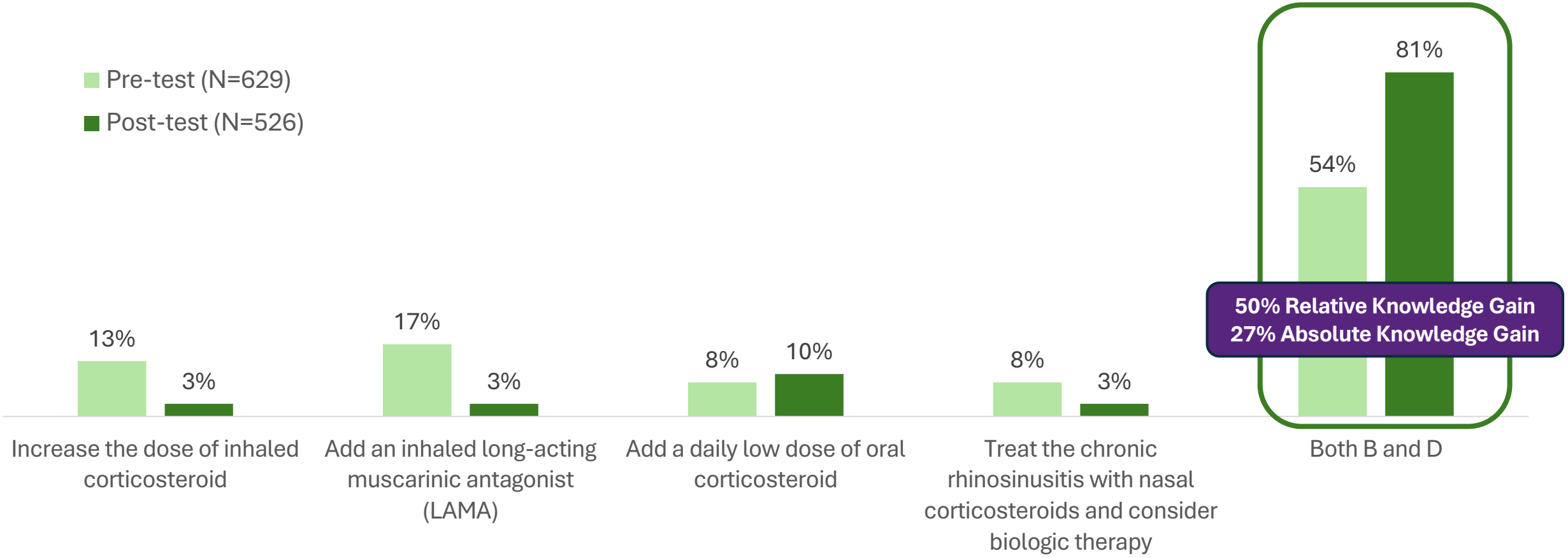


Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Online Enduring

Learning Objective: *Assess the impact of upper airway diseases to personalize treatment strategies for severe asthma.*

Question 4: A 45-year-old male with obesity, moderate obstructive sleep apnea on CPAP, chronic poorly controlled rhinosinusitis, and GERD presents to pulmonary clinic for follow-up of his asthma. His FEV1 is 60% predicted (FEV1/FVC is 0.65), Total IgE is 15 IU/mL, FeNO 10 ppb, and blood eosinophils 100. He has daily wheezing, cough, and dyspnea with 2 exacerbations in the last year despite consistent use of high-dose ICS/LABA. What is the most appropriate next step in managing this patient with severe asthma?

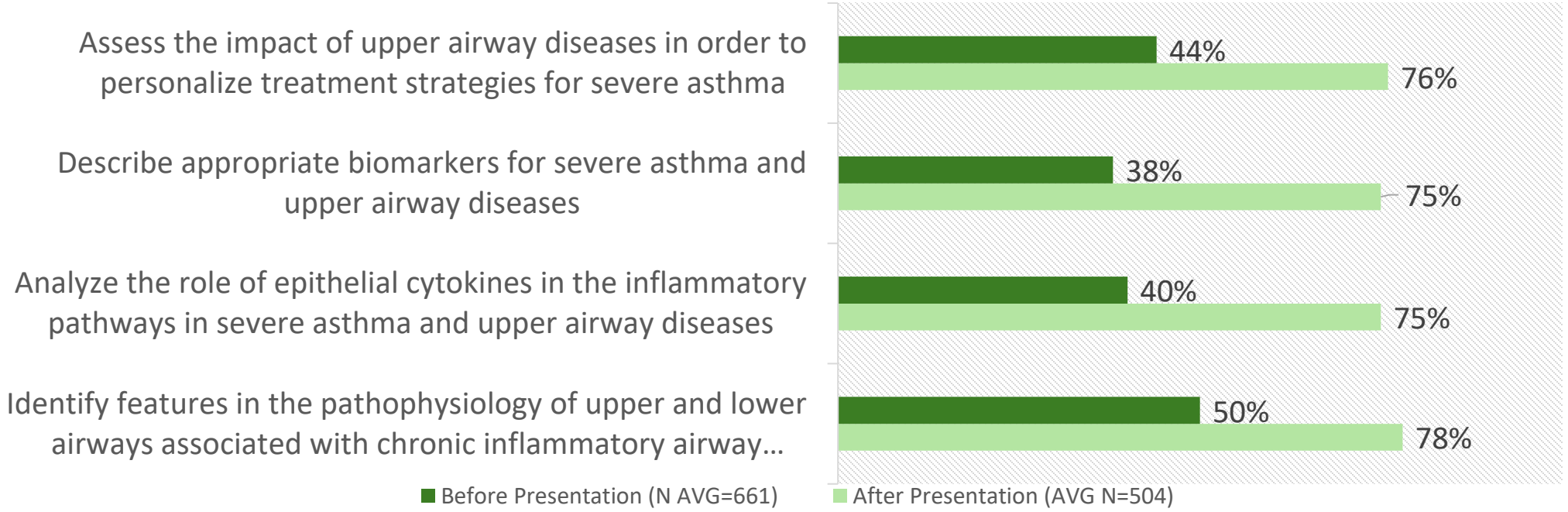


Level (4) Outcomes: Competence

Final Outcomes Summary – Online Enduring

National Jewish Health

Evaluation respondents reported their confidence as it relates to the learning objectives after the activity
(Very confident – somewhat confident)



Level (4) Outcomes: Competence

Final Outcomes Summary – Online Enduring

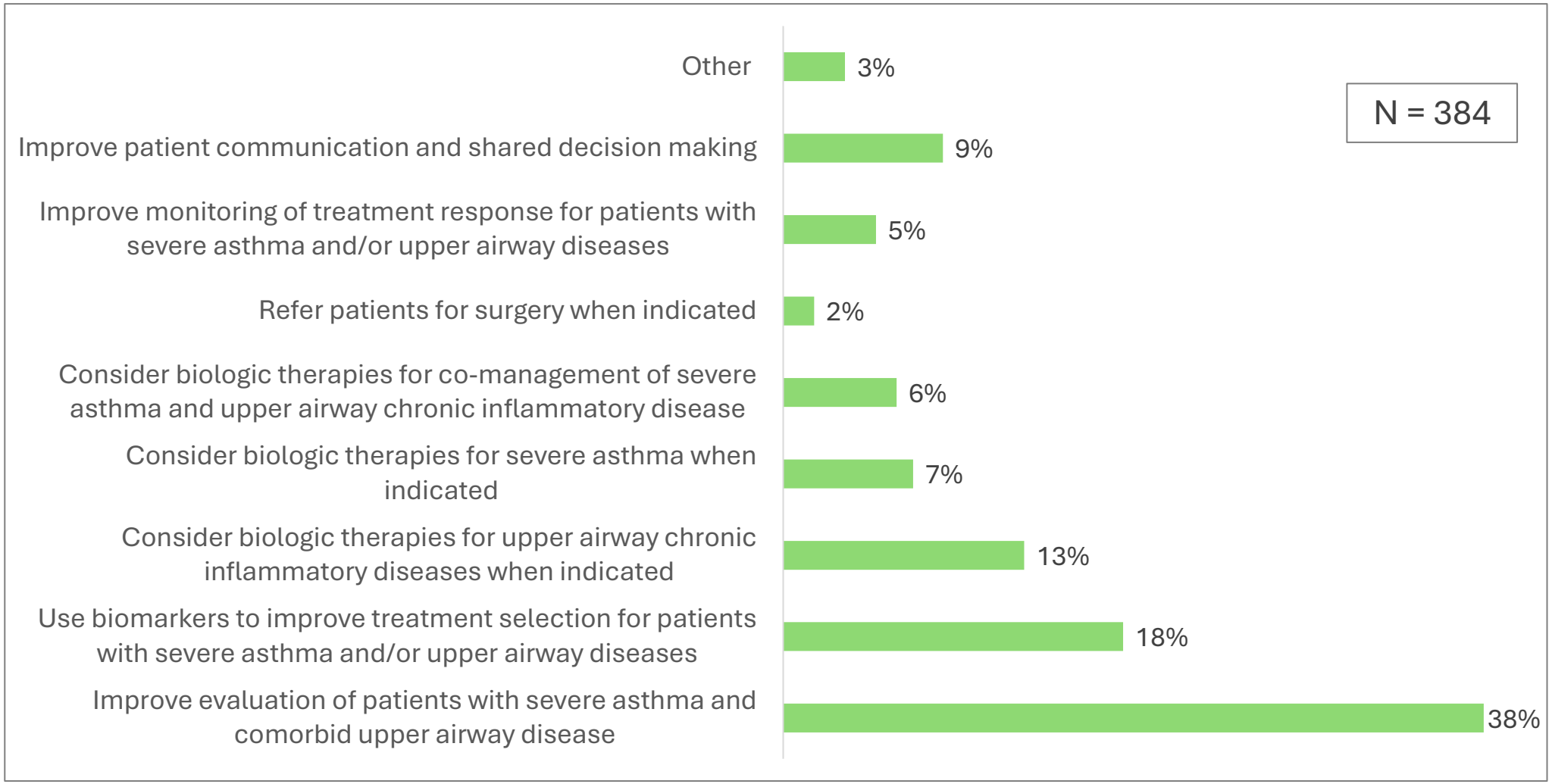
National Jewish Health

Top changes evaluation respondents intend to make in practice after participating in this activity:

93%

N=407

Evaluation respondents intend to make changes in practice as a result of the activity



Evaluation Survey Results

Final Outcomes Summary – Online Enduring

Key Take-Aways

- Consider the pathophysiology
- Learning correct diagnosis and therapy of severe asthma
- New biological treatment options. Also, the inflammatory pathways are complex.
- A better understanding of epithelial alarmins.
- A better understanding of unified airways principle.
- Asthma requires dedicated evaluation for accurate diagnosis.
- Multiple options available for treatment of severe asthma with co-morbidities.
- The importance of using biologic therapies and personalized approaches for managing severe asthma and upper airway diseases.
- Good physical exam and patient history; consider biologics in uncontrollable or unresponsive patients.
- Look for co-morbid conditions during the evaluation of patients with persistent asthma symptoms.
- Awareness of the pathophysiologic mechanisms in asthma.
- New knowledge of unified hypothesis of upper and small airways and the cytokines involved in severe asthma and chronic rhinosinusitis.

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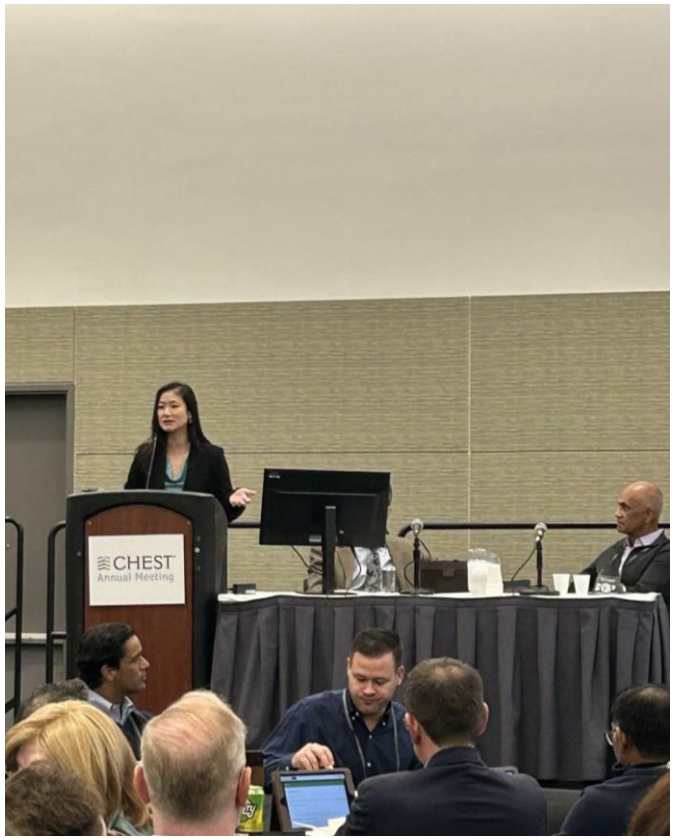
CHEST 2024 Annual Meeting | Live Symposia

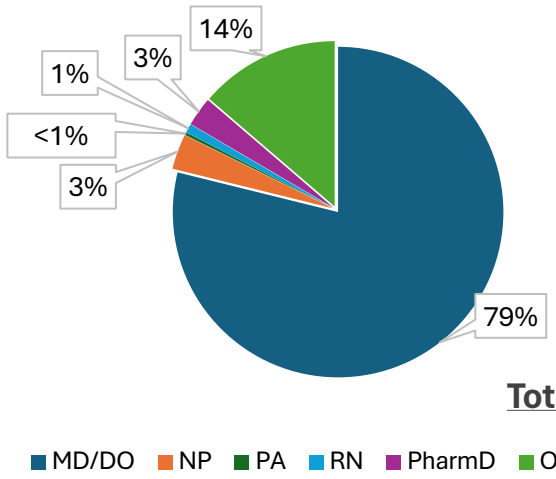
October 6th 2024 – Live Symposium | Boston, Massachusetts



Educational Impact Summary

Final Outcomes Summary – Live Symposium

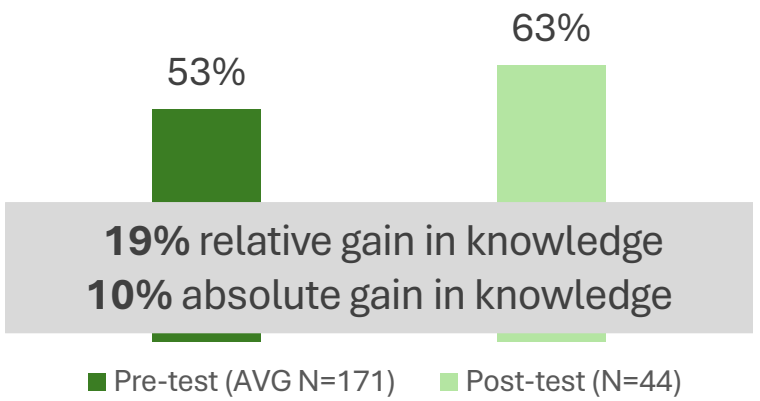
Participation



MD/DO=276
NP=12
PA=1
PharmD=10
RN=3
Other=48

Total Learners = 350

Learning Gain Across Objectives



19% relative gain in knowledge
10% absolute gain in knowledge

Evaluation

Met their educational needs **(98%)**

Reinforced or improved current skills **(98%)**

Improved ability to treat patients **(95%)**

N=44

98%

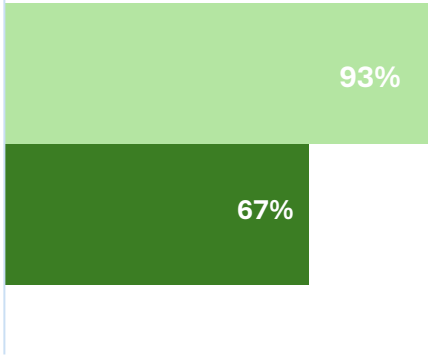
N=40

Evaluation respondents intend to make changes to practice as a result of the activity

Potential Impact To 18,648 Patient Visits This Year

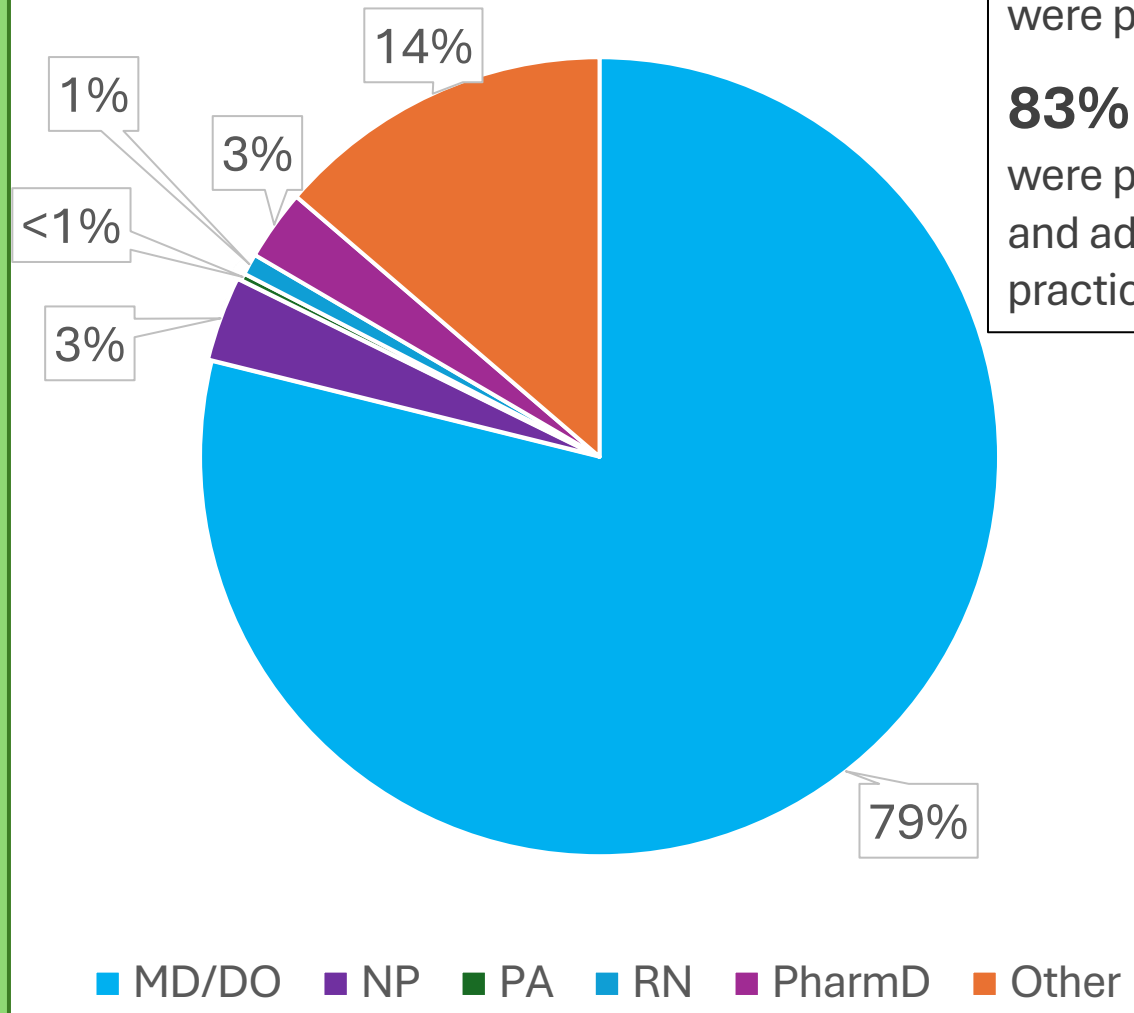
Confidence Across Objectives

How confident are you in your ability to personalize treatment strategies for patients with severe asthma and upper airway disease?



Level (1) Outcomes: Participation (Degree)

Final Outcomes Summary – Live Symposium



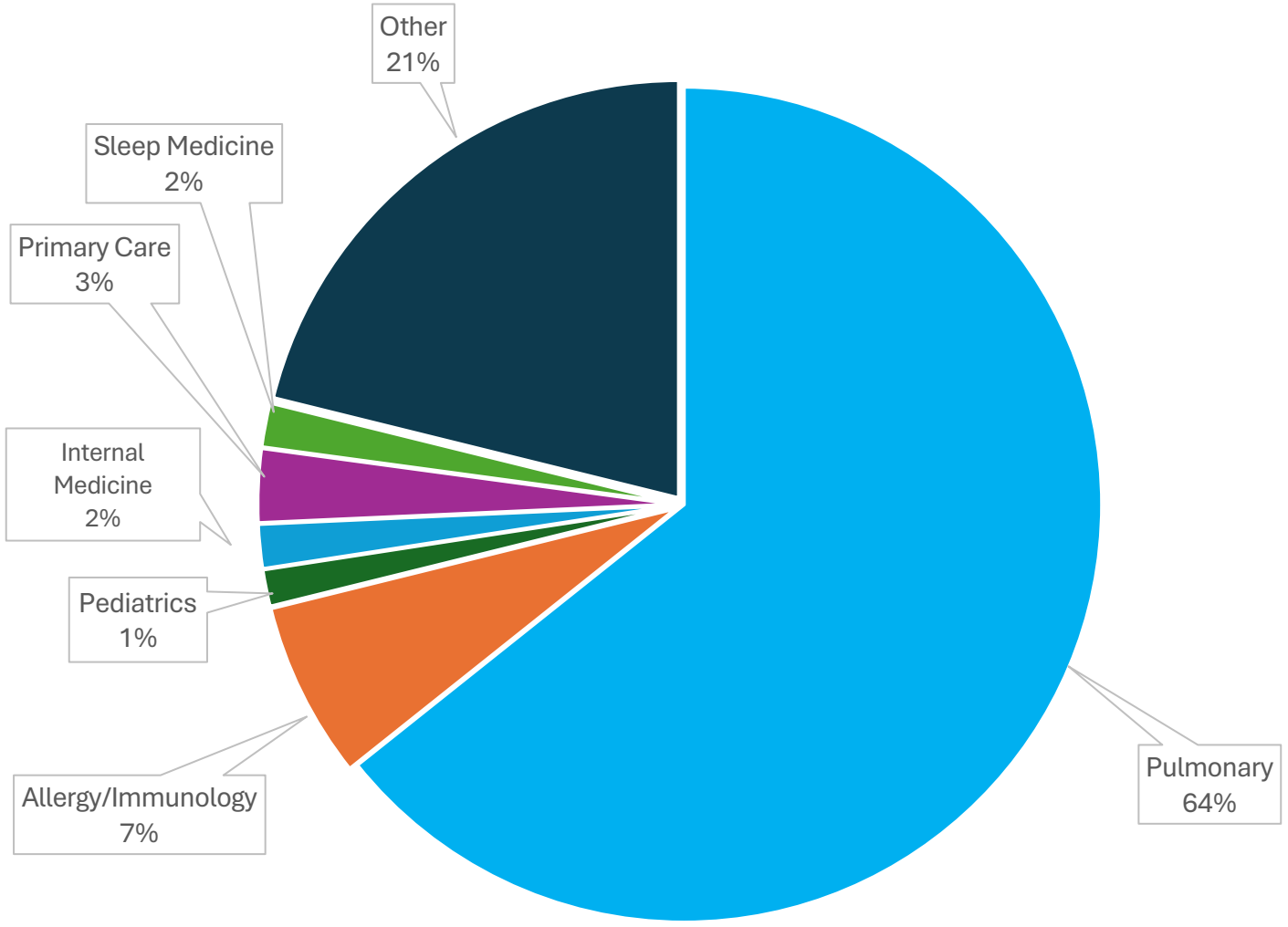
79% of learners were physicians

83% of learners were physicians and advanced practice providers

Degree	Total
MD/DO	276
NP	12
PA	1
RN	3
PharmD	10
Other	48
Total Learners	**350**

Level (1) Outcomes: Participation (Specialty)

Final Outcomes Summary – Live Symposium



Degree	Total
Pulmonary	225
Allergy/Immunology	24
Pediatrics	5
Internal Medicine	6
Primary Care	10
Sleep Medicine	6
Other	74
Total Learners	**350**

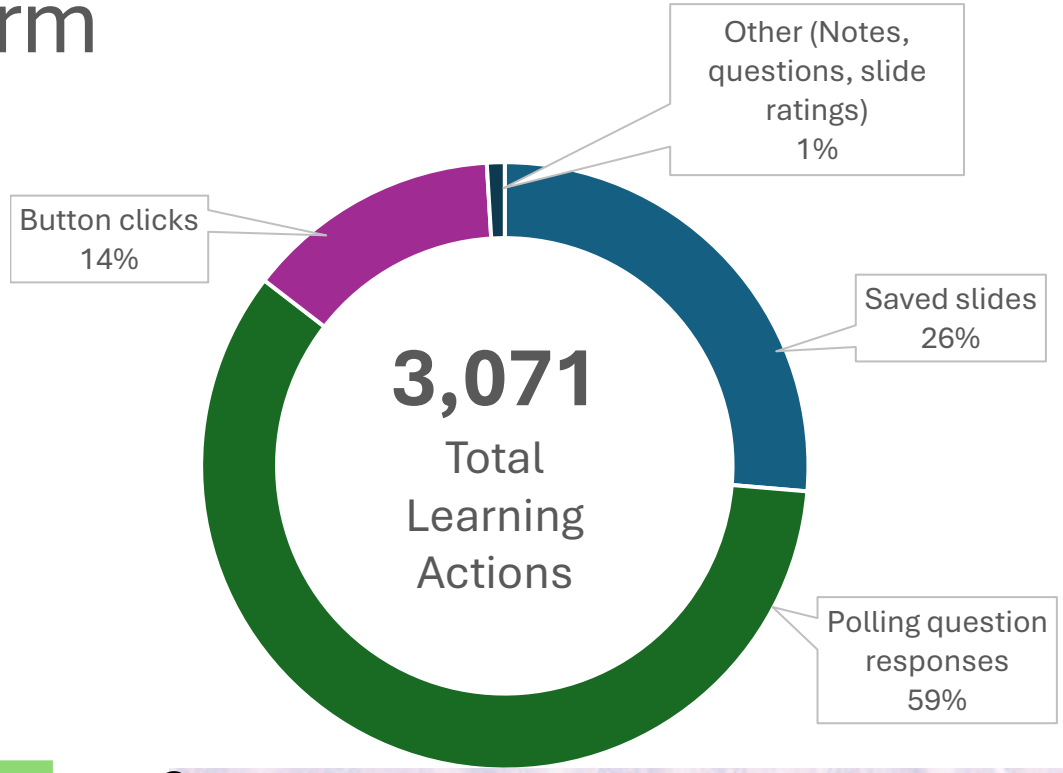
Audience Engagement: Array® Platform

Final Outcomes Summary – Live Symposium

175 learners logged into platform

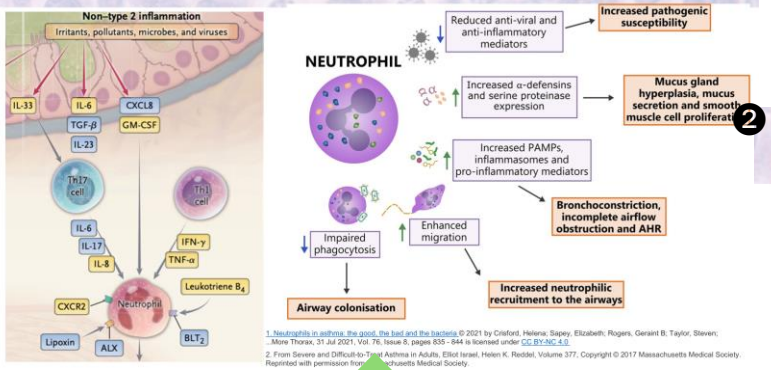
98% **engaged** (saved content, responded to polling, etc)

4% **highly engaged** (asked questions or took notes)



Top 3 most engaging slides

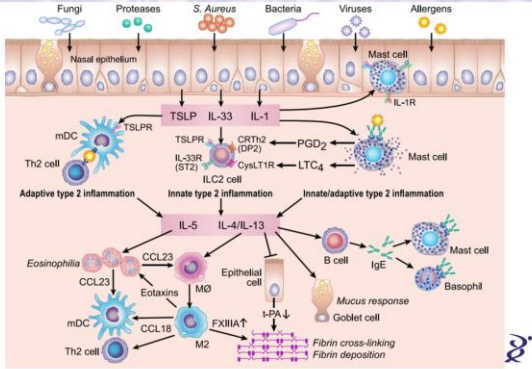
❶ Non-T2 Inflammation



45 slide saves
2 notes taken

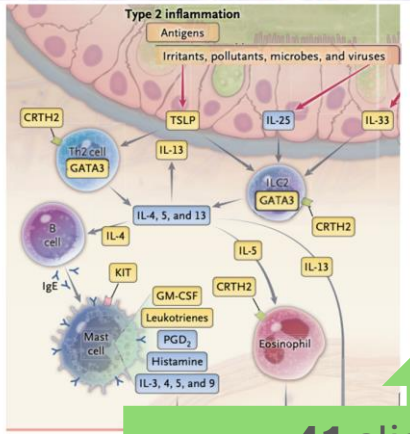
42 slide saves
1 note taken

❷ T2 Inflammation in Upper Airway: CRSwNP



41 slide saves
2 notes taken

❸ T2 Inflammation in Lower Airway: Asthma



- Epithelial alarmins lead to activation of Th2 and innate lymphoid cells 2 (ILC2)
- Type 2 cytokines
  - IL-4→ production of IgE, activation of mast cells, airway remodeling
  - IL-5→ maturation, activation and recruitment of eosinophils
  - IL-13→ mucus production, NO production, airway hyperresponsiveness/smooth muscle contractility, and airway remodeling
- Critical difference between upper and lower airway: lower airway has airway smooth muscle

Audience Engagement: Self-Reflection Questions in Array® Platform

Final Outcomes Summary – Live Symposium

“What brought you here today?”

- Addressing severe asthma
- New tips and updates in asthma management
- Personal or professional challenges with asthma
- Curiosity about new treatments
- Need for guidance on biologic therapies
- Desire for knowledge on emerging trends in asthma care

76 responses, with the majority focusing on asthma-related challenges, treatment updates, and relevance to their professional responsibilities.

75 responses with recurring mentions of biologic therapy, airway disease management and treatment access.

“What current challenges resonate?”

- Access to biologics and the difficulty in determining when to start or stop them
- Managing asthma in patients with high versus low T2 inflammation
- Challenges with upper airway management
- Determining the right biologic therapies for individual patients
- Patient access and equity in asthma treatment

“What patients come to mind with these challenges?”

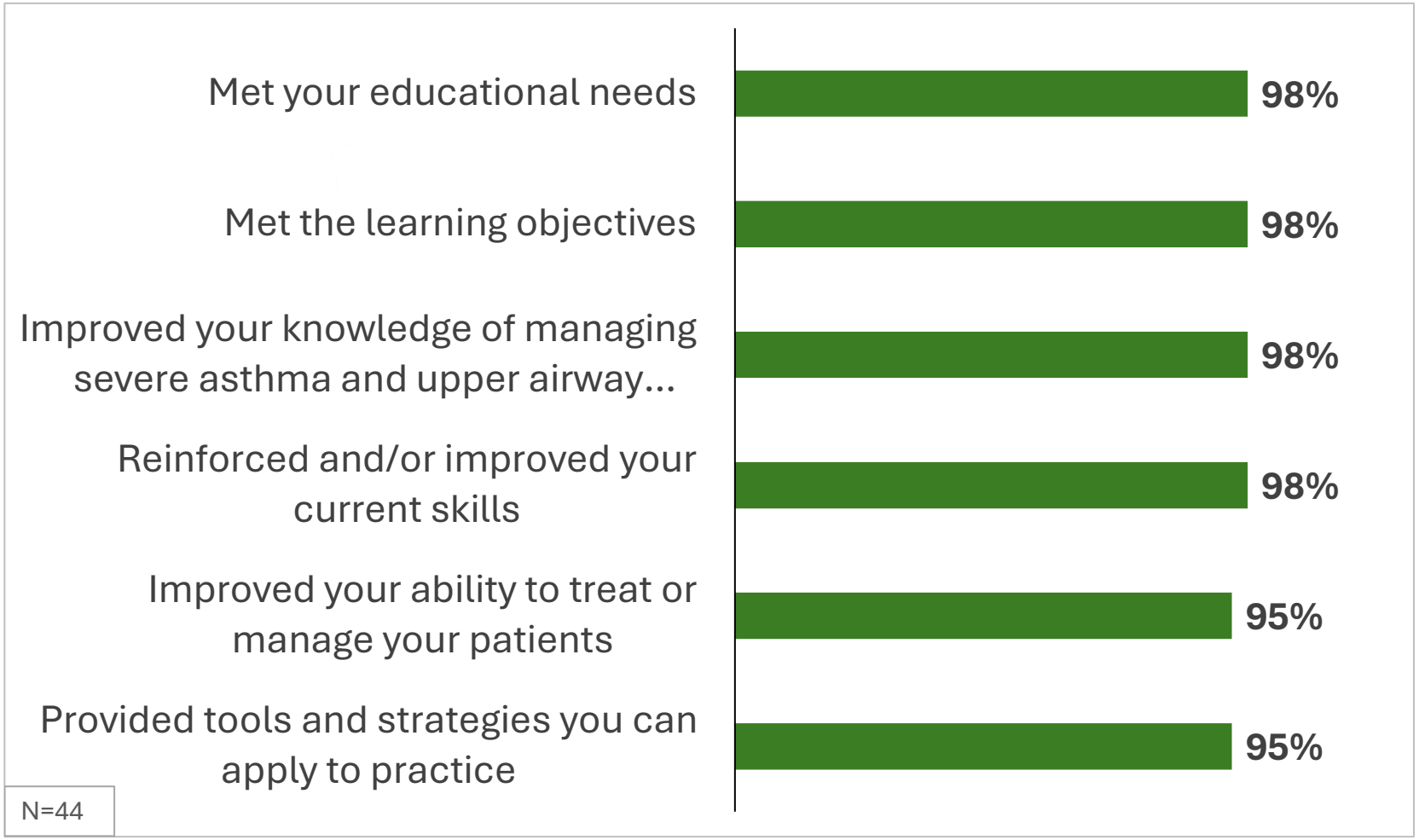
- Patients with uncontrolled asthma, especially those on maximum therapy
- Asthma patients with comorbidities such as obesity
- Young adults presenting with new asthma
- Underserved populations with limited access to care
- Patients where it’s unclear whether to manage primary care or refer to specialists

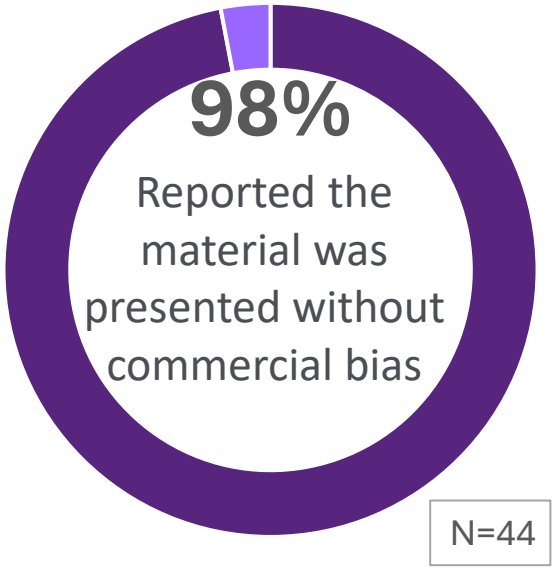
65 total responses, predominantly highlighting patients with severe asthma, those with additional health challenges, and underserved groups.

Level (2) Outcomes: Satisfaction

Final Outcomes Summary – Live Symposium

Evaluation Respondents reported they "Strongly Agree" or "Agree" that the activity:



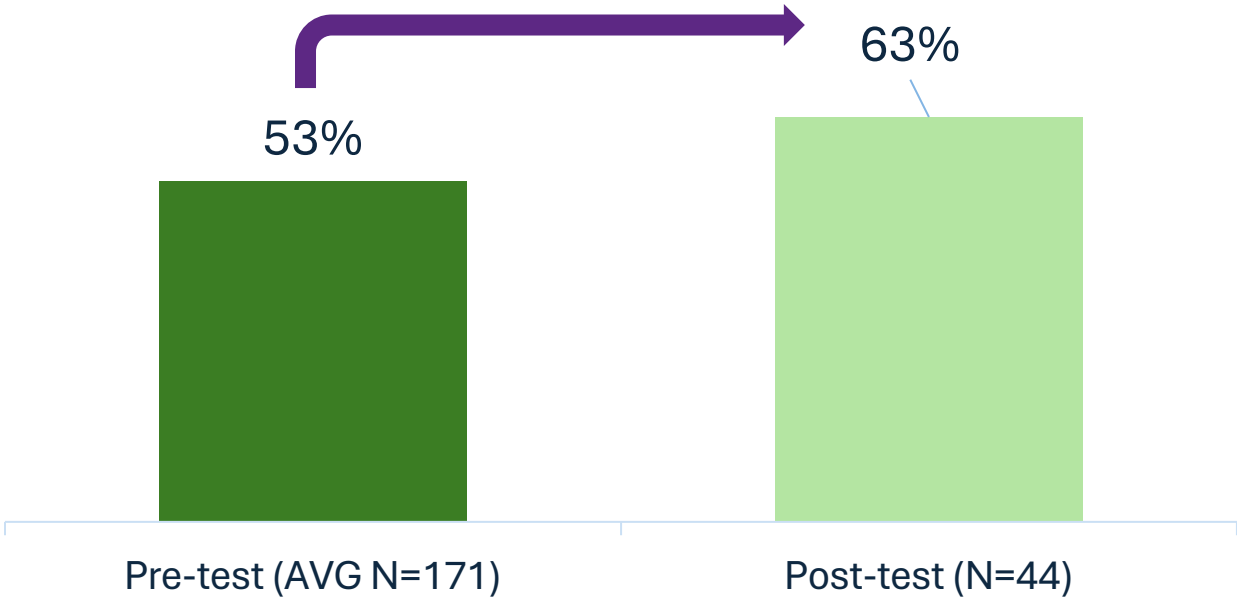


Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Live Symposium

National Jewish Health

Overall Knowledge Gain Across Learning Objectives



19% Overall Relative Knowledge Gain

10% Overall Absolute Knowledge Gain

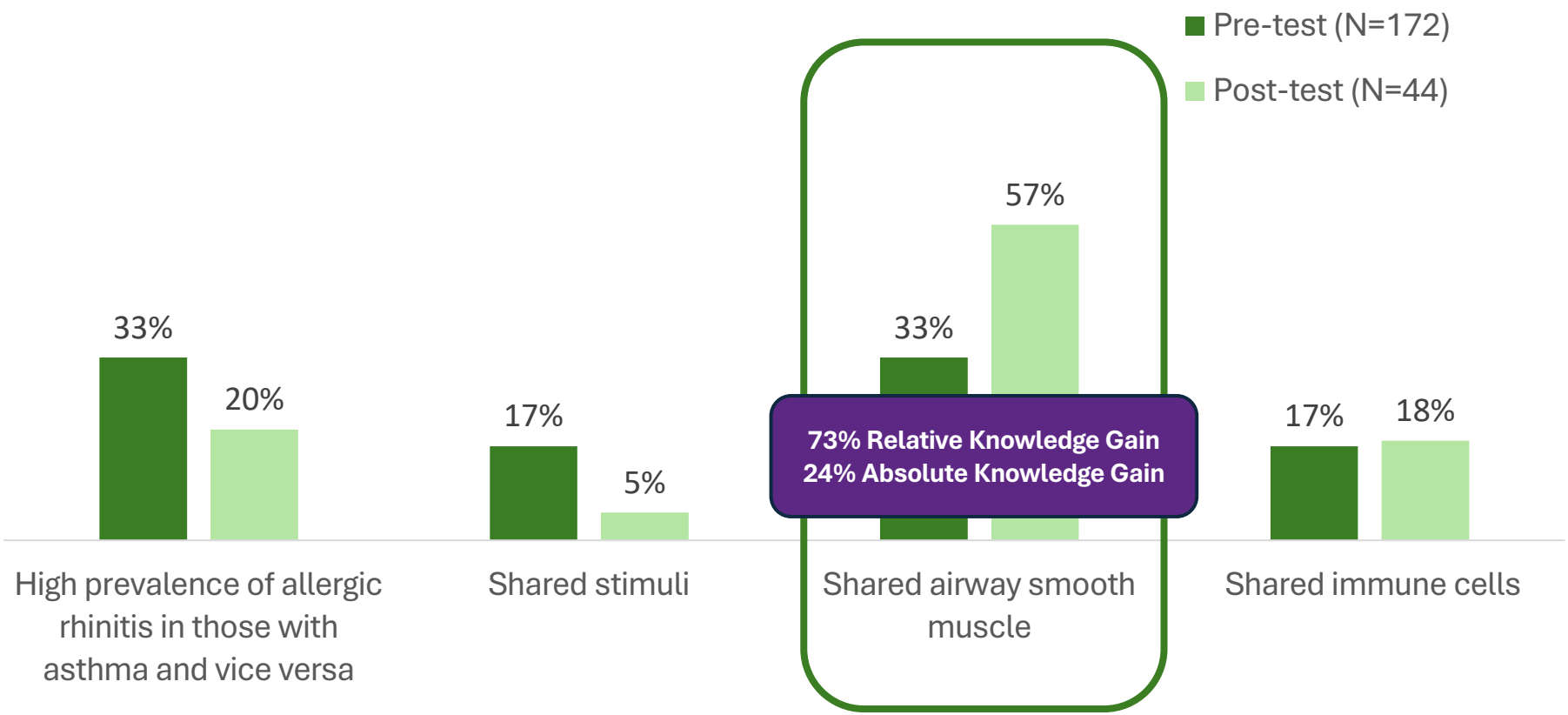
Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Live Symposium

National Jewish Health

Learning Objective: *Identify the features in the pathophysiology of upper and lower airways associated with chronic inflammatory airway diseases.*

Question 1: The unified airway concept is based on all of the following evidence EXCEPT:

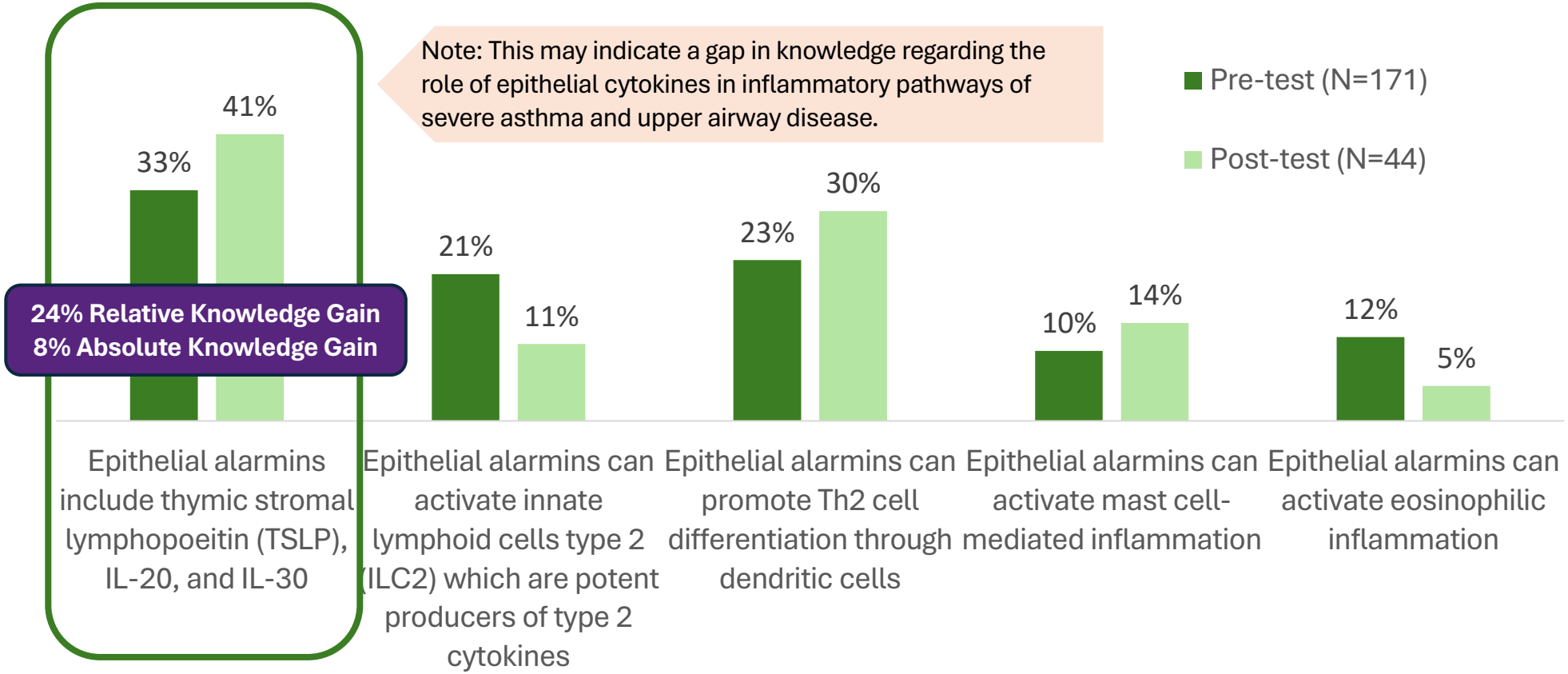


Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Live Symposium

Learning Objective: *Analyze the role of epithelial cytokines in the inflammatory pathways in severe asthma and upper airway diseases.*

Question 2: Which of the following statements regarding epithelial alarmins is NOT true?

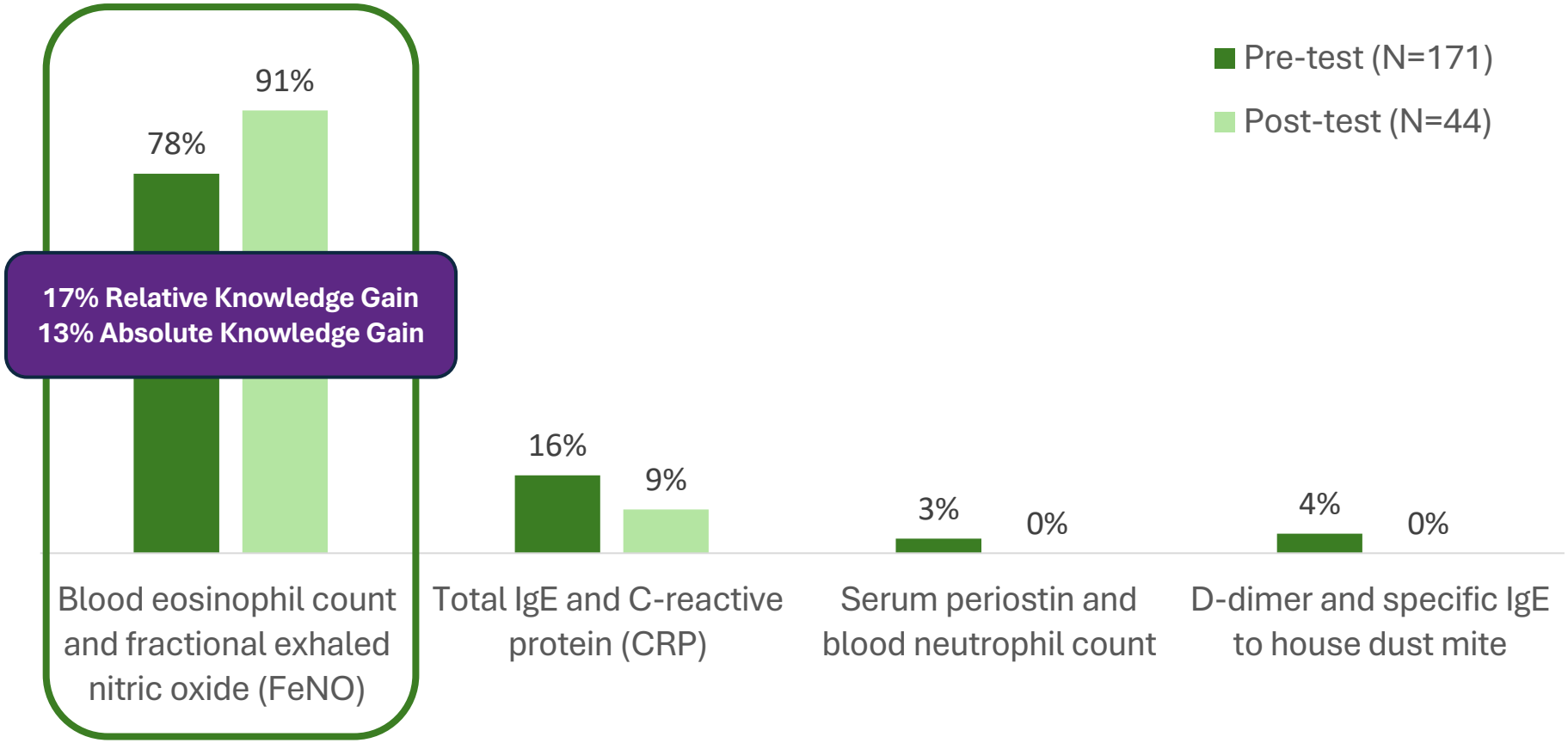


Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Live Symposium

Learning Objective: *Describe appropriate biomarkers for severe asthma and upper airway diseases.*

Question 3: A 45-year-old male with a history of severe asthma presents with worsening shortness of breath, nasal congestion, and anosmia (loss of smell) over the past 6 months. He has frequent exacerbations despite high-dose inhaled corticosteroids and long-acting beta-agonists. Physical examination reveals nasal polyps. His symptoms are not well-controlled, and his physician suspects an overlap between severe asthma and chronic rhinosinusitis with nasal polyps. Which of the following combinations of biomarkers would be most appropriate to test in order to guide treatment for this patient's condition?

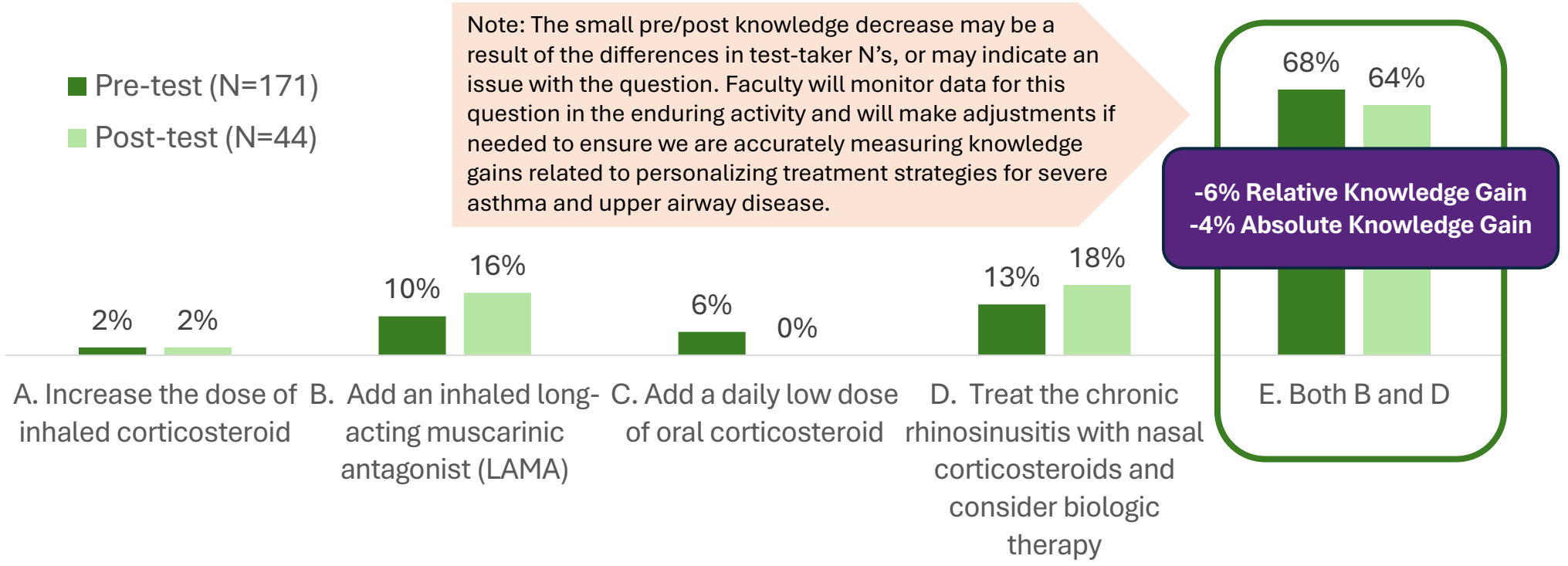


Level (3 & 4) Outcomes: Knowledge & Competence

Final Outcomes Summary – Live Symposium

Learning Objective: *Assess the impact of upper airway diseases to personalize treatment strategies for severe asthma.*

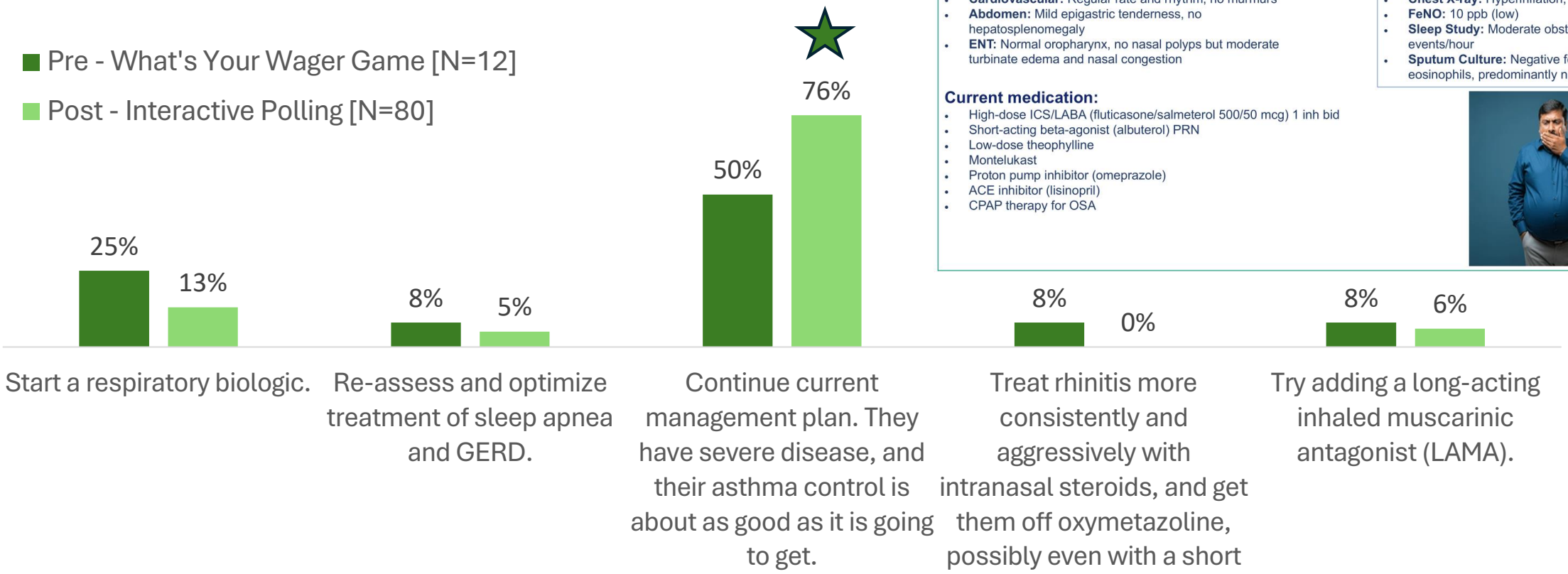
Question 4: A 45-year-old male with obesity, moderate obstructive sleep apnea on CPAP, chronic poorly controlled rhinosinusitis, and GERD presents to pulmonary clinic for follow-up of his asthma. His FEV1 is 60% predicted (FEV1/FVC is 0.65), Total IgE is 15 IU/mL, FeNO 10 ppb, and blood eosinophils 100. He has daily wheezing, cough, and dyspnea with 2 exacerbations in the last year despite consistent use of high-dose ICS/LABA. What is the most appropriate next step in managing this patient with severe asthma?

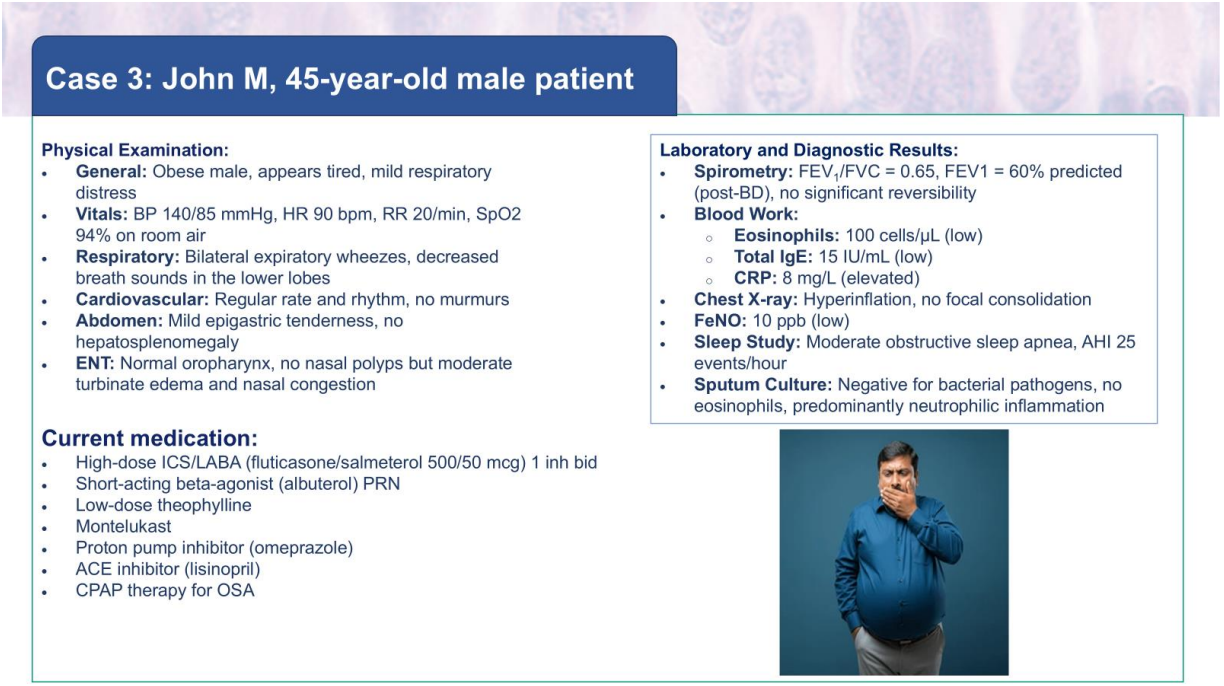


Level (3 & 4) Outcomes: Interactive Polling

Final Outcomes Summary – Live Symposium

Question: The following are possible next steps in the management of this patient with severe asthma. Which of these actions are *inappropriate*?

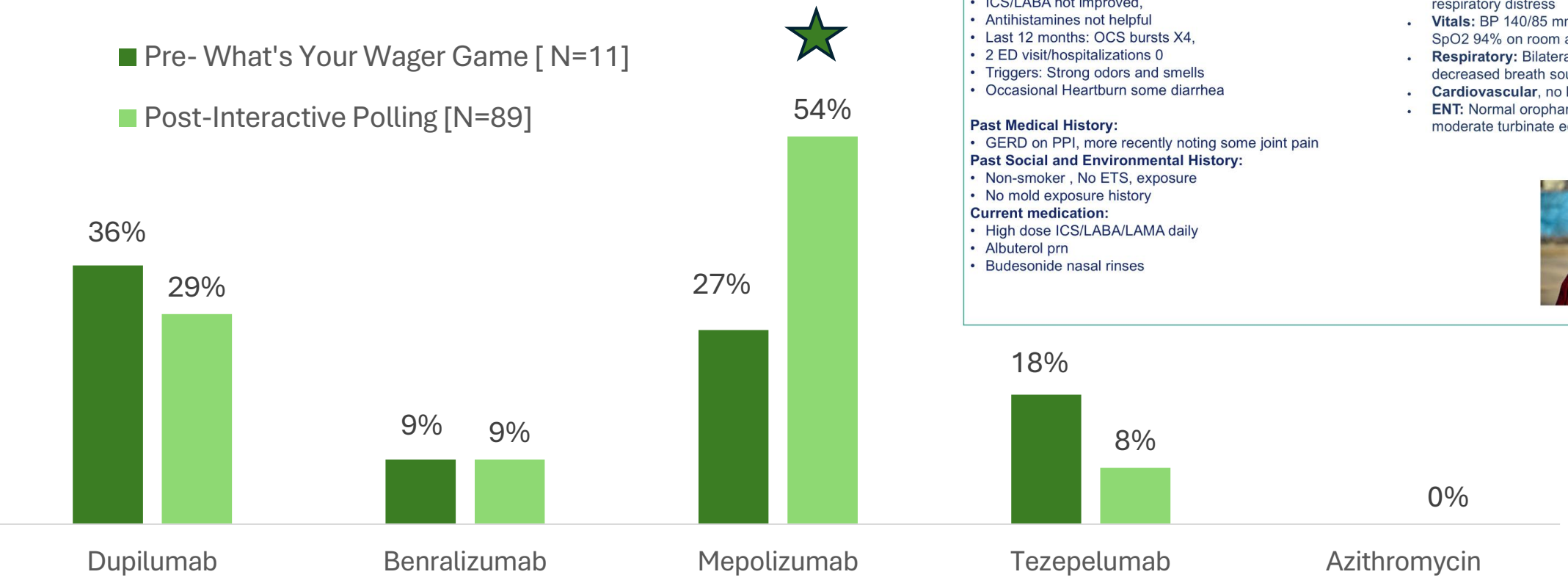




Level (3 & 4) Outcomes: Interactive Polling

Final Outcomes Summary – Live Symposium

Question: Which biologic would be most appropriate for this patient?



Case 4 - Bobby: 67-year-old Woman

History:
- History of chronic cough for past 2 years
nasal congestion and post-nasal drip
- Denies significant allergy history
- ICS/LABA not improved,
- Antihistamines not helpful
- Last 12 months: OCS bursts X4,
- 2 ED visit/hospitalizations 0
- Triggers: Strong odors and smells
- Occasional Heartburn some diarrhea

Past Medical History:
- GERD on PPI, more recently noting some joint pain

Past Social and Environmental History:
- Non-smoker , No ETS, exposure
- No mold exposure history

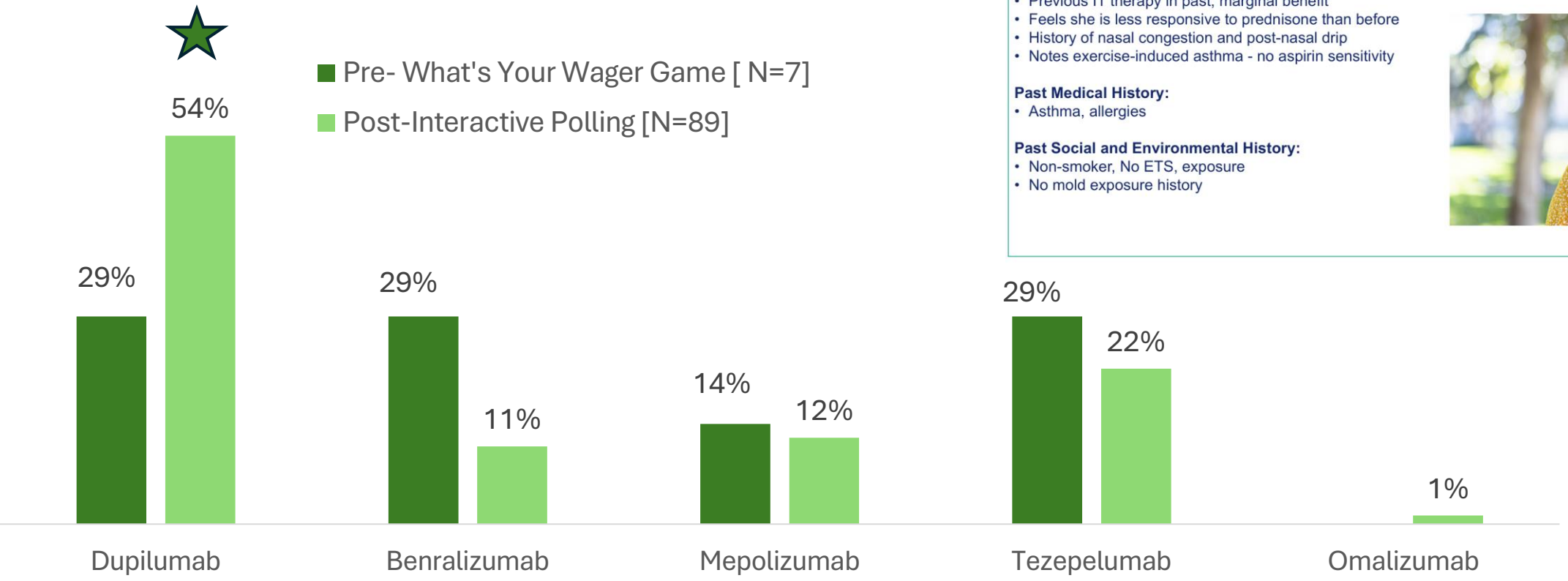
Current medication:
- High dose ICS/LABA/LAMA daily
- Albuterol prn
- Budesonide nasal rinses

Physical Examination:
- Regular rate and rhythm, no murmurs
- **Abdomen:** Mild epigastric tenderness
General: Obese woman, appears tired, mild respiratory distress
- **Vitals:** BP 140/85 mmHg, HR 90 bpm, RR 20/min, SpO2 94% on room air
- **Respiratory:** Bilateral expiratory wheezes, decreased breath sounds in the lower lobes
- **Cardiovascular**, no hepatosplenomegaly
- **ENT:** Normal oropharynx, no nasal polyps but moderate turbinate edema and nasal congestion

Level (3 & 4) Outcomes: Interactive Polling

Final Outcomes Summary – Live Symposium

Question: Which biologic would be most appropriate for this patient?



Case 5 - Chanel: 30-year-old Woman

History:
- History of chronic asthma for 20 years, atopic dermatitis
- History of environmental allergies: dogs, cats, trees
- Had cat removed, no major change
- Trial omalizumab for 6 months, minimal benefit
- Previous IT therapy in past, marginal benefit
- Feels she is less responsive to prednisone than before
- History of nasal congestion and post-nasal drip
- Notes exercise-induced asthma - no aspirin sensitivity

Past Medical History:
- Asthma, allergies

Past Social and Environmental History:
- Non-smoker, No ETS, exposure
- No mold exposure history

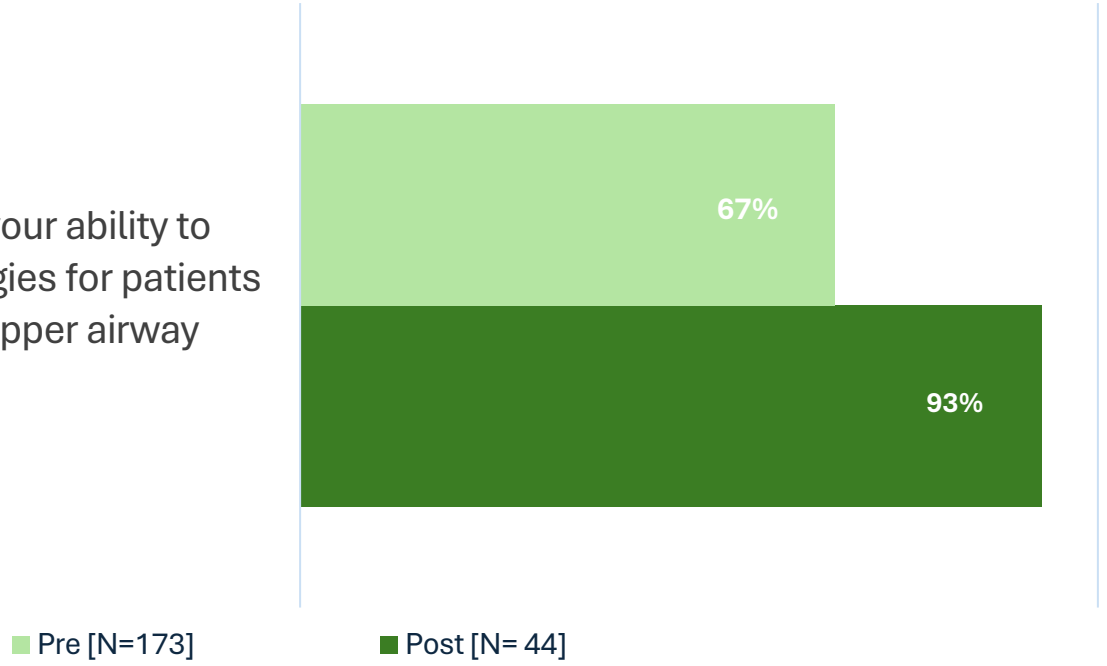
Current medication:
- High dose ICS/LABA/LAMA daily
- Albuterol prn, used 2 to 4 times per day
- Budesonide nasal rinses

Level (4) Outcomes: Competence

Final Outcomes Summary – Live Symposium

Respondents reported their confidence in personalizing treatment strategies for patients with severe asthma and upper airway disease (Very confident – confident)

How confident are you in your ability to personalize treatment strategies for patients with severe asthma and upper airway disease?



98%

N=43

Evaluation respondents reported the patient case scenarios were an effective tool for improving their confidence with patient management

Level (4) Outcomes: Competence

Final Outcomes Summary – Live Symposium

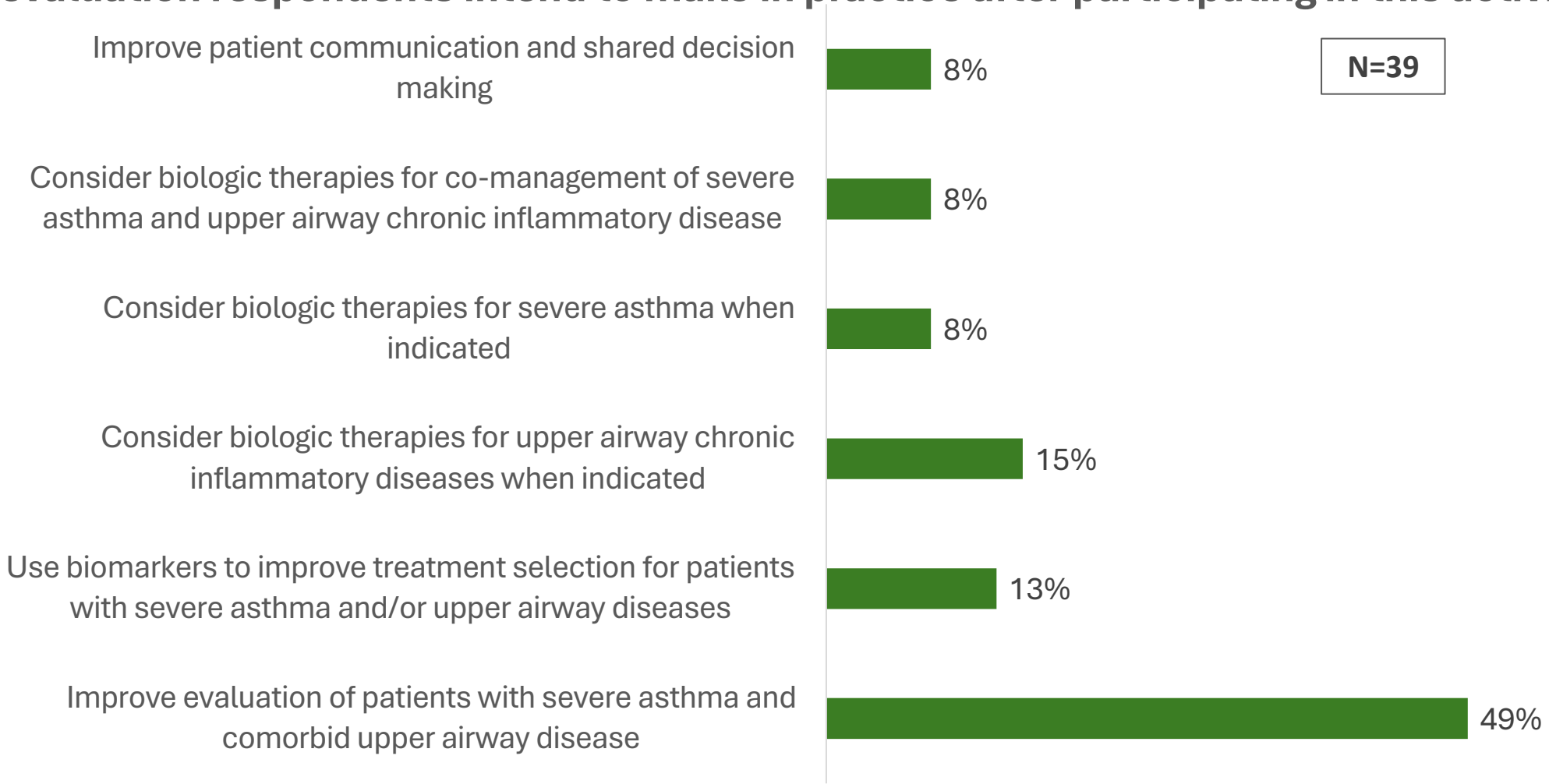
National Jewish Health

98%

N=40

Evaluation respondents intend to make changes in practice as a result of the activity

Top changes evaluation respondents intend to make in practice after participating in this activity:



Evaluation Survey Results

Final Outcomes Summary – Live Symposium

National Jewish Health

Key Takeaways

- When to initiate immunotherapy for patient with asthma and allergic polyps
- Lowering threshold for using biologics
- Not delaying biological treatment if clinically indicated
- Consider biologic therapies where appropriate
- Broader knowledge of indications for biologics
- The airway unified concept
- Patients need more thorough evaluation prior to a treatment plan
- Expanding range of therapies for asthma
- Personalize strategy
- Good explanation of the cellular mechanisms

Future Topics

- Side effects of immunotherapy
- MPA, GPA, EGPA
- Non T2 asthma
- Biologic evaluation
- More information about airway disease
- COPD and upper airway inflammation

"It was an outstanding activity
"Great job. I would love to attend again and again ."

- Live symposium attendees

Level (5) Performance

Final Outcomes Summary – Live Symposium

National Jewish Health

45-Day Follow-up Survey

While the response rate to the follow-up survey was low with only one respondent (a pulmonologist), their responses indicate that participation in the activity has made a positive impact on their practice and their patients.

What change(s) have you incorporated into practice as a result of this activity?

- ☑ *Improved evaluation of patients with severe asthma and comorbid upper airway disease*
- ☑ *Considered biologic therapies for chronic inflammatory diseases of the upper airway*
- ☑ *Considered biologic therapies for severe asthma*

5-9

of my patients have benefited from the information I learned in the activity

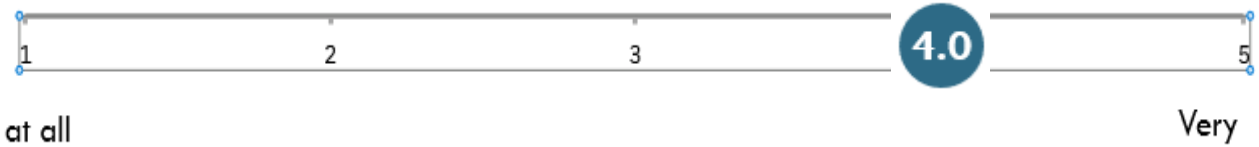
4 out of 5 reported on post-activity confidence in:

Identifying the features in the pathophysiology of upper and lower airways associated with chronic inflammatory airway diseases.

Analyzing the role of epithelial cytokines in the inflammatory pathways in severe asthma and upper airway diseases.

Describing appropriate biomarkers for severe asthma and upper airway diseases.

Assessing the impact of upper airway diseases in order to personalize treatment strategies for severe asthma.



Accreditation Details

Final Outcomes Summary – Online Enduring and Live Symposium

National Jewish Health is accredited with Commendation by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. The NJH Office of Professional Education produced and accredited this program and adhered to the updated ACCME guidelines.

National Jewish Health designates the live and enduring activities for a maximum of 1.0 *AMA PRA Category 1 Credit*™.