

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection



Final Status Report

Live and Online Enduring Activity

*This educational activity was supported by an
educational grant from Insmed*



#1 In Respiratory Care



Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

Program Overview

The program is an innovative and multimedia live educational program held as an adjunct symposium to the American College of Chest Physicians Annual Meeting (CHEST 2019) and an online enduring activity based on that session. The goal of this live and online enduring program is to improve the awareness, knowledge, and competency of pulmonologists and infectious disease physicians in the diagnosis, management, and treatment of nontuberculous mycobacteria (NTM). The engaging multimedia program features expert faculty, a patient perspective video clip, interactive polling with immediate feedback, and infographic clinical reference aid to help attendees convert information into practice.

Learning Objectives

1. Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events.
2. Distinguish appropriate personalized NTM treatment approach according to patient's clinical presentation.
3. Review strategies for patient adherence and treatment completion to improve patient outcomes.

“All of the activity’s content was very important and interesting and the format and presentation was clear and easy to understand.”

- Online enduring participant

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection



Charles Daley, MD

Chief, Division of Mycobacterial & Respiratory Infections
Professor of Medicine
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University of Colorado Denver
Denver, Colorado



Shannon H. Kasperbauer, MD

Associate Professor of Medicine
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Denver, Colorado



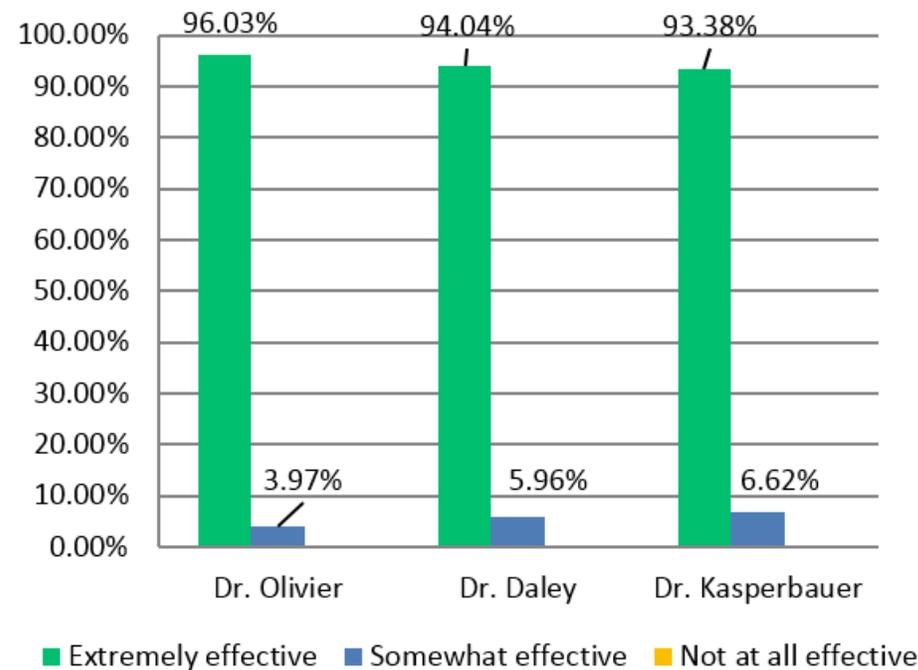
Kenneth N. Olivier, MD, MPH

Senior Clinician
Pulmonary Clinical Medicine Section
National Institutes of Health
Bethesda, Maryland



Attendees overwhelmingly felt that the expert faculty were extremely effective with their presentation of the material

For the Faculty Presenters, rate the effectiveness in communicating the key points of the presentation:



Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

Online Enduring Activity Launched November 26, 2019

CME University

Updates in Nontuberculous Mycobacteria (NTM): Best Practices in Diagnosis, Management and Personalized Treatment Selection

Provided by National Jewish Health

National Jewish Health
Breaching Science to Life.

Supported by an Educational Grant from Insmed

Release Date: November 26, 2019 Valid for credit through November 25, 2020

ESTIMATED ESTIMATED TIME TO COMPLETE
1 hour

FACULTY

- Charles Daley, MD**
Chief, Division of Mycobacterial and Respiratory Infections
Professor of Medicine
National Jewish Health
University of Colorado Denver
Denver, Colorado
- Shannon H. Kasperbauer, MD**
Associate Professor of Medicine
Division of Mycobacterial and Respiratory Infections
National Jewish Health
University of Colorado Denver
Denver, Colorado
- Kenneth N. Olivier, MD, MPH**
Senior Clinician
Pulmonary Clinical Medicine Section
National Institutes of Health
Bethesda, Maryland

TARGET AUDIENCE
Pulmonologists, Infectious Disease Physicians, and Internal Medicine Physicians.

EDUCATIONAL OBJECTIVES
After completing this activity, the participant should be better able to:

Member Login
Username:
Password:
Create New Account Login
Forgot my password

User Menu
Home
My Profile
My History
First Time user

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Updates in Nontuberculous Mycobacteria (NTM): Best Practices in Diagnosis, Management and Personalized Treatment Selection



Format: Video
Time to Complete: 1.00 hour
Released: November 26, 2019
Expires: November 25, 2020
Maximum Credits:
1.00 / AMA PRA Category 1 Credit™

ENROLL TODAY
Activity Runs: Nov 26th 2019 – Nov 25th 2020
Register now to gain access to this course.

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Description **Educational Objectives** CME/CE Information Faculty and Disclosures Instructions

<https://www.mycme.com/courses/updates-in-nontuberculous-mycobacteria-ntm-best-practices-in-diagnosis-management-and-personalized-treatment-selection-6321>

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

Online Enduring Activity Additional Launch April 17, 2020



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Best Practices for Diagnosis, Management and
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Updates in Nontuberculous Mycobacteria (NTM): Best Practices in Diagnosis, Management and Personalized Treatment Selection

Released On
April 17, 2020

Expires On
November 25, 2020

Media Type
Internet

Completion Time
60 minutes

Specialty
Infectious Disease, Internal
Medicine, Pulmonology

<https://learning.freecme.com/a/34681P3qmCcG>

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Online Report]

Qualitative Educational Impact Summary: Final Online Enduring

Participants	Educational Impact	Intended Practice Change
4,587 Learners 1,286 Completers	100% relative gain in participants' ability to analyze recent evidence, guidelines and best practices for the diagnosis and treatment of NTM following the educational activity. [N=1286]	82% Reported that they intended to make changes to their practice following the activity [N=1162]
Who see 17,790 NTM Patients Monthly	173% relative gain of participants' ability to distinguish the appropriate personalized NTM treatment approach following the educational activity. [N=1286]	29% Identified changes related to diagnosis and treatment as the primary change they planned to make
Which translates to 213,480 Patient Visits Annually	86% relative gain in participants ability to review strategies for patient adherence and treatment completion following the educational activity. [N=1286]	42% Listed treatment and management topics as their key take-away for this presentation

**Numbers are based on post-test and evaluation survey data.*

**Learners include all three distribution partners and include those who visited the overview page*

**Completers include all three distribution partners*

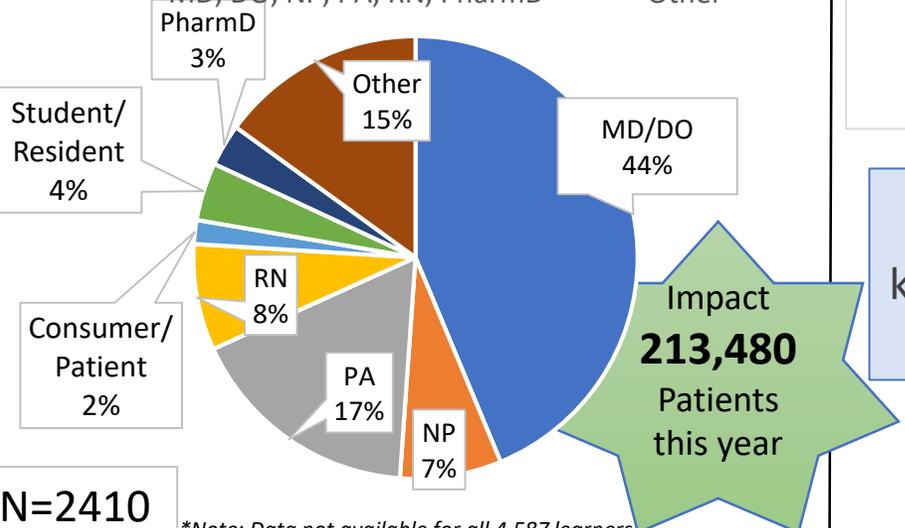
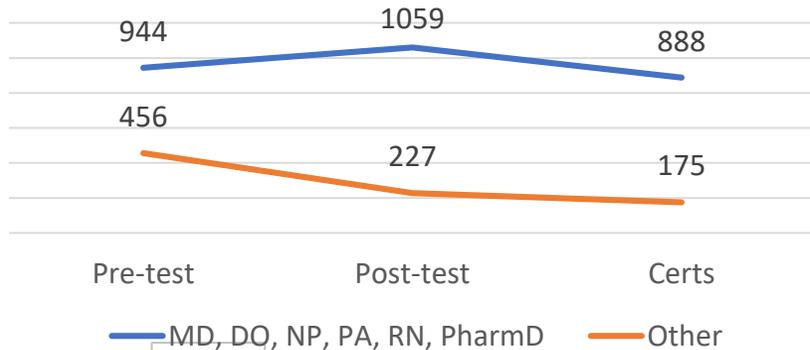
Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Online Report]

Quantitative Educational Impact Summary: Final Online Report

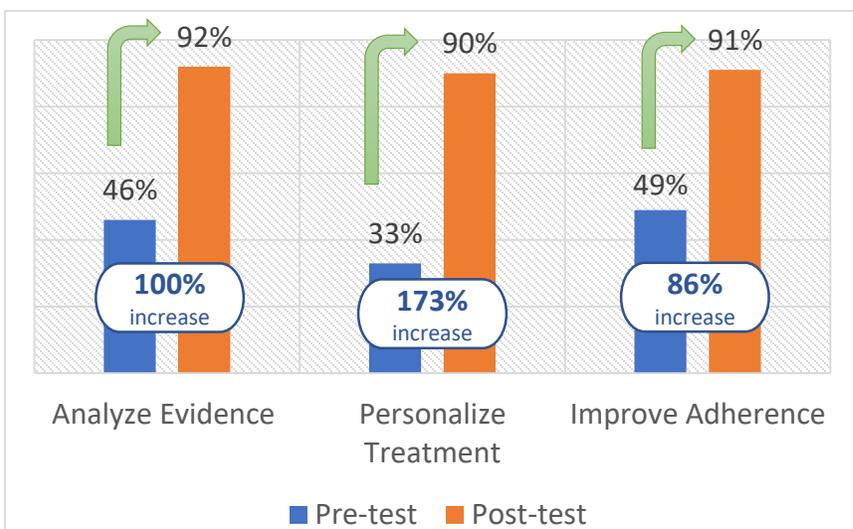
Participation

4,587 Learners, 1,286 Completers, 1,063 Certs



*Note: Data not available for all 4,587 learners.

Learning Gains Across Objectives



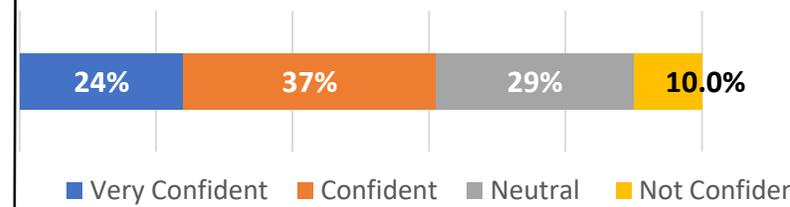
Overall **117%** relative gain in knowledge across all learning objectives combined.

Intent to Change and Learner Needs

82% of learners stated they intend to make changes to their practice [N=1162]

- ✓ 29% improve process of diagnosis and treatment of NTM
- ✓ 18% apply overall knowledge and awareness of NTM
- ✓ 13% referral to specialist

Confidence @ Post-Test



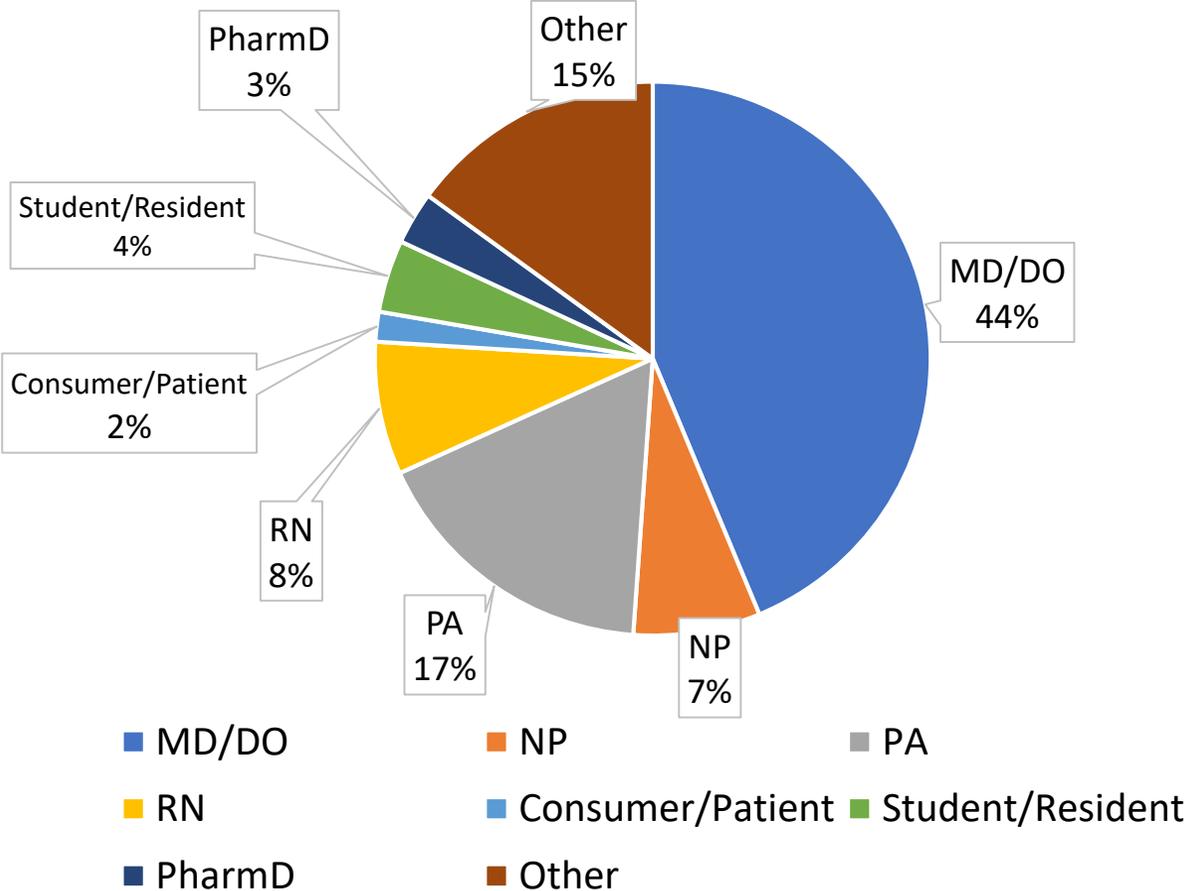
"Excellent program with information useful for non-pulmonologists."
- Online enduring participant

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[Final Online Report]

Level 1 Outcome: Participation Final Online Report

Participation by Designation



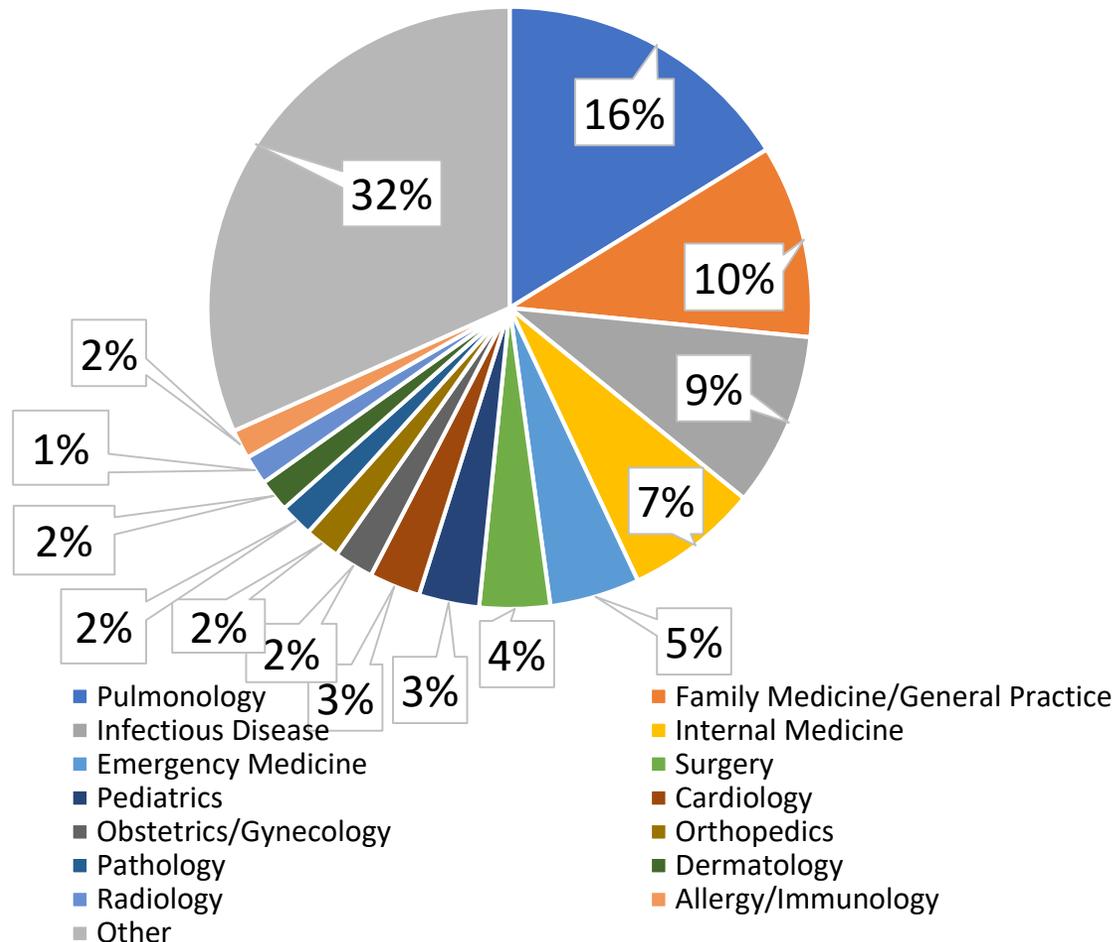
Designation	# of Participants
MD/DO	1054
PA	412
RN	187
NP	178
Student/Resident	102
PharmD	74
Consumer/Patient	42
Other	361
Total	2410

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Level 1 Outcome: Participation Final Online Report

Participation by Specialty



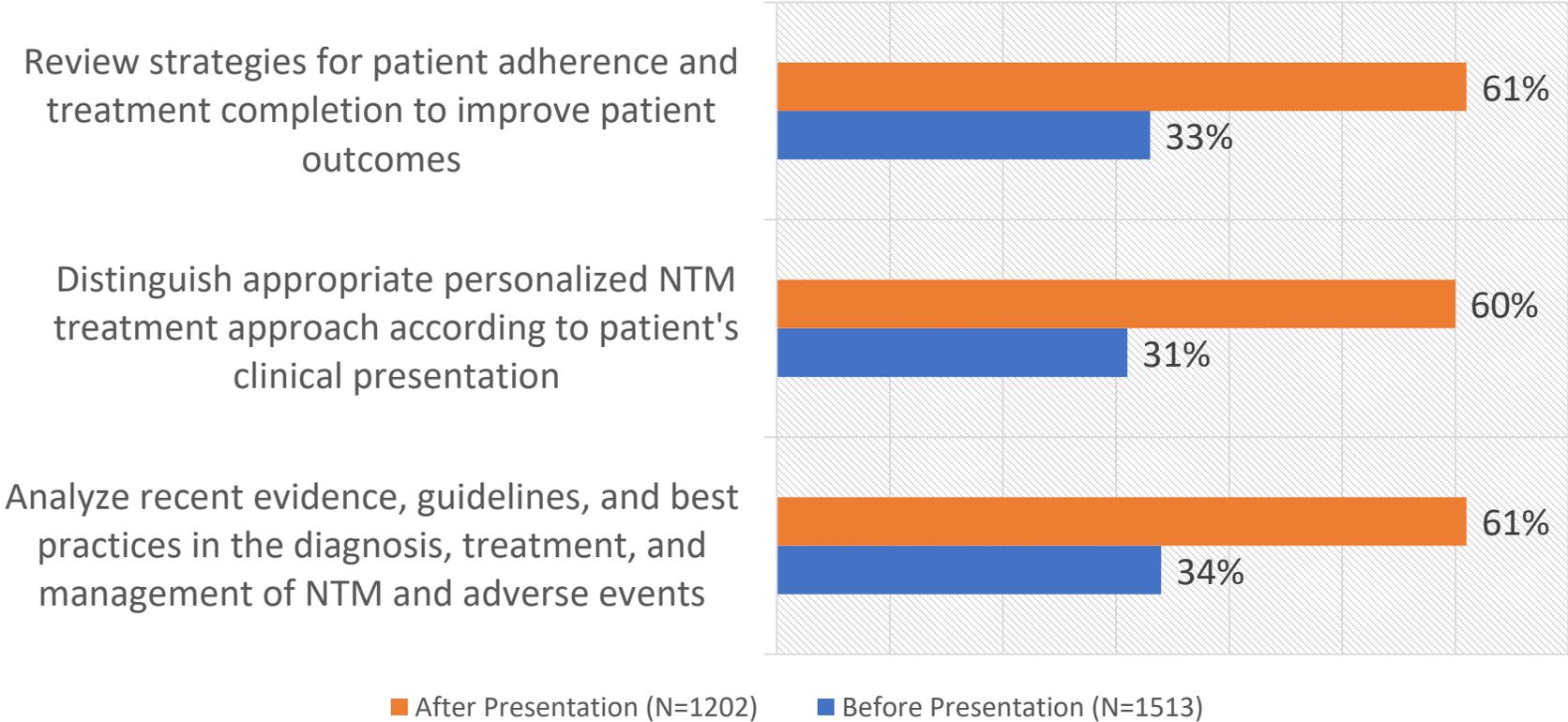
Specialty	# of Participants
Pulmonology	390
Family Medicine/General Practice	250
Infectious Disease	225
Internal Medicine	172
Emergency Medicine	116
Surgery	91
Pediatrics	78
Cardiology	66
Obstetrics/Gynecology	51
Orthopedics	46
Pathology	43
Dermatology	42
Radiology	38
Allergy/Immunology	38
Other	764
Total	2410

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Online Report]

Level 2&3 Outcomes: Learning & Satisfaction Final Online Report

Participants reported their confidence regarding each learning objective (confident – very confident)



Following the online activity, learners reported an **85%** relative gain in confidence related to each of the stated learning objectives



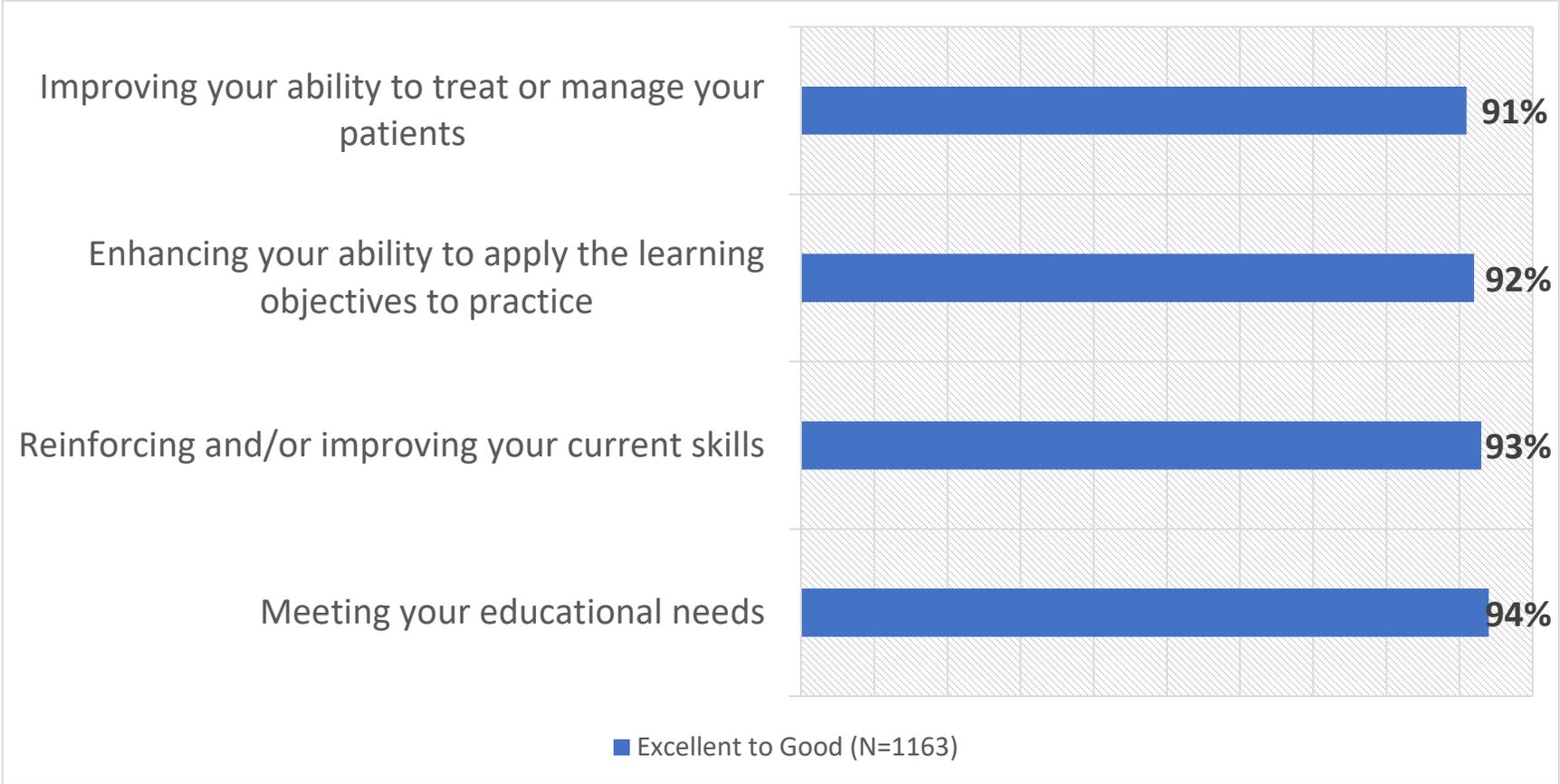
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[Final Online Report]

Level 2&3 Outcomes: Learning & Satisfaction Final Online Report

Analysis of participants responses related to educational needs

Participants reported the activity was “Excellent” to “Good” at:



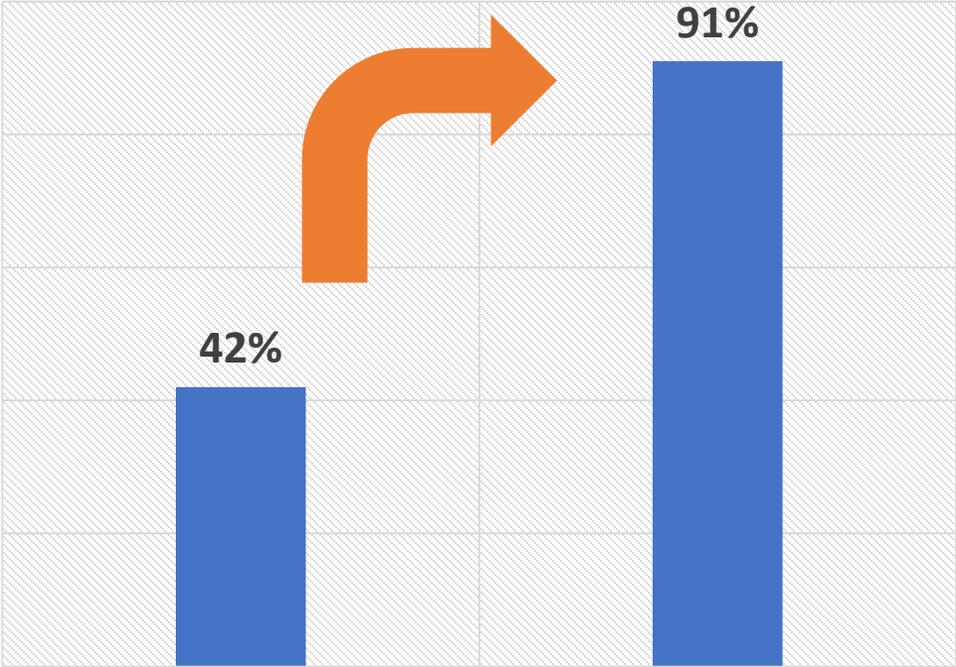
Participants reported high levels of satisfaction related to the ability of the activity to impact practical applications



Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

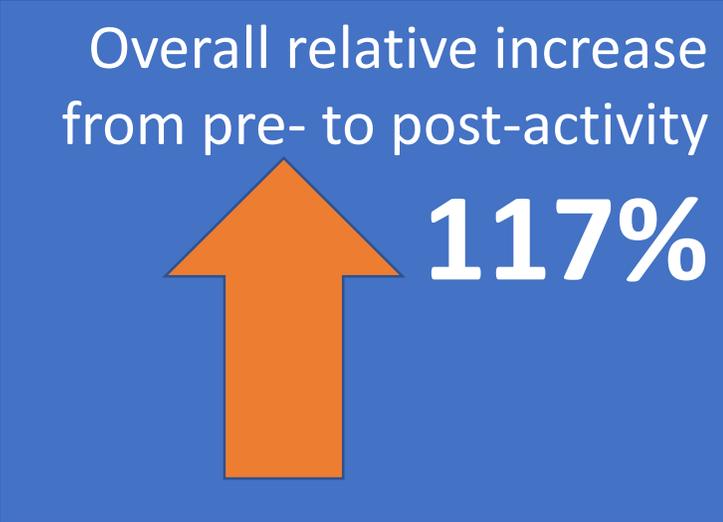
[Final Online Report]

Level 3&4 Outcomes: Overall Learning (Knowledge/Competence) (Online Enduring)



Pre-test (N=1513)

Post-test (N=1286)



Standard Deviation	
Pre-test	Post-test
.01	.05

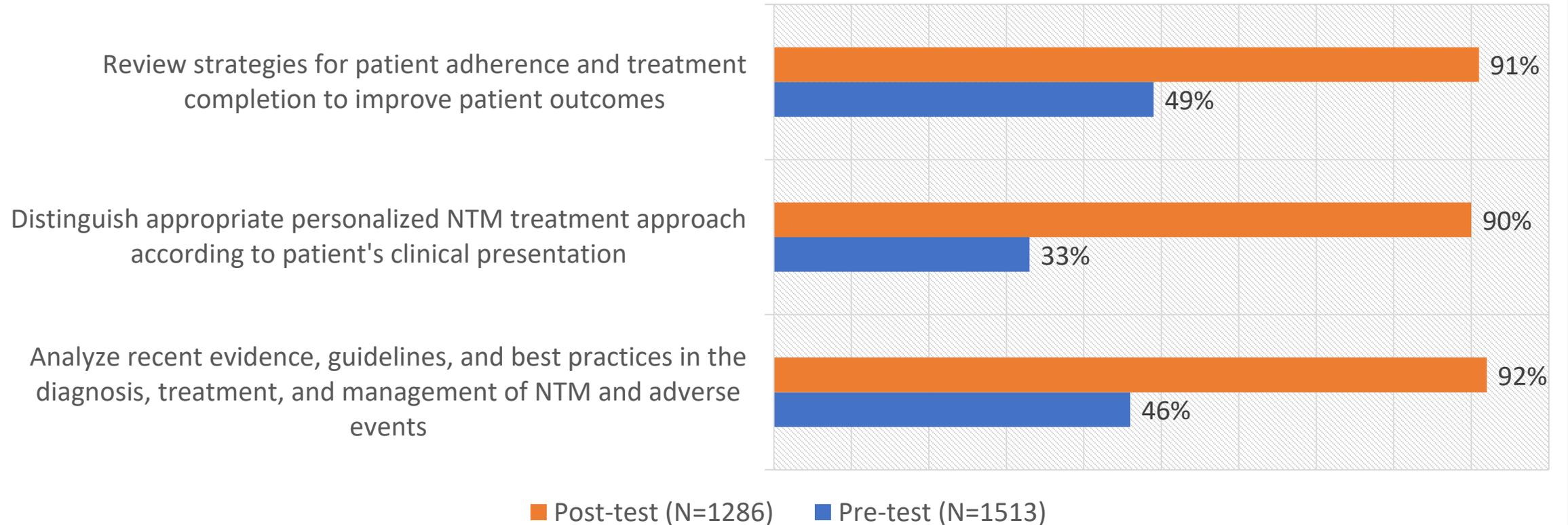
Level 3 and 4 outcomes were measured by comparing participants' pre- and post-test answers. The attendees' responses to these questions demonstrated that **participants gained knowledge as a result of the activity.**

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Online Report]

Level 3&4 Outcomes: Learning by Objective (Knowledge/Competence) (Online Enduring)

Learning Gains By Objective



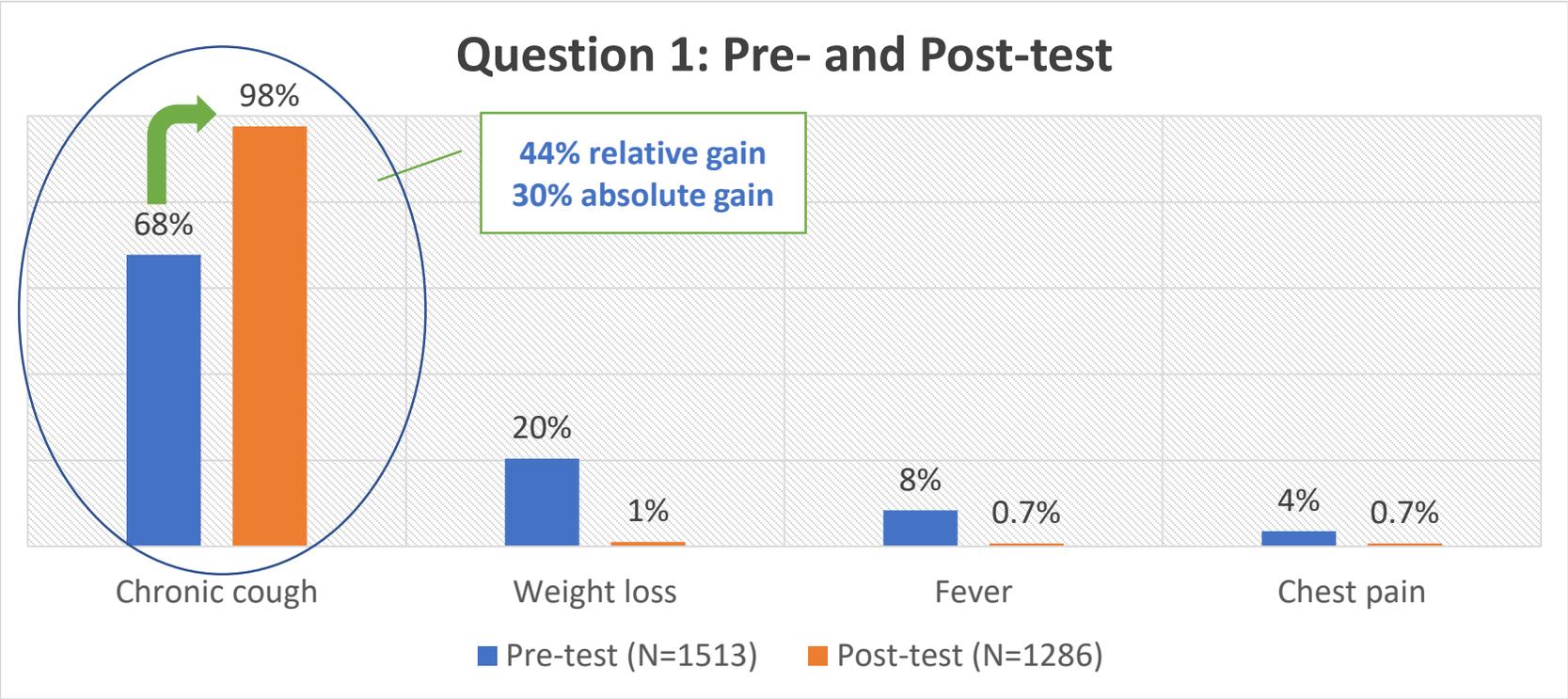
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[Final Online Report]

Level 3 Outcomes: Knowledge – Assessment Question 1 (Pre/Post-Test) (Online Enduring)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q1: Which of the following symptoms were identified by a majority of NTM patients in a recent FDA patient-focused poll as having the most significant impact on their daily life?



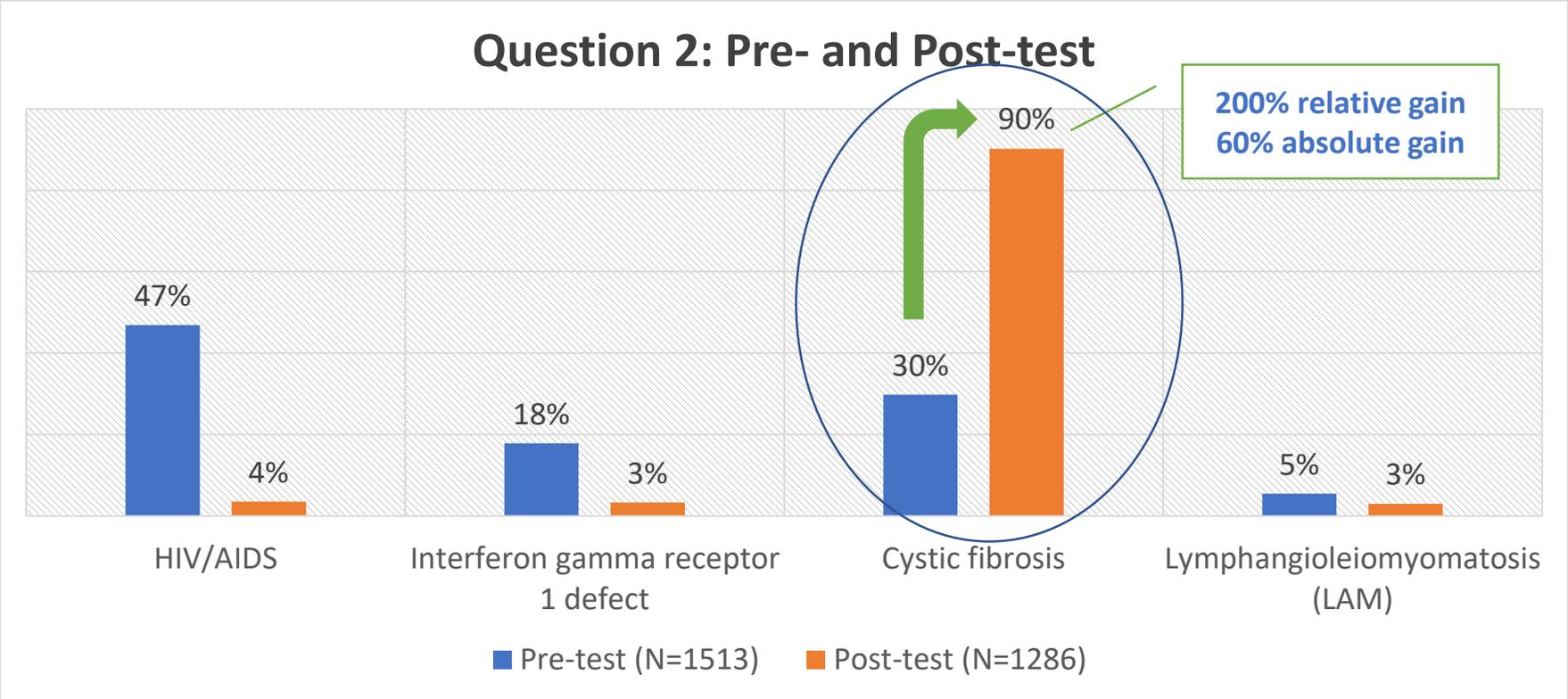
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[Final Online Report]

Level 3 Outcomes: Knowledge – Assessment: Question 2 (Pre/Post-Test) (Online Enduring)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q2: Which of the following conditions has been associated with host susceptibility to NTM pulmonary disease?



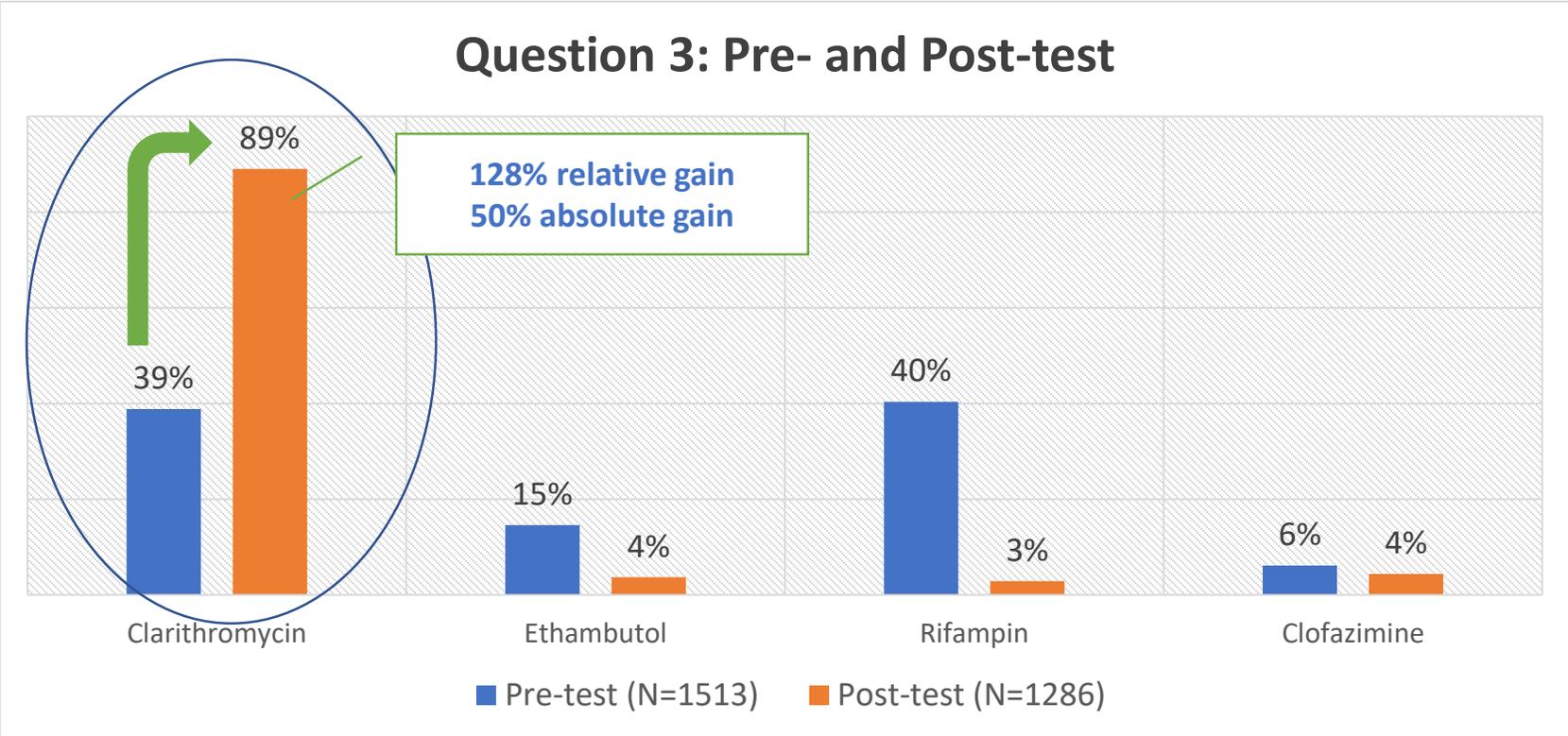
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[Final Online Report]

Level 3 Outcomes: Knowledge – Assessment: Question 3 (Pre/Post-Test) (Online Enduring)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q3: Which of the following drugs that are used to treat Mycobacterium avium pulmonary disease has the best correlation between in vitro resistance and treatment outcome?



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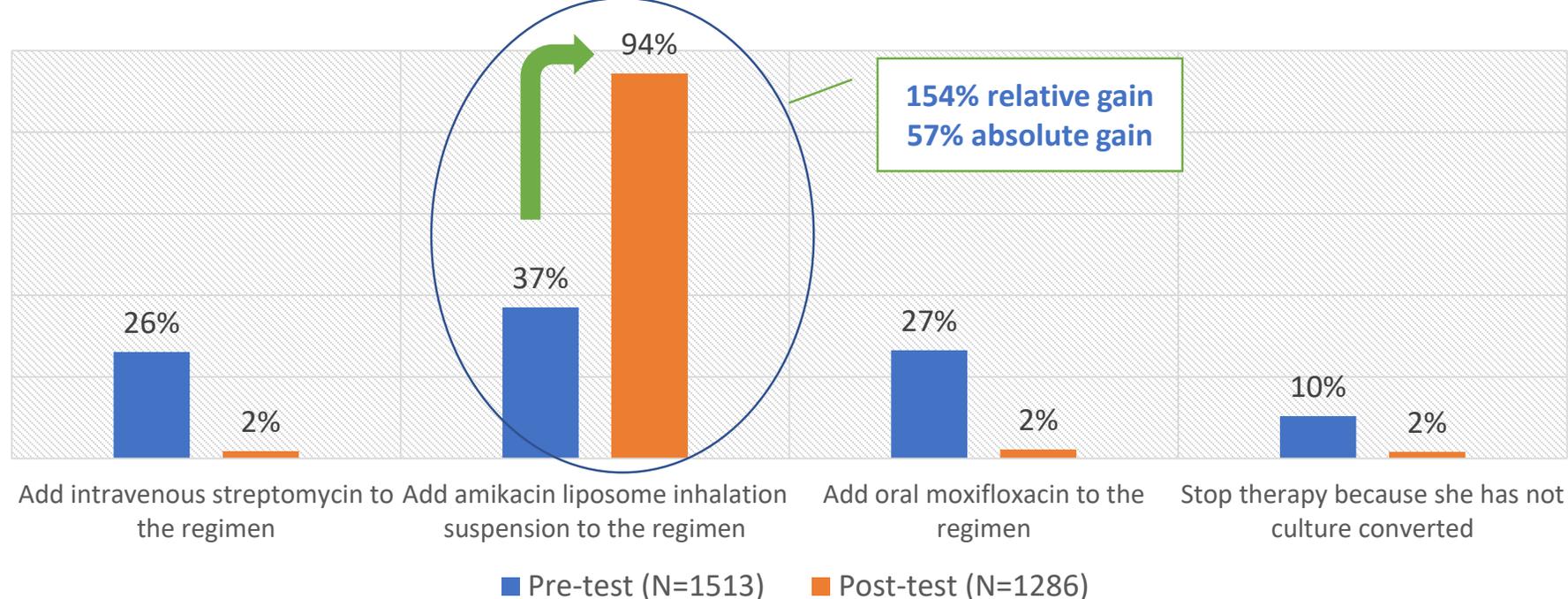
Level 3&4 Outcomes: Knowledge/Competence

Assessment: Question 4 (Pre/Post-Test) (Online Enduring)

Learning Objective: *Distinguish appropriate personalized NTM treatment approach according to patient's clinical presentation*

Q4: A 72-year-old woman with non-cavitary Mycobacterium avium complex pulmonary disease has remained sputum culture positive after 6 months of guideline-based treatment. Which of the following would be the most appropriate intervention?

Question 4: Pre- and Post-test



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[Final Online Report]

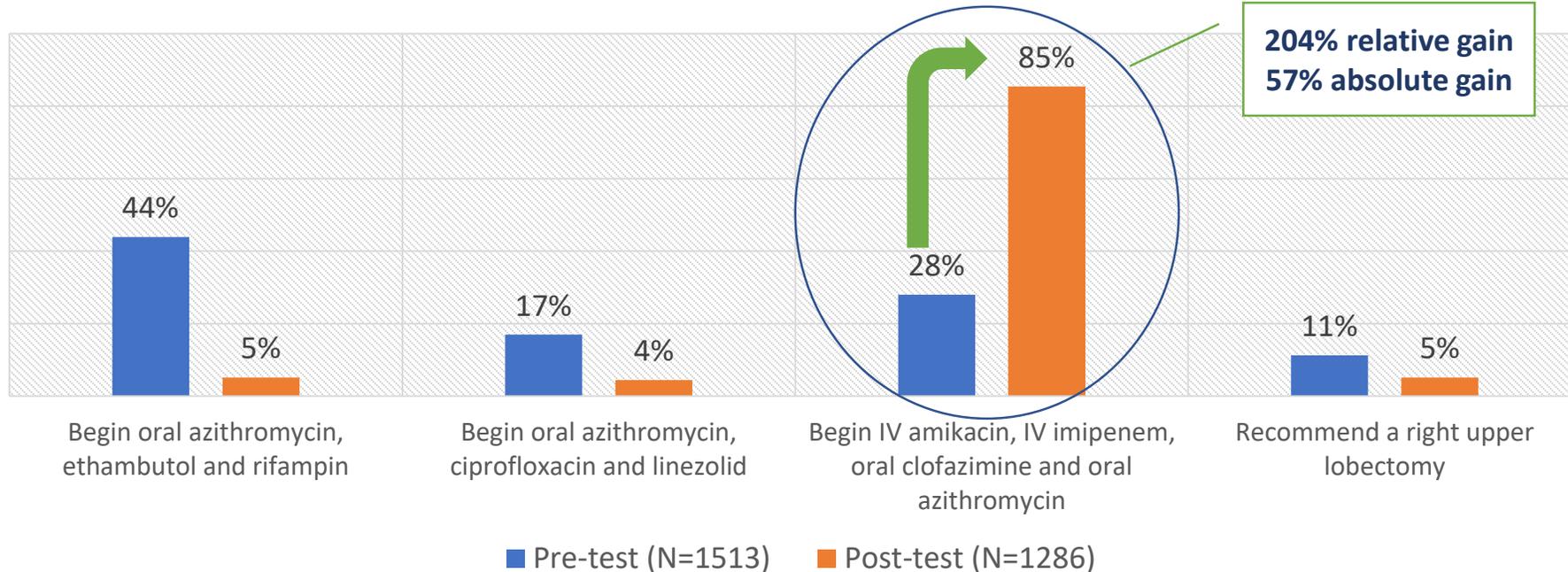
Level 3&4 Outcome: Knowledge/Competence

Assessment: Question 5 (Pre/Post-Test) (Online Enduring)

Learning Objective: Distinguish appropriate personalized NTM treatment approach according to patient's clinical presentation

Q5: Your patient is found to have *M. abscessus* subsp. *abscessus* pulmonary infection. She is an otherwise healthy 66-year-old female with weight loss, night sweats and cough. Her CT is notable for multiple small cavities in the right upper lobe. What is the most appropriate therapy?

Question 5: Pre- and Post-test



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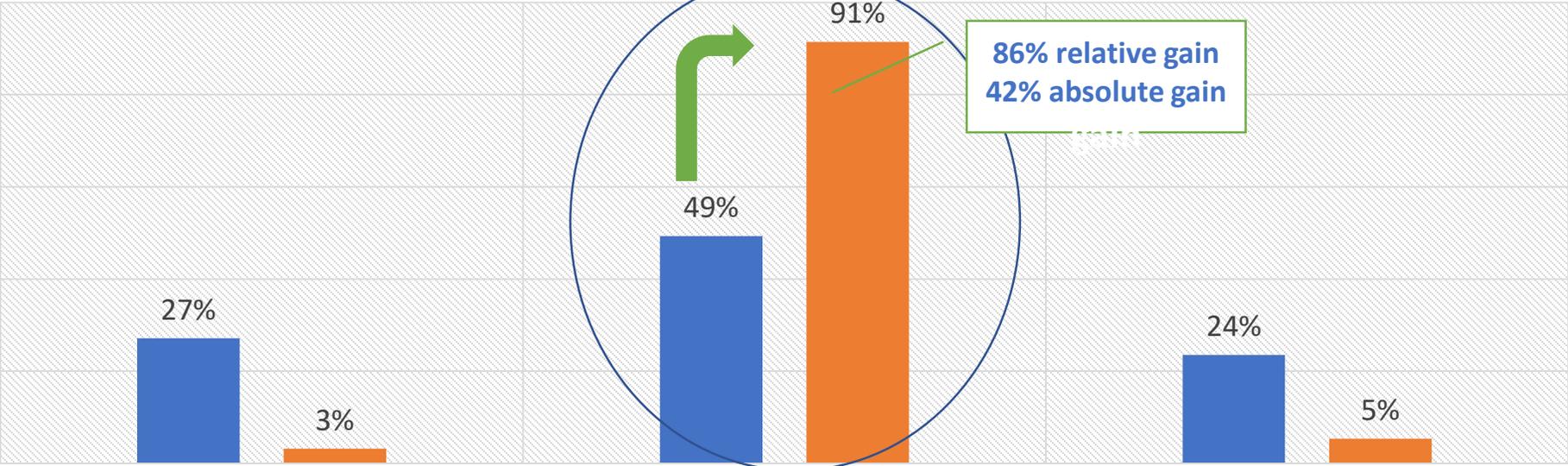
[Final Online Report]

Level 3 Outcome: Knowledge – Assessment: Question 6 (Pre/Post-Test) (Online Enduring)

Learning Objective: Review strategies for patient adherence and treatment completion to improve patient outcomes

Q6: The following measure will help improve adherence to therapy for M. abscessus pulmonary disease.

Question 6: Pre- and Post-test



Administration of IV imipenem every 6 hours Stagger the introduction of antibiotics Administration of IV amikacin daily

■ Pre-test (N=1513) ■ Post-test (N=1286)



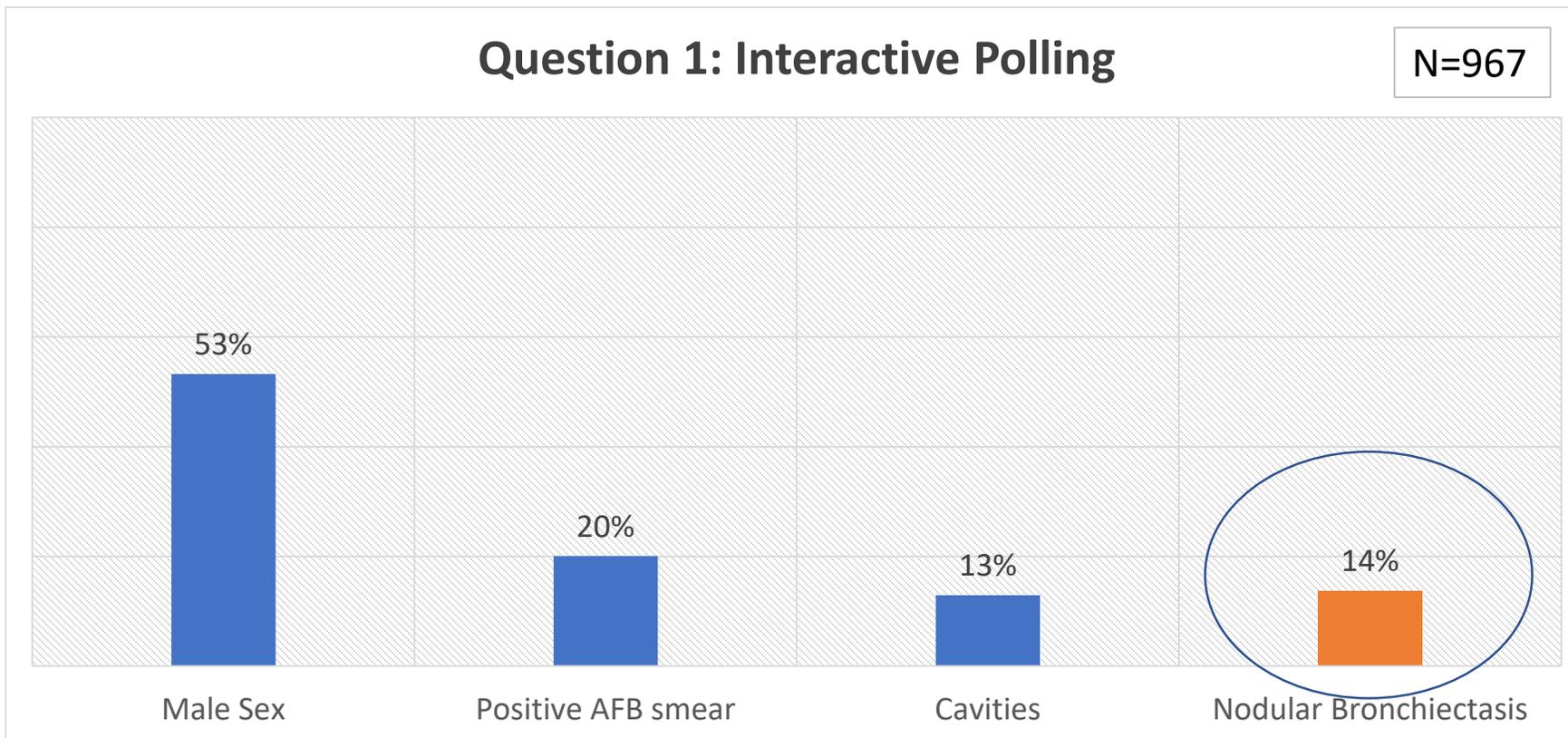
Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Online Report]

Level 3 Outcomes: Knowledge – Interactive Polling Question 1 (Online Enduring)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q1: Which of the following characteristics associated with NTM lung disease have not been associated with a worse prognosis?



Polling questions were posed before the content.

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Online Report]

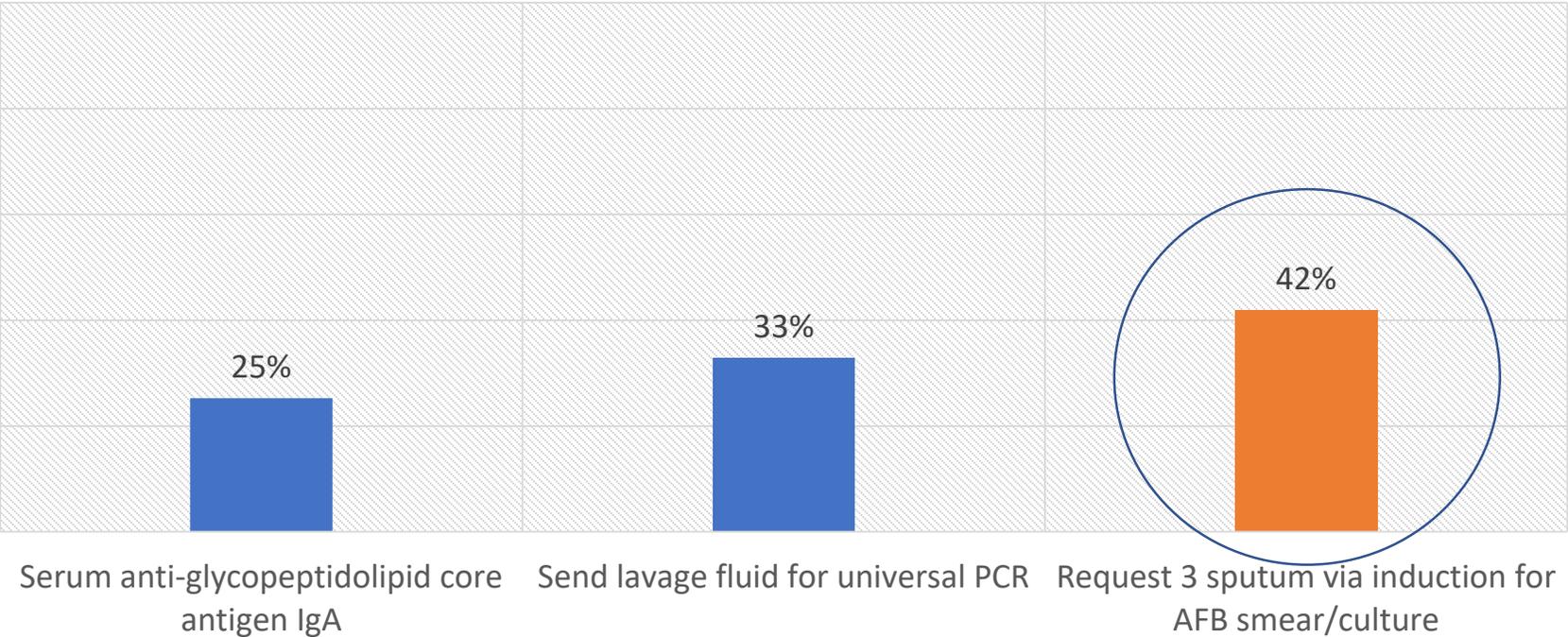
Level 3&4 Outcomes: Knowledge/Competence – Interactive Polling Question 2 (Online Enduring)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q2: 23-year-old female with a cough for one year. Bronchoscopy negative for AFB, fungal, routine pathogens. Which diagnostic test will aid in the evaluation of possible M. abscessus lung disease?

Question 2: Interactive Polling

N=769



Polling questions were posed before the content.

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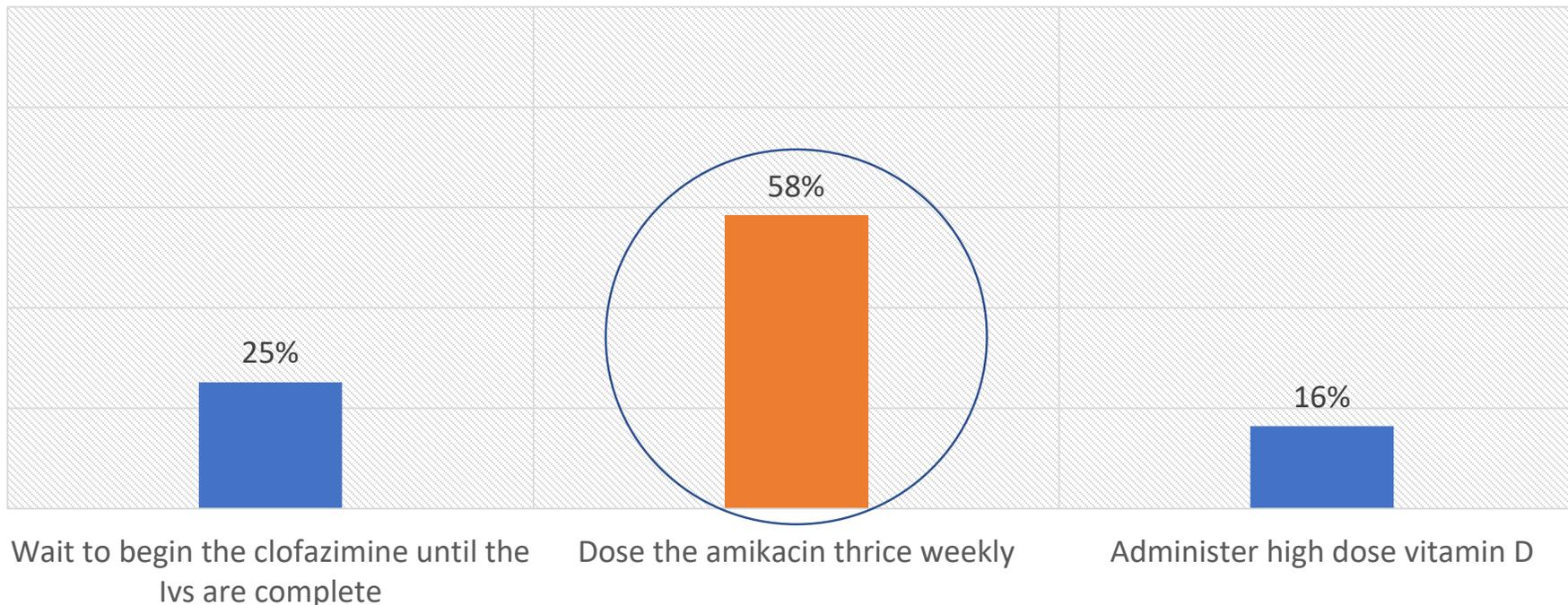
Level 3&4 Outcomes: Knowledge/Competence – Interactive Polling Question 3 (Online Enduring)

Learning Objective: Review strategies for patient adherence and treatment completion to improve patient outcomes

Q3: The patient begins IV amikacin daily, IV imipenem every 8 hours, oral azithromycin daily and oral clofazimine daily. She develops tinnitus 3 weeks into treatment. How could you have avoided this side effect?

Question 3: Interactive Polling

N=779



Polling questions were posed before the content.

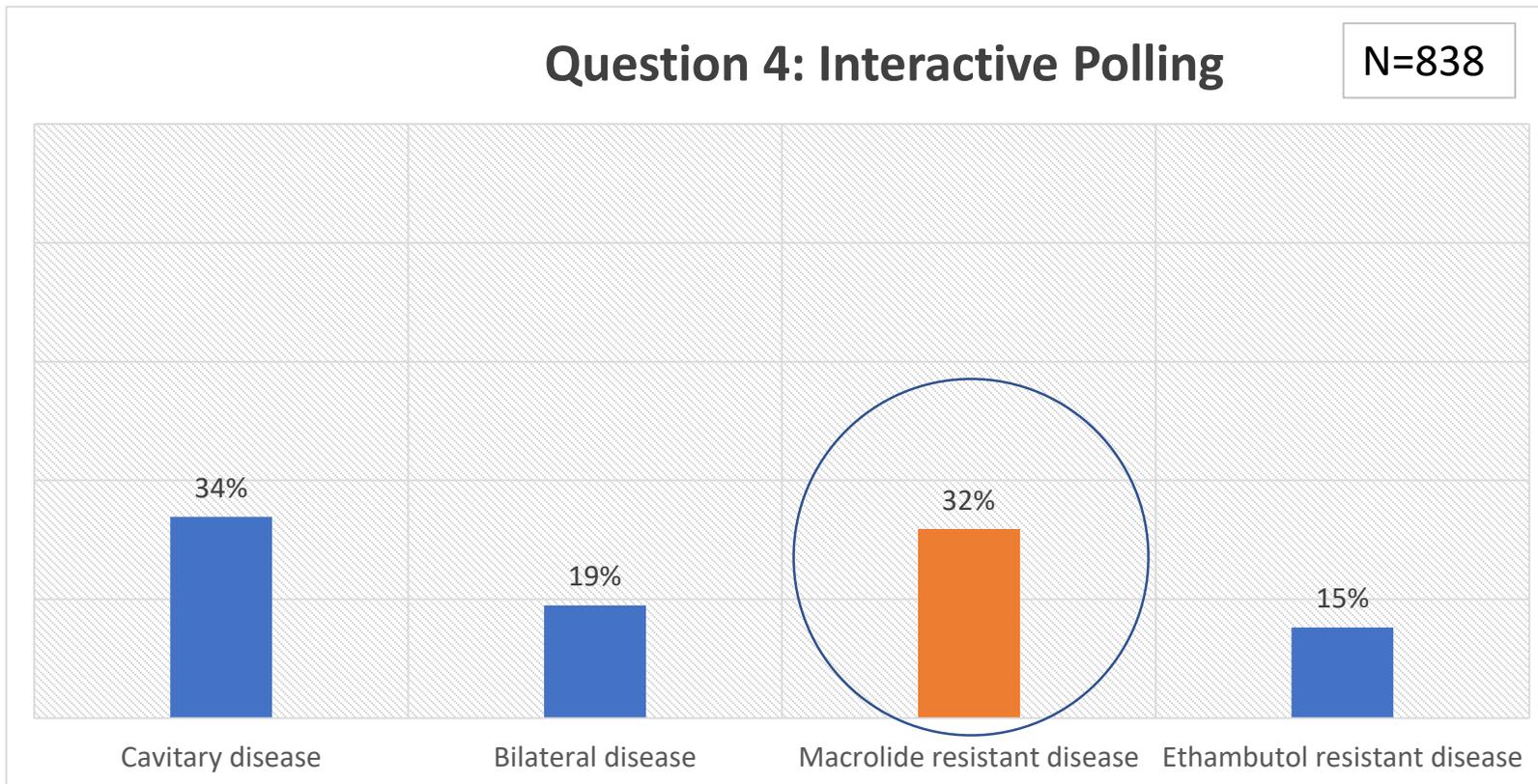
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[Final Online Report]

Level 3&4 Outcomes: Knowledge/Competence – Interactive Polling Question 4 (Online Enduring)

Learning Objective: Review strategies for patient adherence and treatment completion to improve patient outcomes

Q4: Which of the following factors would likely lead to the worst treatment outcome in this patient?



Polling questions were posed before the content.

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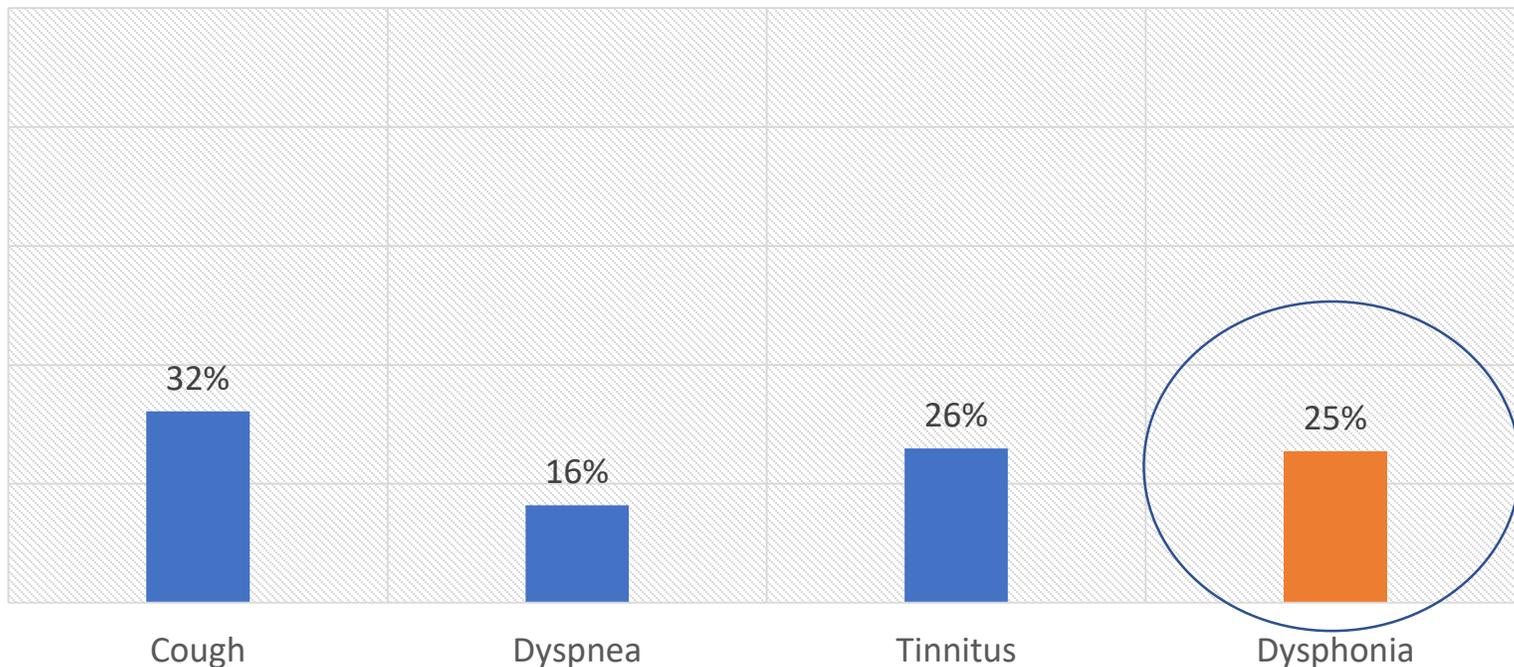
Level 3&4 Outcomes: Knowledge/Competence – Interactive Polling Question 5 (Online Enduring)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q5: Which of the following is the most common symptom related to use of amikacin liposome inhalation suspension?

Question 5: Interactive Polling

N=798



Polling questions were posed before the content.

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Online Report]

An analysis of open-ended comments demonstrate the following changes learners intend to make (Online Enduring):

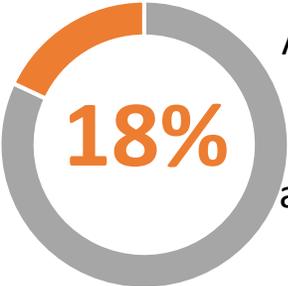
82%

Learners intend to make changes to practice as a result of the activity

N=1162



Process of diagnosis and treatment of NTM



Apply overall knowledge and awareness of NTM



Referral to specialist



Educating patients on side effects and compliance



Proper medication regimen



Identification of species through testing



Use of amikacin liposome inhalation suspension



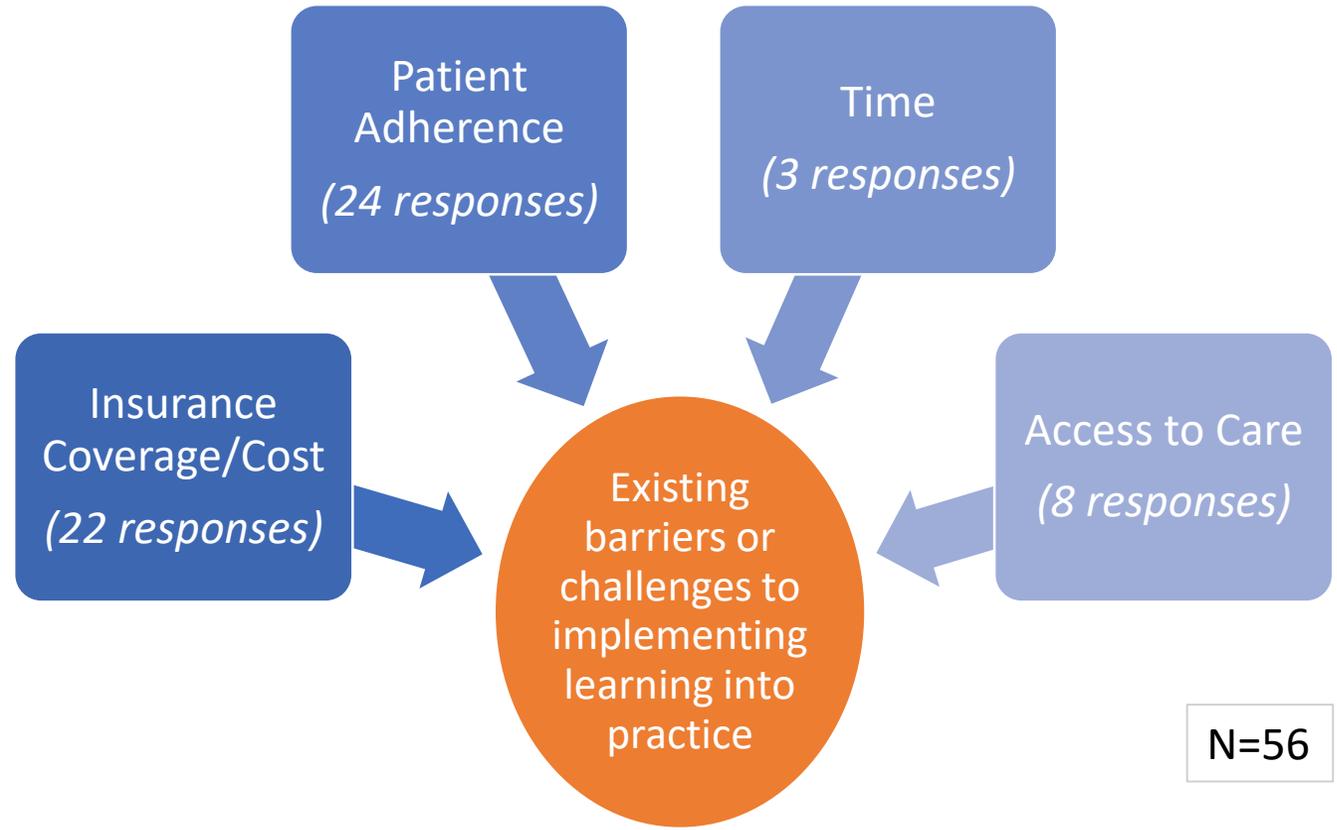
Follow NTM guidelines for the management of NTM

N=374

Program Evaluation (Online Enduring): An analysis of open-ended comments demonstrating the barriers that were addressed

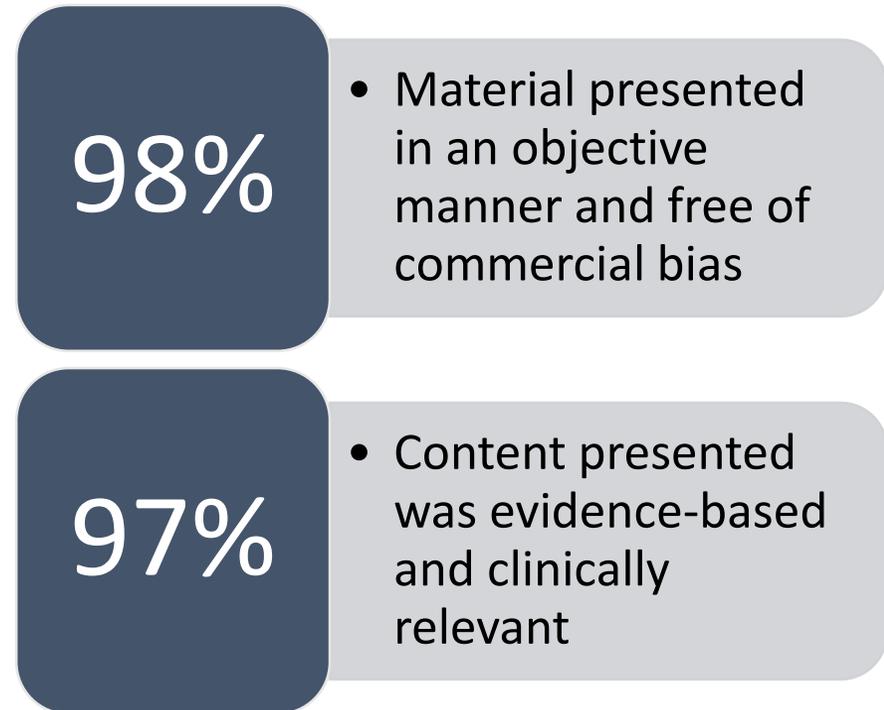
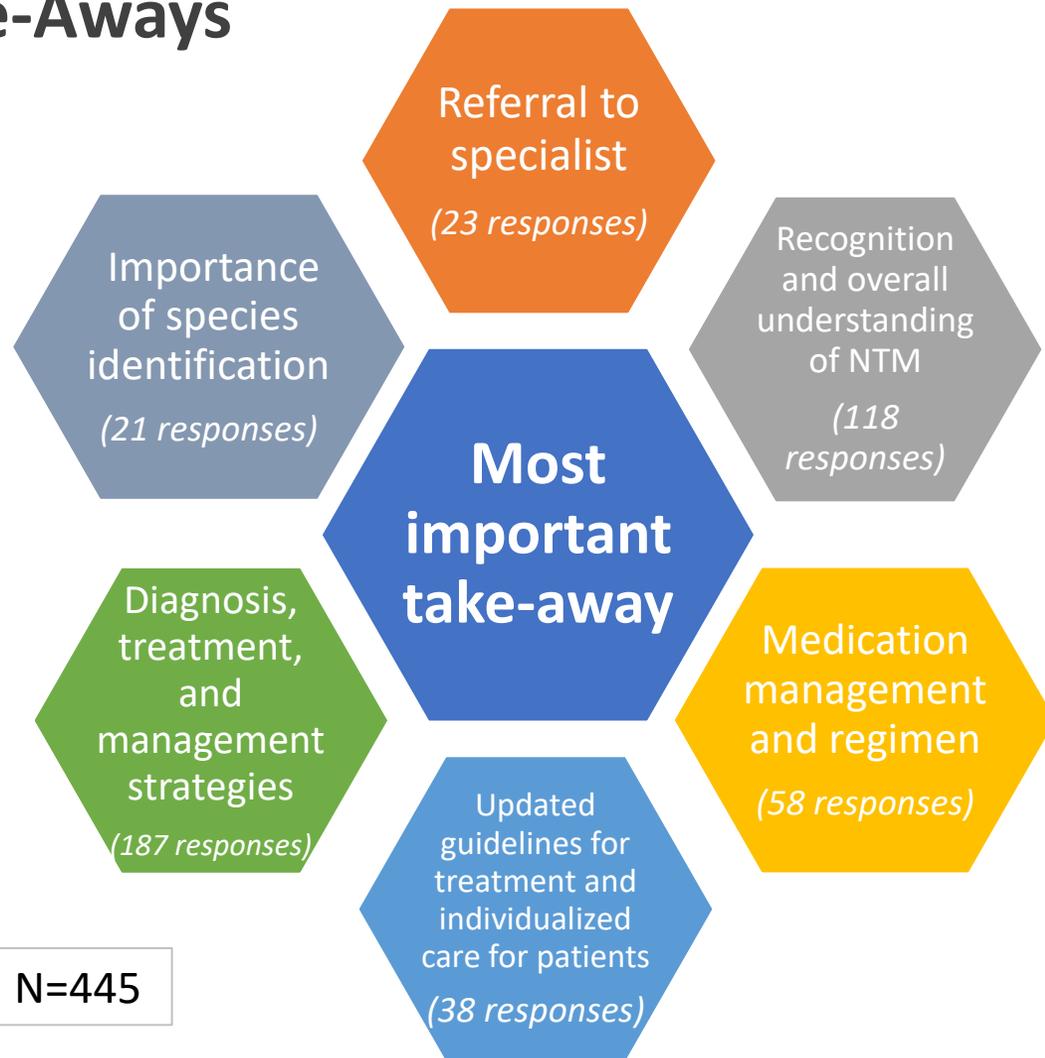


N=1162



N=56

Program Evaluation (Online Enduring) Take-Aways



N=1162

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

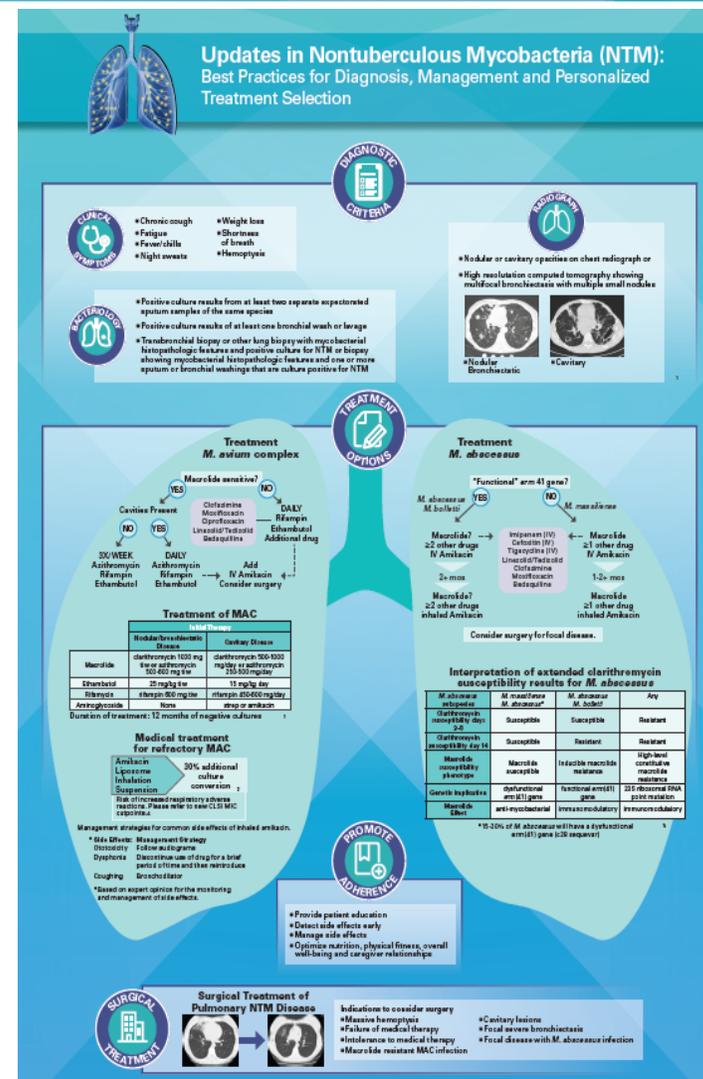
[Final Online Report]

Program Evaluation (Online Enduring): Clinical Reference Aid

86%

of participants are likely to use the clinical reference aid in their practice

N=1162



Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Online Report]

Program Evaluation (Online Enduring): Future Education

What topics would you like more information about in future educational activities?	
Autoimmune Disease	Breast Cancer
Lung Cancer	Medications
Coccidioidomycosis	Immunotherapy
Urology	Laboratory Safety
Cardiology	Intolerance to first line regimen
Emergency Medicine	In-depth education about causes of lung diseases
Tuberculosis	Multi-drug resistant infections
COVID-19 information and treatment	Peptic ulcer
Skin manifestations of systemic diseases	Diabetes

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

Program Overview: LIVE Symposium

The program is an innovative and multimedia live educational program held as an adjunct symposium to the American College of Chest Physicians Annual Meeting (CHEST 2019) and an online enduring activity based on that session. The goal of this live and online enduring program is to improve the awareness, knowledge, and competency of pulmonologists and infectious disease physicians in the diagnosis, management, and treatment of nontuberculous mycobacteria (NTM). The engaging multimedia program features expert faculty, a patient perspective video clip, interactive polling with immediate feedback, and infographic clinical reference aid to help attendees convert information into practice.

Learning Objectives

- Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events.
- Distinguish appropriate personalized NTM treatment approach according to patient's clinical presentation.
- Review strategies for patient adherence and treatment completion to improve patient outcomes.



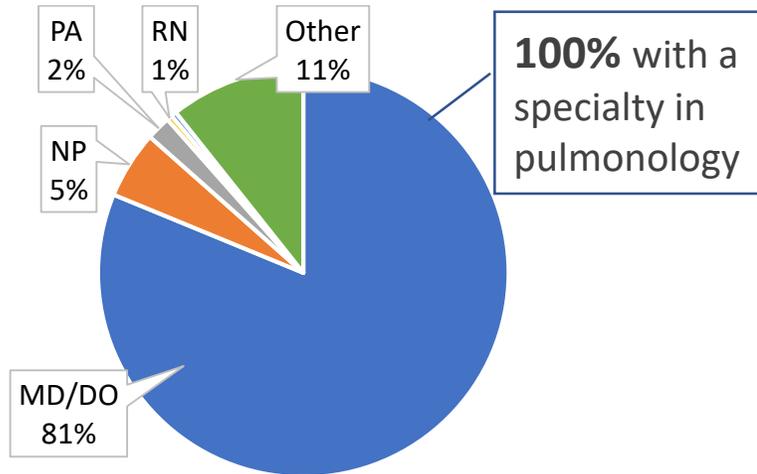
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[Final Live Report]

Quantitative Educational Impact Summary: Live Symposium

Participation

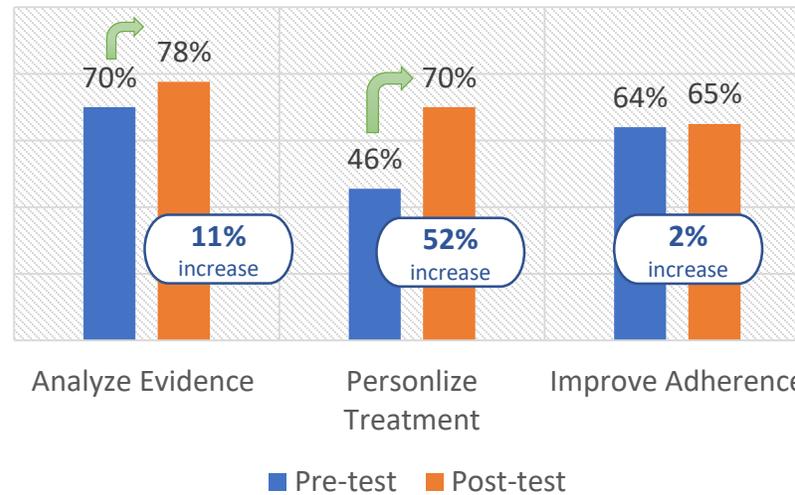
Total Live Learners = 469



Impact
25,488*
Patients
this year

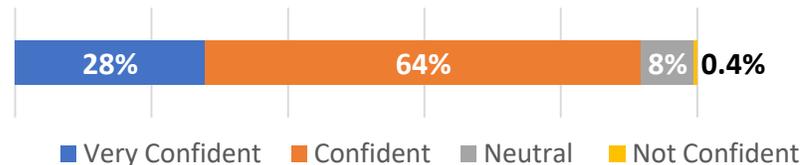
*Numbers are based on post-test and evaluation survey data N=151

Learning Gains Across Objectives



Overall 20% relative gain in knowledge across all learning objectives.

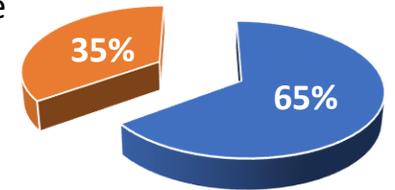
Confidence @ Post-Test



Persistent Learning Gaps/Needs

Potential knowledge gap persists related to strategies for patient adherence and prognosis of NTM

✓ 35% were unable to review strategies for patient adherence



Barriers to Care

On follow-up, **74%** of respondents indicated that patient adherence and treatment-related adverse events represented the greatest barriers toward optimal patient care.

N=42

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

Qualitative Educational Impact Summary: Live Symposium

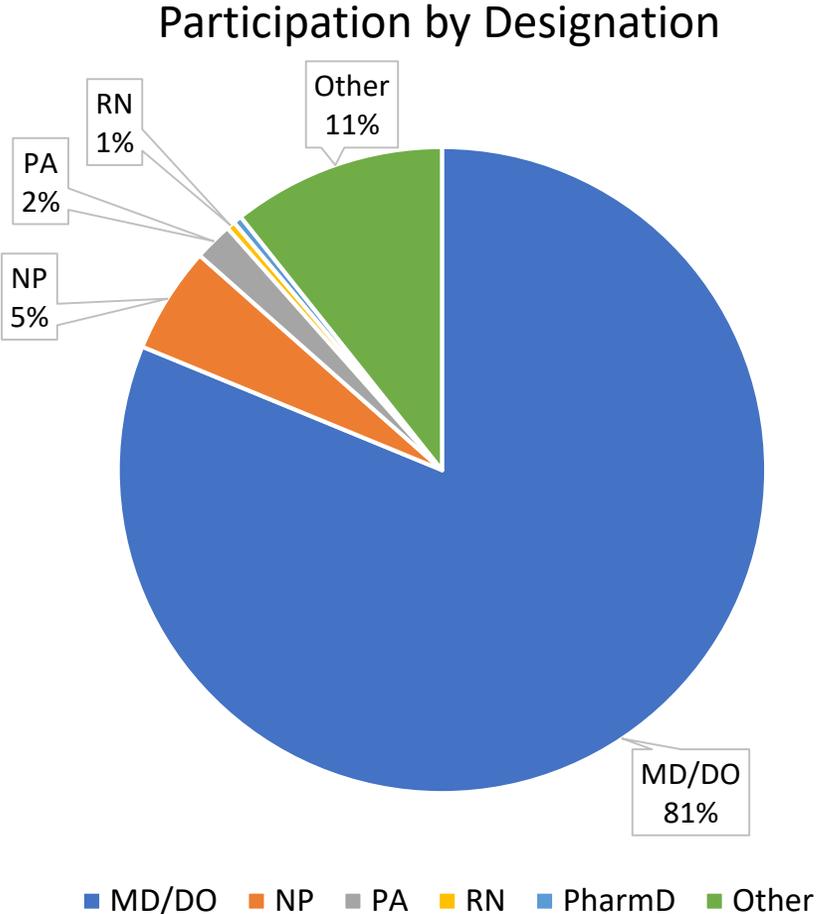
Participants	Educational Impact	Practice Change
469* Total Participants	92% of participants reported that they were very confident or confident in their ability to analyze recent evidence, guidelines and best practices for the diagnosis and treatment of NTM following the educational activity.	87.5% Reported that they had made changes to their practice as a result of the educational activity. N=40 for follow-up survey
Who see 531 NTM Patients Weekly	90% of participants reported post-activity that they were very confident or confident in their ability to distinguish the appropriate personalized NTM treatment approach following the educational activity.	100% Of those who had not yet made changes were very to somewhat likely to make practice changes.
Which translates to 12,744 Patient Visits over 6 Months; 25,488 Patient Visits Annually	92% of participants reported post-activity that they were very confident or confident in their ability to review strategies for patient adherence and treatment completion following the educational activity.	74% Listed patient adherence and treatment-related side effects as the biggest barriers toward optimal patient outcomes

*Numbers are based on post-test and evaluation survey data N=151.

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

Level 1 Outcome: Live Symposium Participation



Designation	# of Participants
MD/DO	381
NP	25
PA	9
RN	2
PharmD	2
Other	50
Total	469

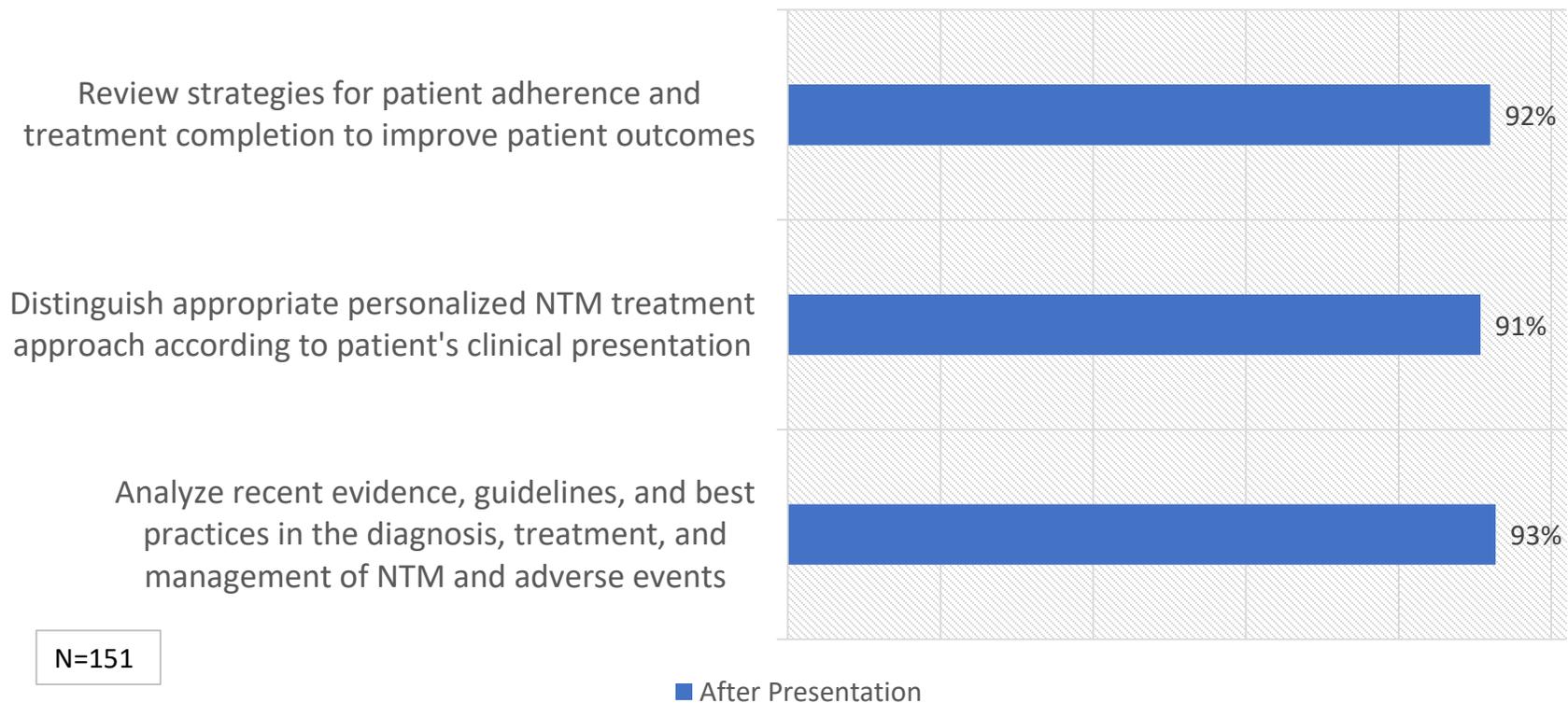


Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

Level 2&3 Outcomes: Learning & Satisfaction

Participants reported their confidence regarding each learning objective (confident – very confident)



Following the presentation, learners reported a high level of confidence related to each of the stated learning objectives



**Online activity will provide confidence data both pre- and post-activity*

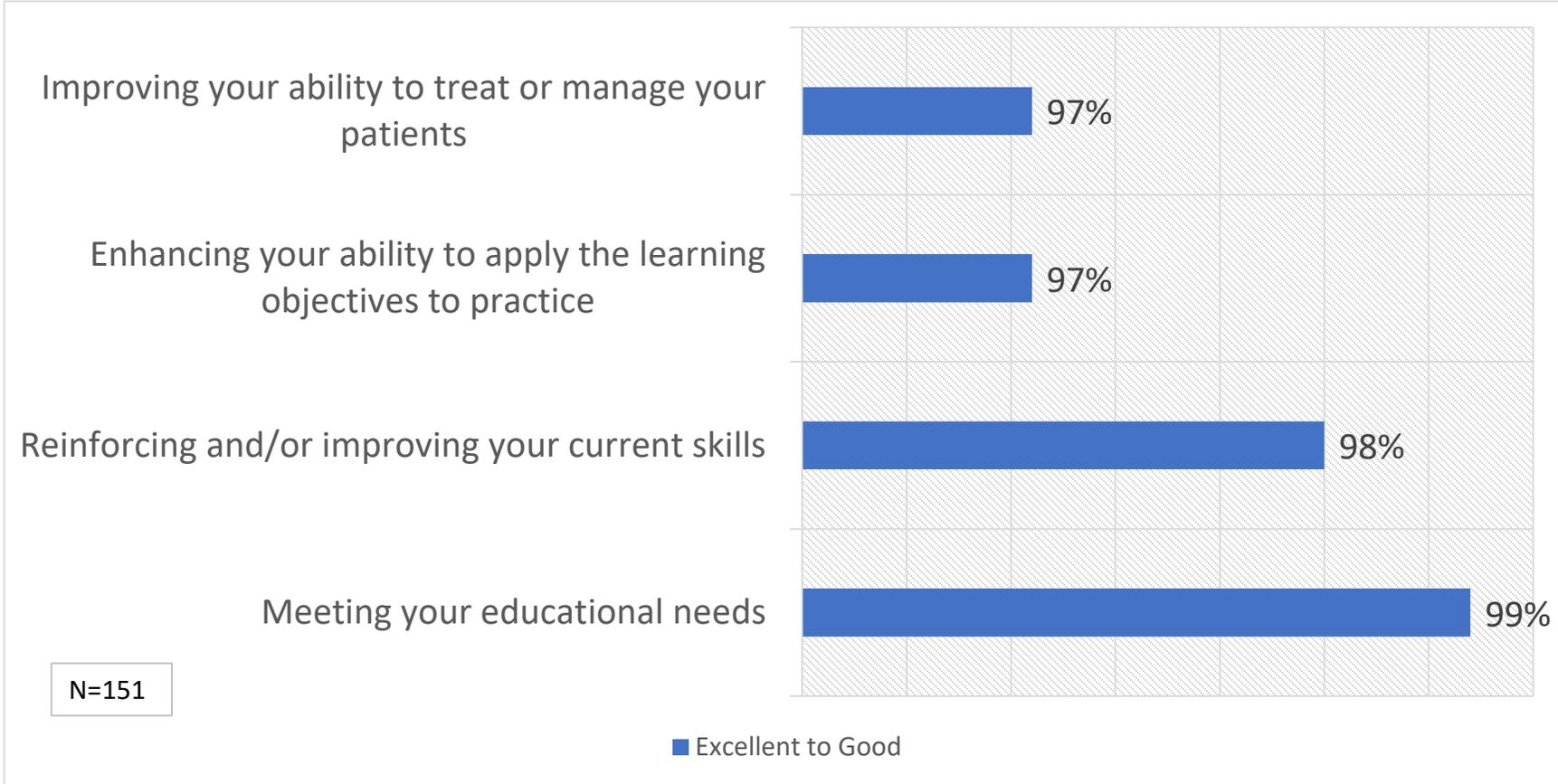
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[Final Live Report]

Level 2&3 Outcomes: Learning & Satisfaction

Analysis of participants responses related to educational needs

Participants reported the activity was “Excellent” to “Good” at:



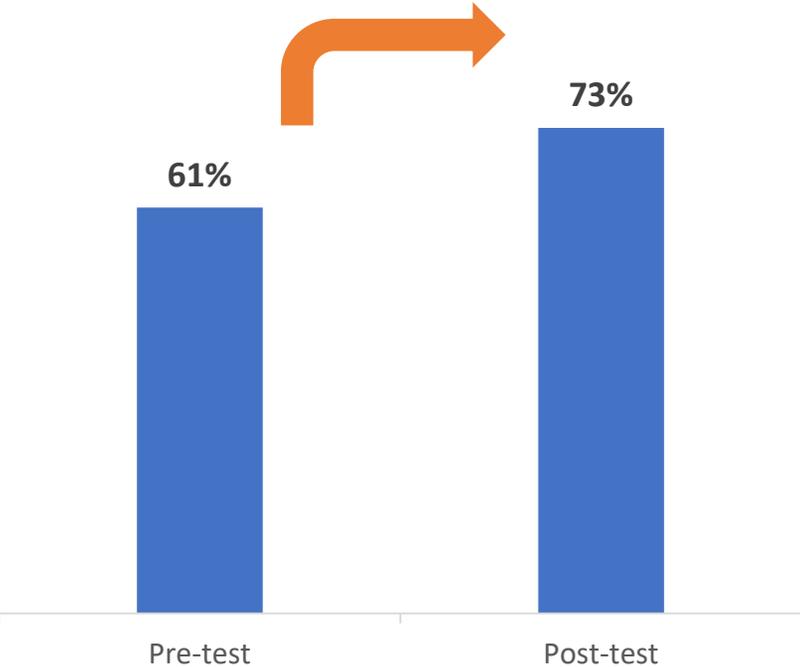
Participants reported high levels of satisfaction related to the ability of the activity to impact practical applications



Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

Level 3&4 Outcomes: Overall Learning (Knowledge/Competence)



Level 3 and 4 outcomes were measured by comparing participants' pre- and post-test answers. The attendees' responses to these questions demonstrated that **participants gained knowledge as a result of the activity.**

Overall relative increase from pre- to post-activity

20%

Standard Deviation	
Pre-test	Post-test
N/A*	.03

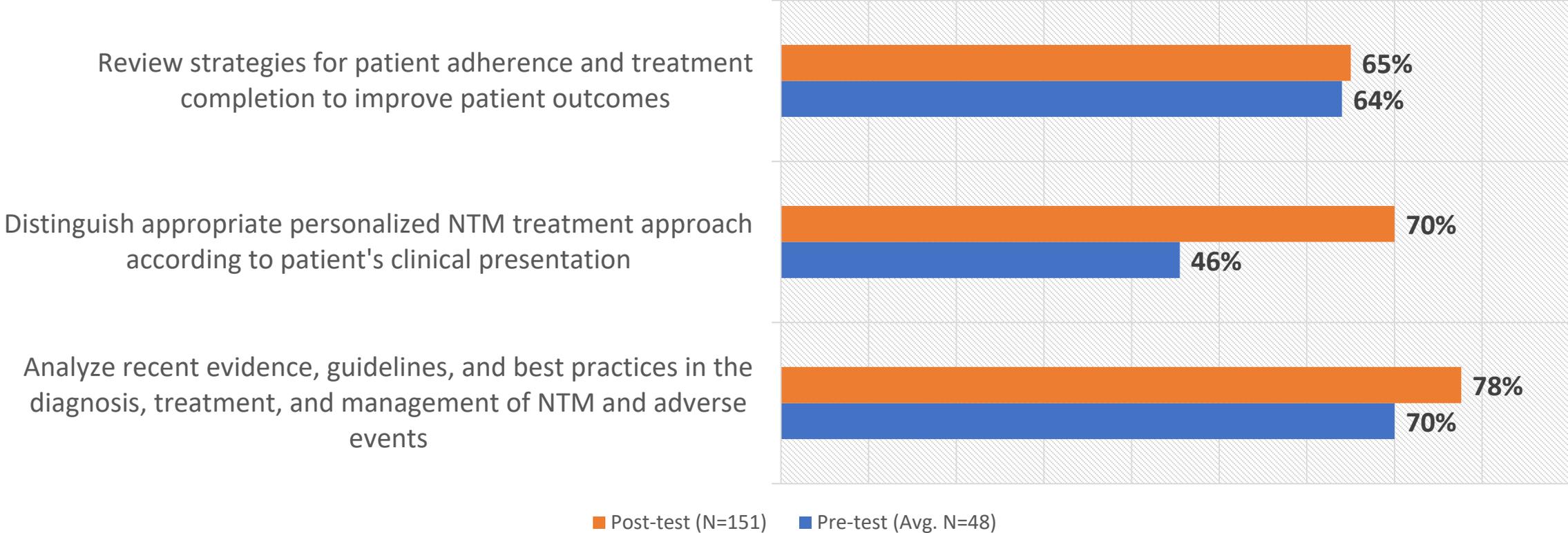
*Pre-test responses were obtained via ARS and reported as an aggregate only

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Level 3&4 Outcomes: Learning by Objective (Knowledge/Competence)

Learning Gains By Objective



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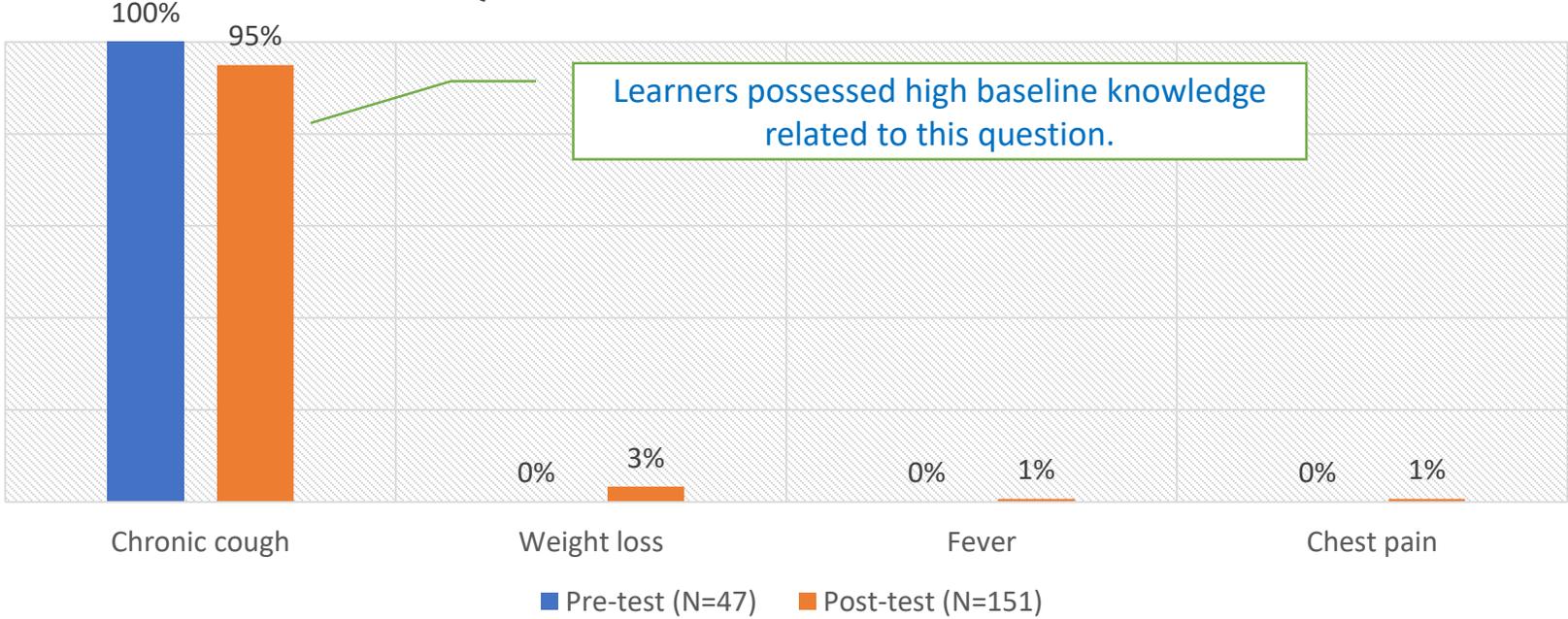
[Final Live Report]

Level 3 Outcomes: Knowledge – Assessment Question 1 (Pre/Post-Test)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q1: Which of the following symptoms were identified by a majority of NTM patients in a recent FDA patient-focused poll as having the most significant impact on their daily life?

Question 1: Pre- and Post-test



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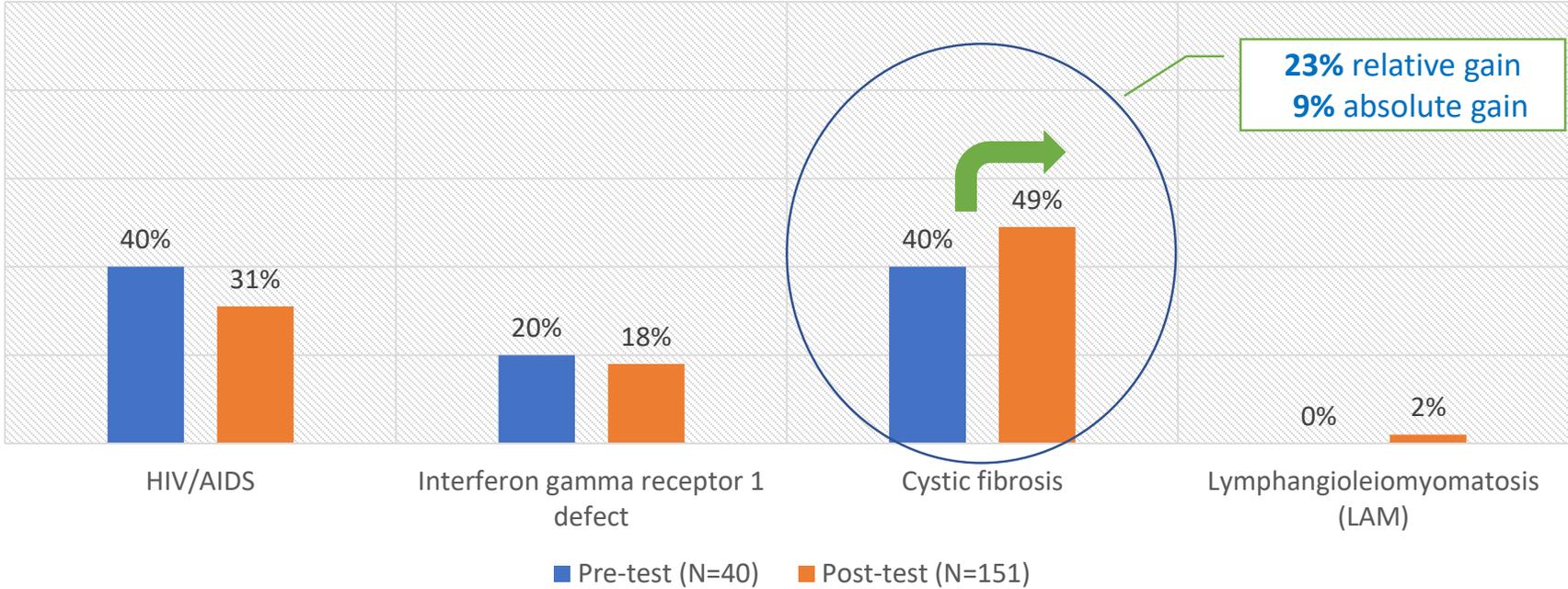
[Final Live Report]

Level 3 Outcomes: Knowledge – Assessment: Question 2 (Pre/Post-Test)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q2: Which of the following conditions has been associated with host susceptibility to NTM pulmonary disease?

Question 2: Pre- and Post-test



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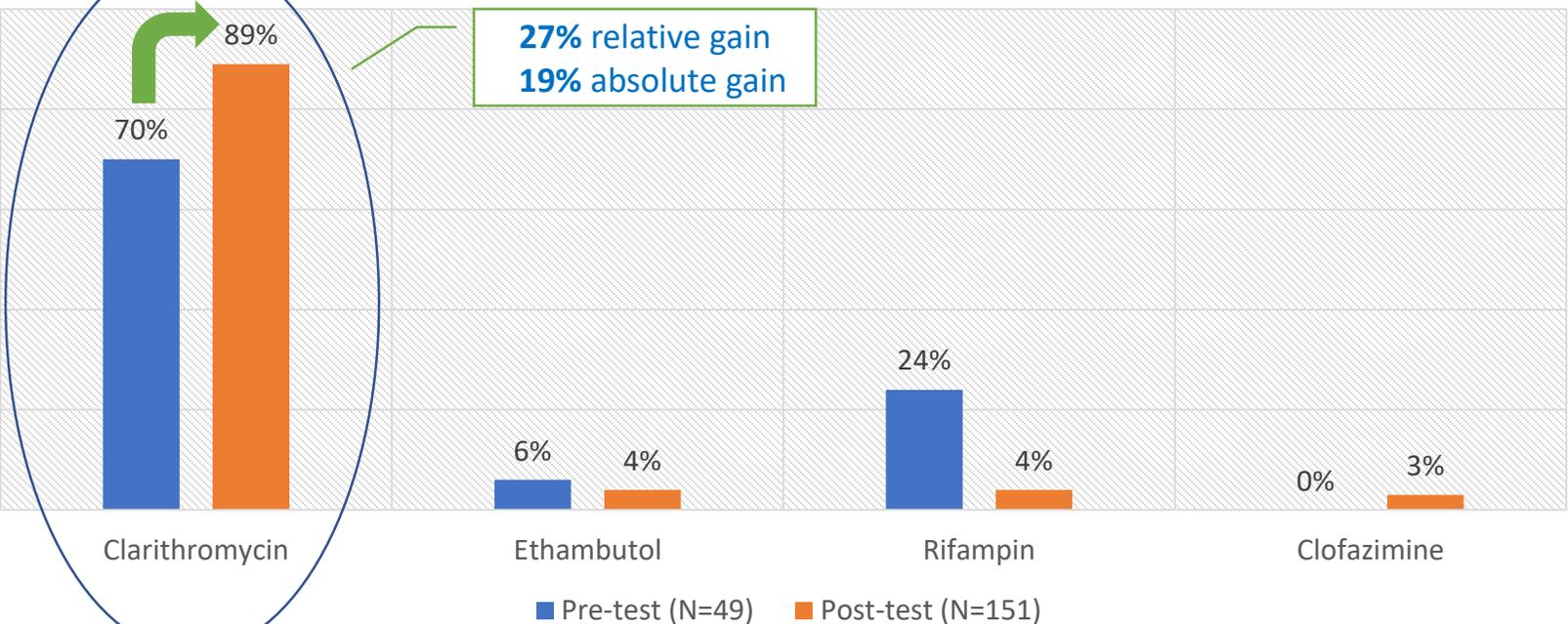
[Final Live Report]

Level 3 Outcomes: Knowledge – Assessment: Question 3 (Pre/Post-Test)

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q3: Which of the following drugs that are used to treat Mycobacterium avium pulmonary disease has the best correlation between in vitro resistance and treatment outcome?

Question 3: Pre- and Post-test



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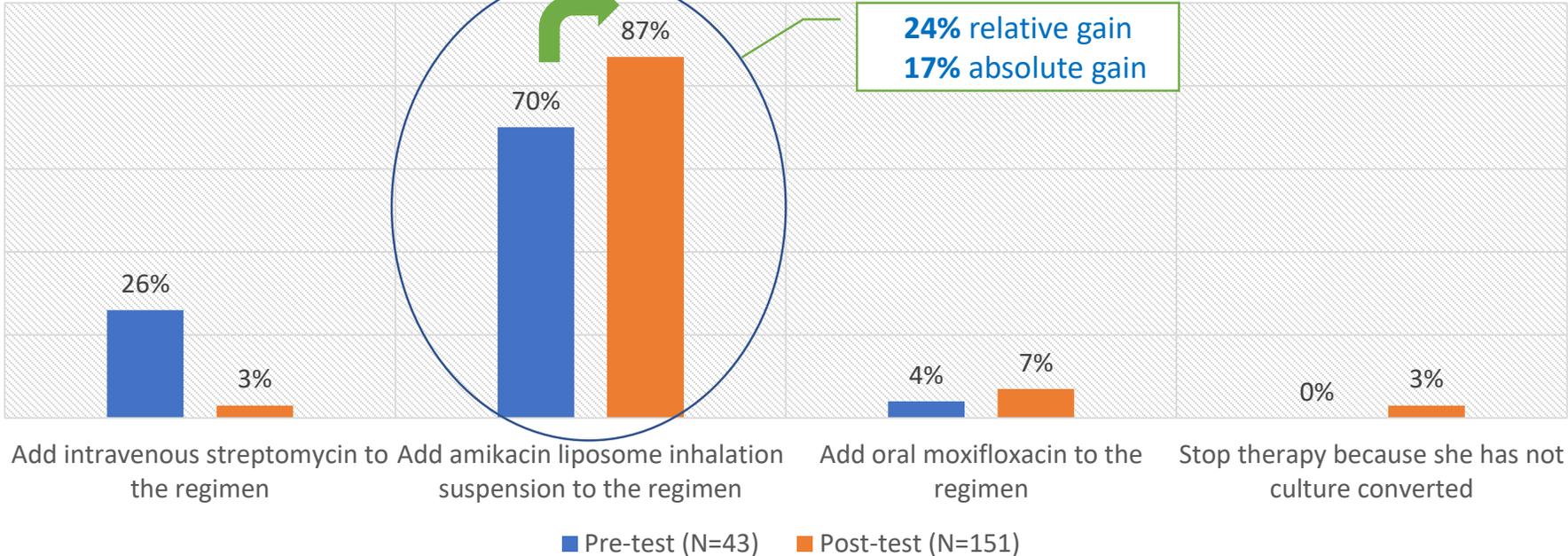
[Final Live Report]

Level 3&4 Outcomes: Knowledge/Competence Assessment: Question 4 (Pre/Post-Test)

Learning Objective: Distinguish appropriate personalized NTM treatment approach according to patient’s clinical presentation

Q4: A 72-year-old woman with non-cavitary Mycobacterium avium complex pulmonary disease has remained sputum culture positive after 6 months of guideline-based treatment. Which of the following would be the most appropriate intervention?

Question 4: Pre- and Post-test



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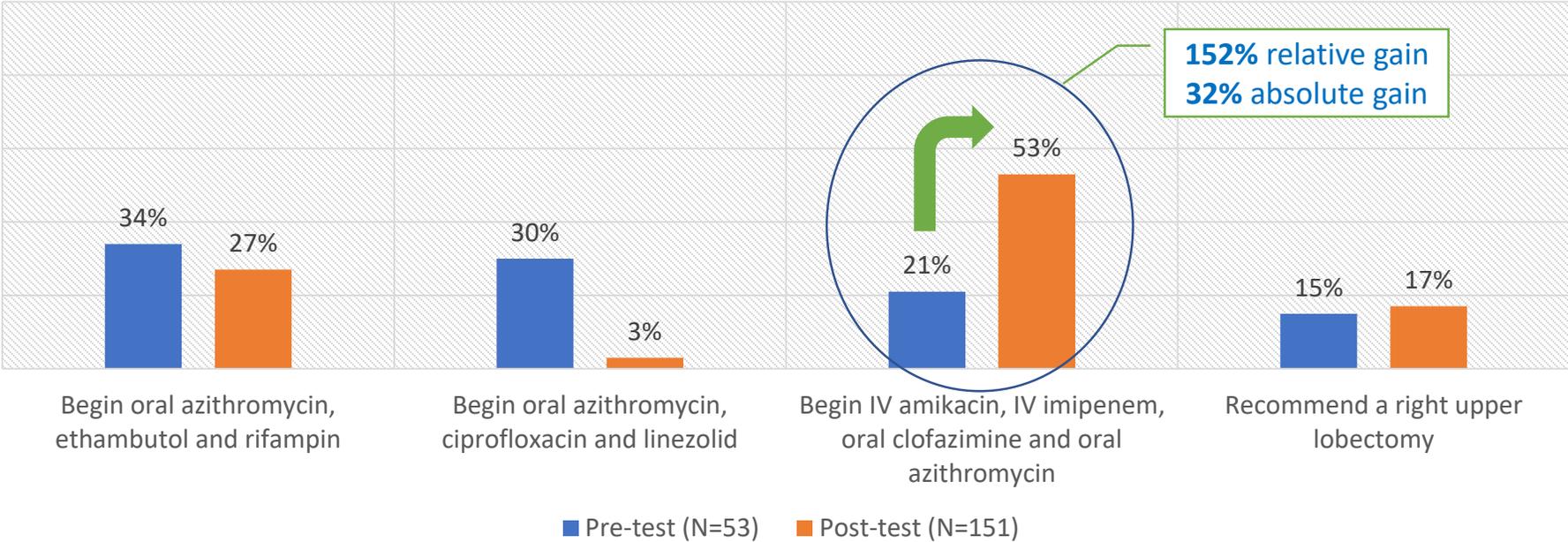
[Final Live Report]

Level 3&4 Outcome: Knowledge/Competence Assessment: Question 5 (Pre/Post-Test)

Learning Objective: Distinguish appropriate personalized NTM treatment approach according to patient’s clinical presentation

Q5: Your patient is found to have *M. abscessus* subsp. *abscessus* pulmonary infection. She is an otherwise healthy 66-year-old female with weight loss, night sweats and cough. Her CT is notable for multiple small cavities in the right upper lobe. What is the most appropriate therapy?

Question 5: Pre- and Post-test



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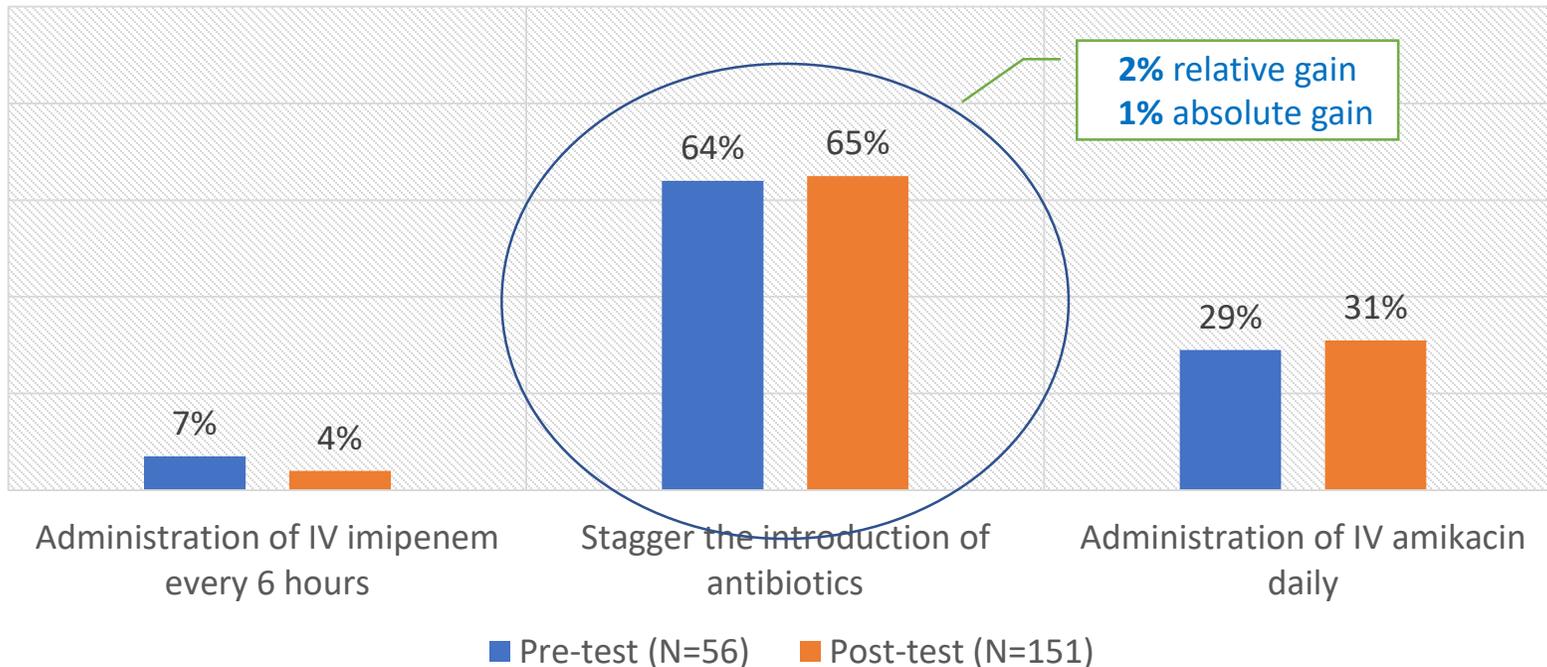
[Final Live Report]

Level 3 Outcome: Knowledge – Assessment: Question 6 (Pre/Post-Test)

Learning Objective: Review strategies for patient adherence and treatment completion to improve patient outcomes

Q6: The following measure will help improve adherence to therapy for M. abscessus pulmonary disease.

Question 6: Pre- and Post-test



The ability to identify measures to improve adherence to therapy continues to represent a knowledge gap

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[Final Live Report]

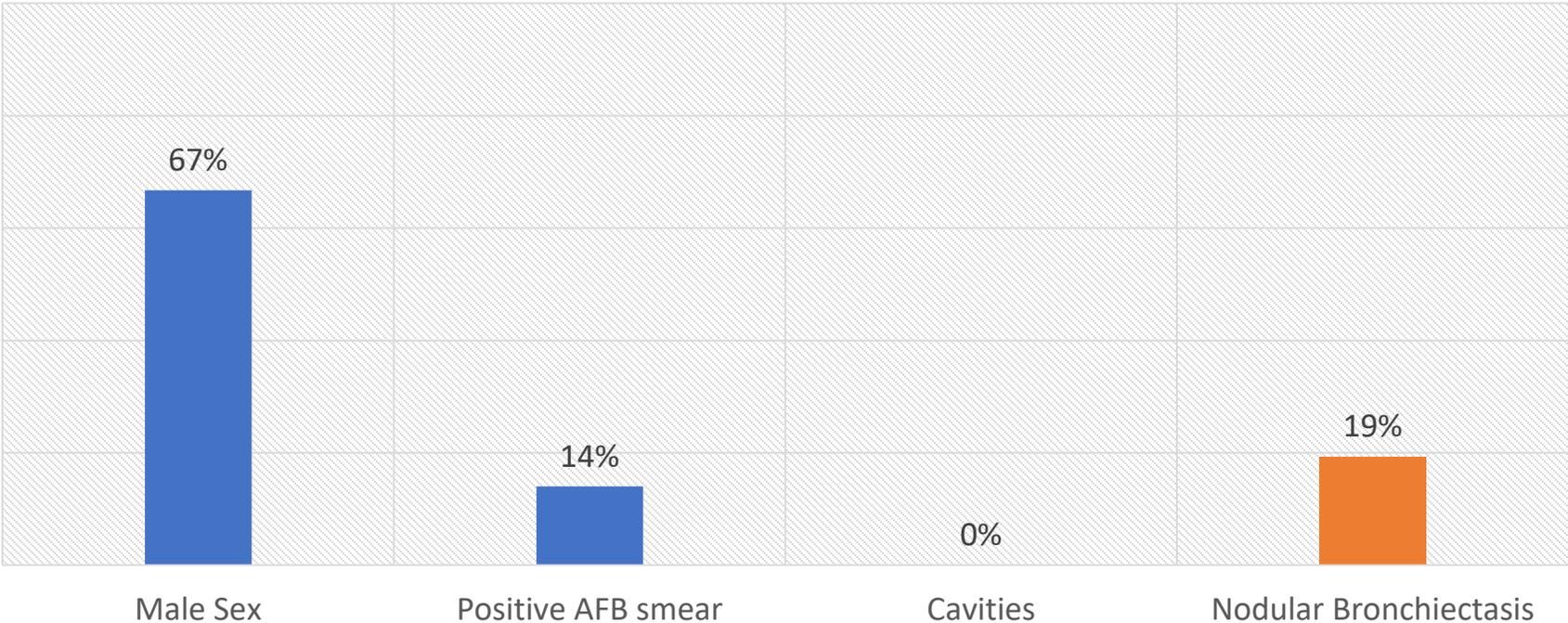
Level 3 Outcomes: Knowledge – Interactive Polling Question 1

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q1: Which of the following characteristics associated with NTM lung disease have not been associated with a worse prognosis?

Question 1: Interactive Polling

N=57



Polling questions were asked prior to the educational content.

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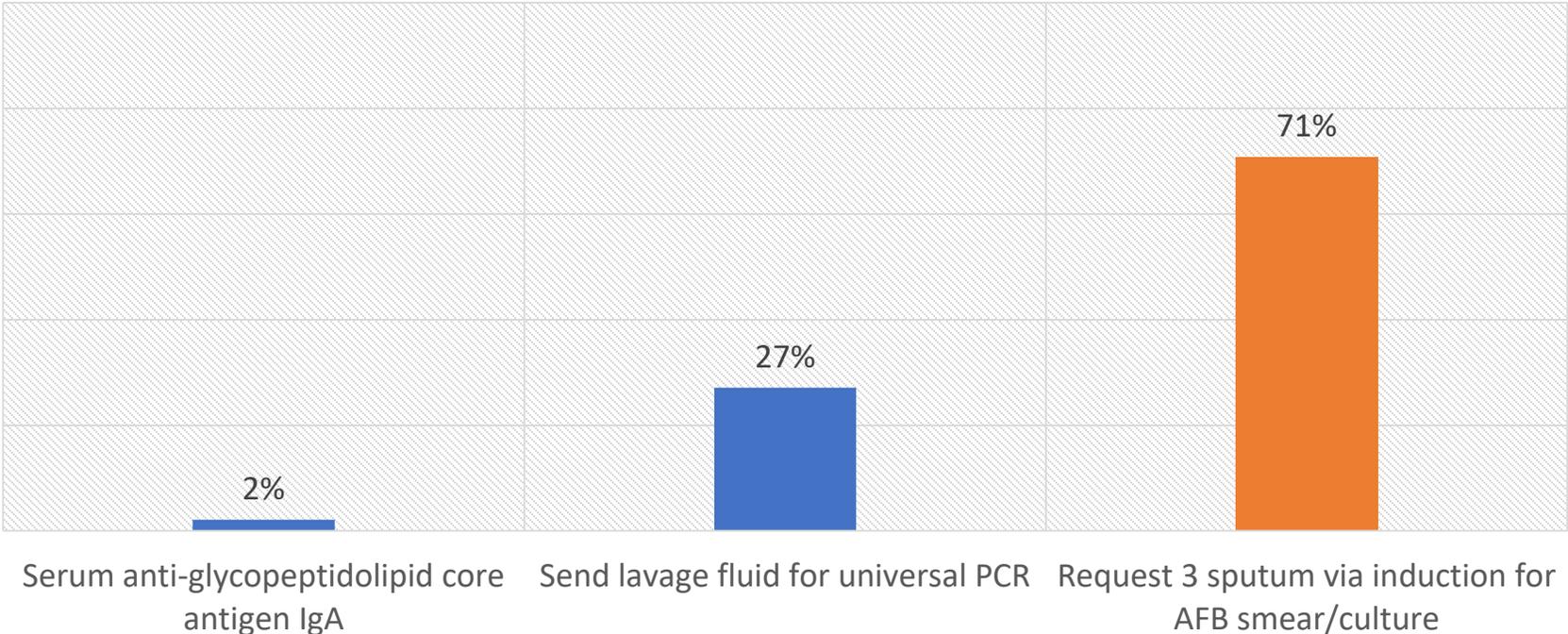
Level 3&4 Outcomes: Knowledge/Competence – Interactive Polling Question 2

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q2: 23-year-old female with a cough for one year. Bronchoscopy negative for AFB, fungal, routine pathogens. Which diagnostic test will aid in the evaluation of possible M. abscessus lung disease?

Question 2: Interactive Polling

N=48



Polling questions were asked prior to the educational content.

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

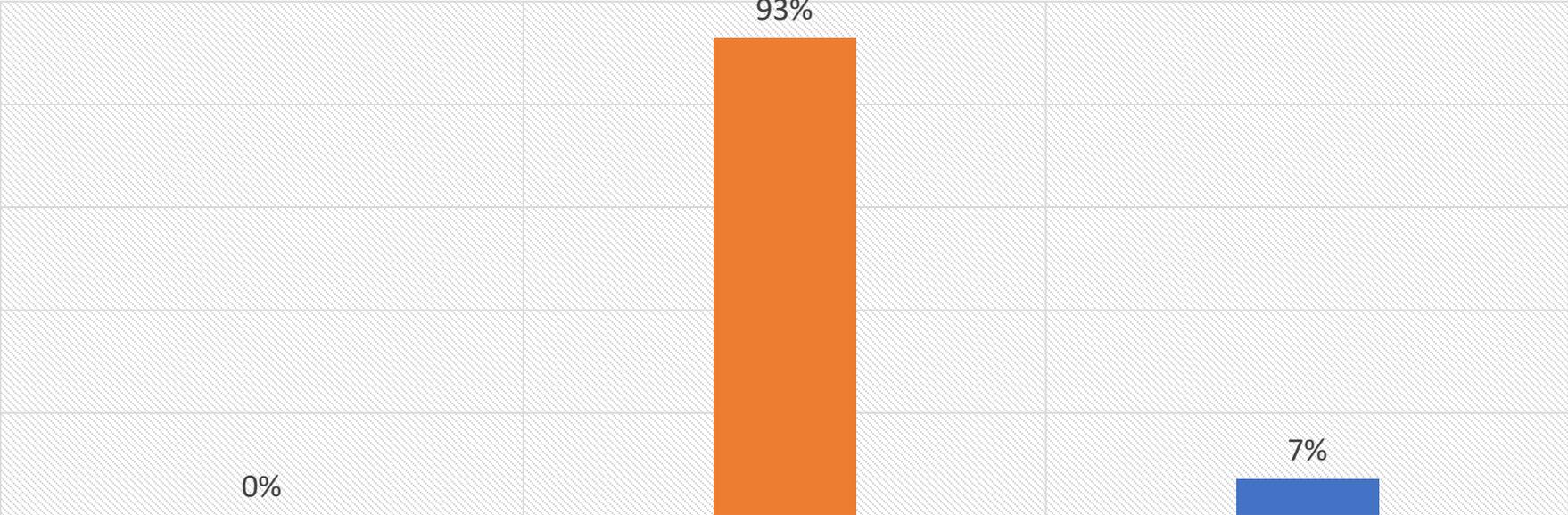
Level 3&4 Outcomes: Knowledge/Competence – Interactive Polling Question 3

Learning Objective: Review strategies for patient adherence and treatment completion to improve patient outcomes

Q3: The patient begins IV amikacin daily, IV imipenem every 8 hours, oral azithromycin daily and oral clofazimine daily. She develops tinnitus 3 weeks into treatment. How could you have avoided this side effect?

Question 3: Interactive Polling

N=42



Polling questions were asked prior to the educational content.

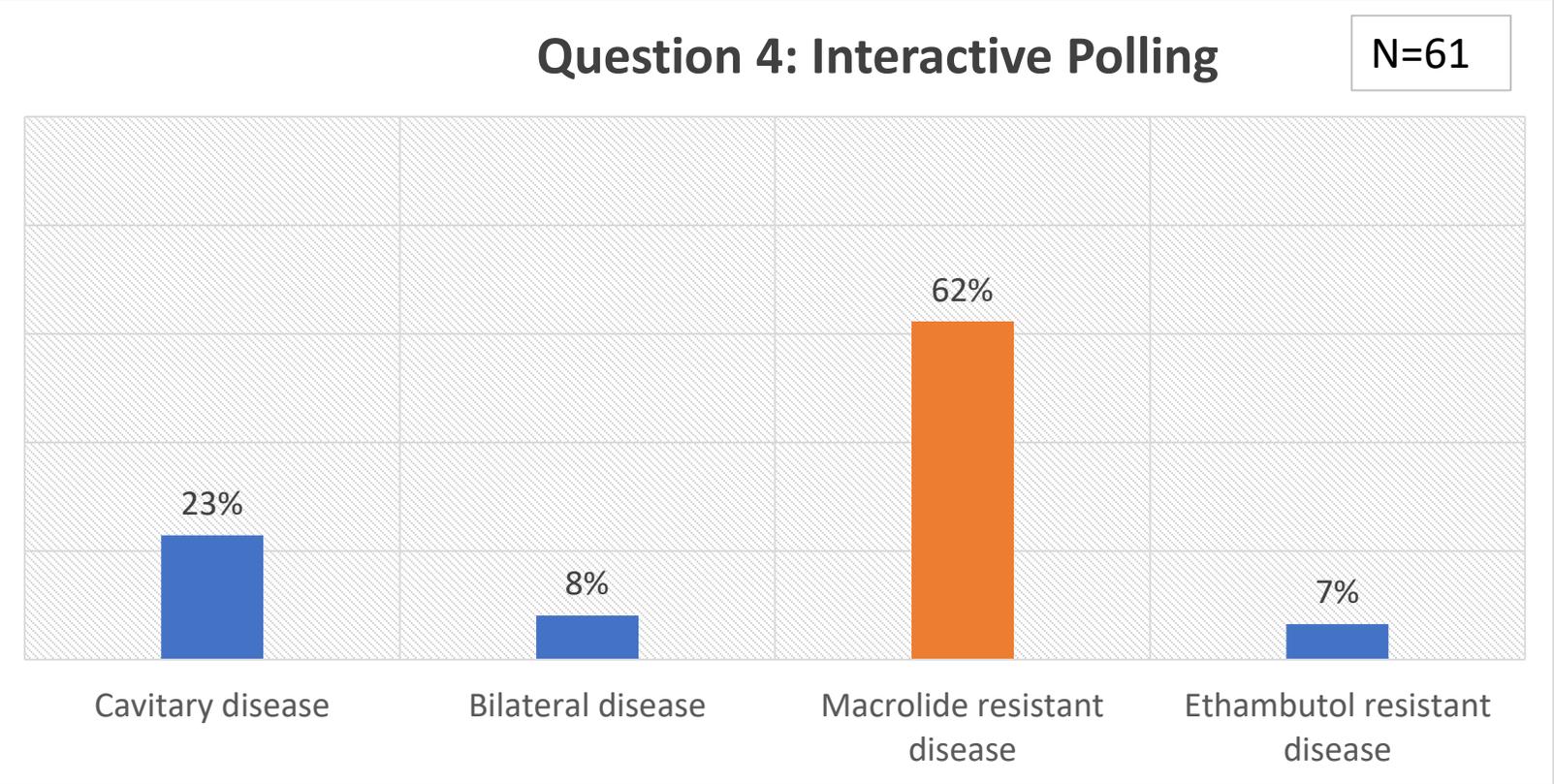
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[Final Live Report]

Level 3&4 Outcomes: Knowledge/Competence – Interactive Polling Question 4

Learning Objective: Review strategies for patient adherence and treatment completion to improve patient outcomes

Q4: Which of the following factors would likely lead to the worst treatment outcome in this patient?



Polling questions were asked prior to the educational content.

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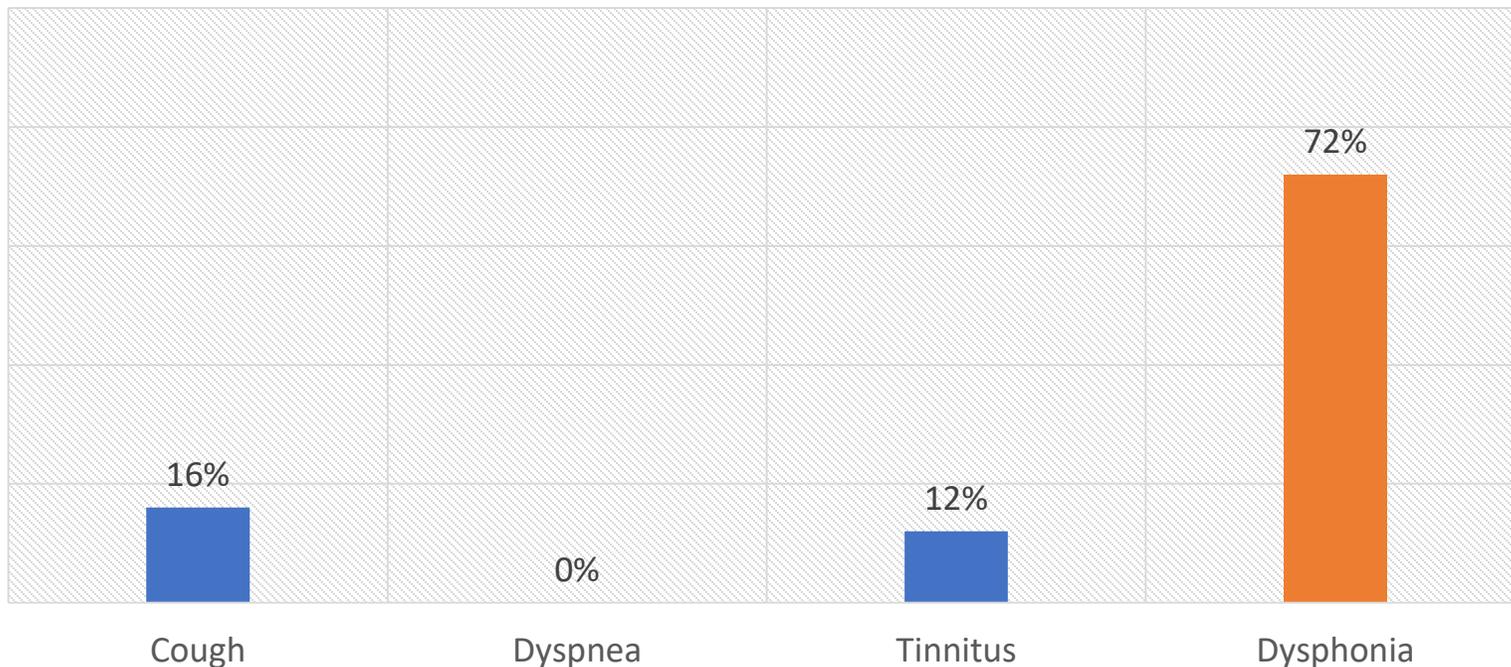
Level 3&4 Outcomes: Knowledge/Competence – Interactive Polling Question 5

Learning Objective: Analyze recent evidence, guidelines, and best practices in the diagnosis, treatment, and management of NTM and adverse events

Q5: Which of the following is the most common symptom related to use of amikacin liposome inhalation suspension?

Question 5: Interactive Polling

N=50



Polling questions were asked prior to the educational content.

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

An analysis of open-ended comments demonstrate that completers plan to make changes in the following areas:

96%

Learners intend to make changes to practice as a result of the activity

N=127

Follow guidelines and algorithms for treatment
(29 responses)

Use of inhaled amikacin
(25 responses)

Understanding of medication regimen
(19 responses)

Use of new treatment options
(11 responses)

Sensitivity testing
(11 responses)

Effective referrals to infectious disease
(10 responses)

Collaboration with lab to establish the species
(9 responses)

Frequent sputum induction cultures
(6 responses)

Screening of patients
(2 responses)

Consideration of surgery
(2 responses)

Team-based approach
(1 response)

Insurance coverage
(1 response)

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]



N=125

- 99%** • Material presented in an objective manner and free of commercial bias
- 100%** • Content presented was evidence-based and clinically relevant
- 90%** • Activity addressed strategies for overcoming barriers to optimal patient care

N=149

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

94% of participants are likely to use the clinical reference aid in their practice



Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

CLINICAL CRITERIA

- Chronic cough
- Fatigue
- Fever/chills
- Night sweats
- Weight loss
- Shortness of breath
- Hemoptysis

RADIOGRAPH

- Nodular or cavity spaces on chest radiograph or
- High resolution computed tomography showing multifocal bronchiectasis with multiple small nodules

LABORATORY

- Positive culture results from at least two separate sputum samples of the same species
- Positive culture results of at least one bronchial wash or lavage
- Transbronchial biopsy or other lung biopsy with mycobacterial histopathologic features and positive culture for NTM or biopsy showing mycobacterial histopathologic features and one or more sputum or bronchial washings that are culture positive for NTM

TREATMENT OPTIONS

Treatment *M. avium* complex

Macrolide sensitive? **YES** → Clarithromycin, Moxifloxacin, Clofazimine, Linezolid/Tarcepid, Bedaquiline, Rifampin, Ethambutol

Macrolide sensitive? **NO** → DAILY: Azithromycin, Rifampin, Ethambutol; 3x WEEK: Azithromycin, Rifampin, Ethambutol

Cavities Present? **YES** → Add N Amikacin, Consider surgery

Treatment *M. abscessus*

Functional arm 41 gene? **NO** → Macrolide ± 1 other drug, N Amikacin

Functional arm 41 gene? **YES** → Inopenen (IV), Tigecycline (IV), Linezolid/Tarcepid, Clofazimine, Moxifloxacin, Bedaquiline

Macrolide? ± 2 other drugs, Inhaled Amikacin

Macrolide? ± 2 other drugs, Inhaled Amikacin

Consider surgery for focal disease.

Treatment of MAC

	Initial Therapy	Second-Line Therapy
Macrolide	Clarithromycin 1000 mg bid or azithromycin 500-600 mg tid	Clarithromycin 500-1000 mg bid or azithromycin 250-500 mg tid
Ethambutol	15 mg/kg bid	15 mg/kg bid
Rifampin	600 mg bid	600 mg bid
Antituberculars	None	stop or amikacin

Duration of treatment: 12 months of negative cultures

Medical treatment for refractory MAC

Amikacin, Liposome Inhalation Suspension → 30% additional culture conversion

Risk of increased respiratory adverse reactions. Please refer to new CLSI MIC capabilities.

Interpretation of extended clarithromycin susceptibility results for *M. abscessus*

Clarithromycin susceptibility	<i>M. abscessus</i>	<i>M. abscessus</i> M. abscessus*	Any
Clarithromycin susceptible	Susceptible	Susceptible	Resistant
Clarithromycin resistant	Susceptible	Resistant	Resistant
High-level clarithromycin resistance	Macrolide susceptible	Indefinite macrolide resistance	High-level clarithromycin resistance
Genetic features	Functional arm 41 gene	Functional arm 41 gene	335 observed PNA point mutation
World-ID	arm 41 gene	arm 41 gene	arm 41 gene

* 20% of *M. abscessus* with a functional arm 41 gene is resistant

PROVIDE ADHERENCE

- Provide patient education
- Detect side effects early
- Manage side effects
- Optimize nutrition, physical fitness, overall well-being and caregiver relationships

SURGICAL TREATMENT

Surgical Treatment of Pulmonary NTM Disease

Indications to consider surgery:

- Massive hemoptysis
- Failure of medical therapy
- Intolerance to medical therapy
- Macrolide resistant MAC infection
- Cavitary lesions
- Focal severe bronchiectasis
- Focal disease with *M. abscessus* infection

1 Am J Respir Crit Care Med Vol 175, pp 267-276, 2007. | 2 Am J Respir Crit Care Med 2017; 195(8): 814-823. | 3 Thorax 2017;72(Suppl 2):i1 | 4 CLSI. M26. 2016

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[Final Live Report]

What topics would like more information about in future educational activities?

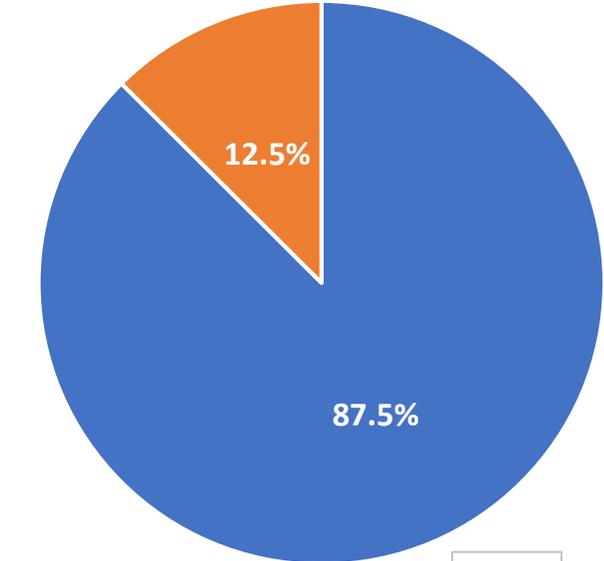
Bronchiectasis	Morbidity and mortality associated with NTM
NTM, when to treat	Clinical management of NTM infections
More information on newer medications	Tobacco prevention
More clinical-based learning	Chronic pulmonary infections
Role of physiotherapy	COPD
Management of IPF	Steroid dependent asthma
Case studies and examples	Biomarkers for NTM
ILD	Adjunctive treatments of bacterial pneumonias
Updates on treatment	Prevention
Lung nodule management	Lung transplant
Cystic fibrosis	Centers of excellence for NTM
Non-pharmaceutical interventions	Surgical treatment
Management of side effects	Medications in pipeline for NTM

Updates in Nontuberculous Mycobacteria (NTM): Best Practices for Diagnosis, Management and Personalized Treatment Selection

[Final Live Report]

Self-Reported Performance (Live Symposium)

Did this activity provide new ideas or information you have used in practice?



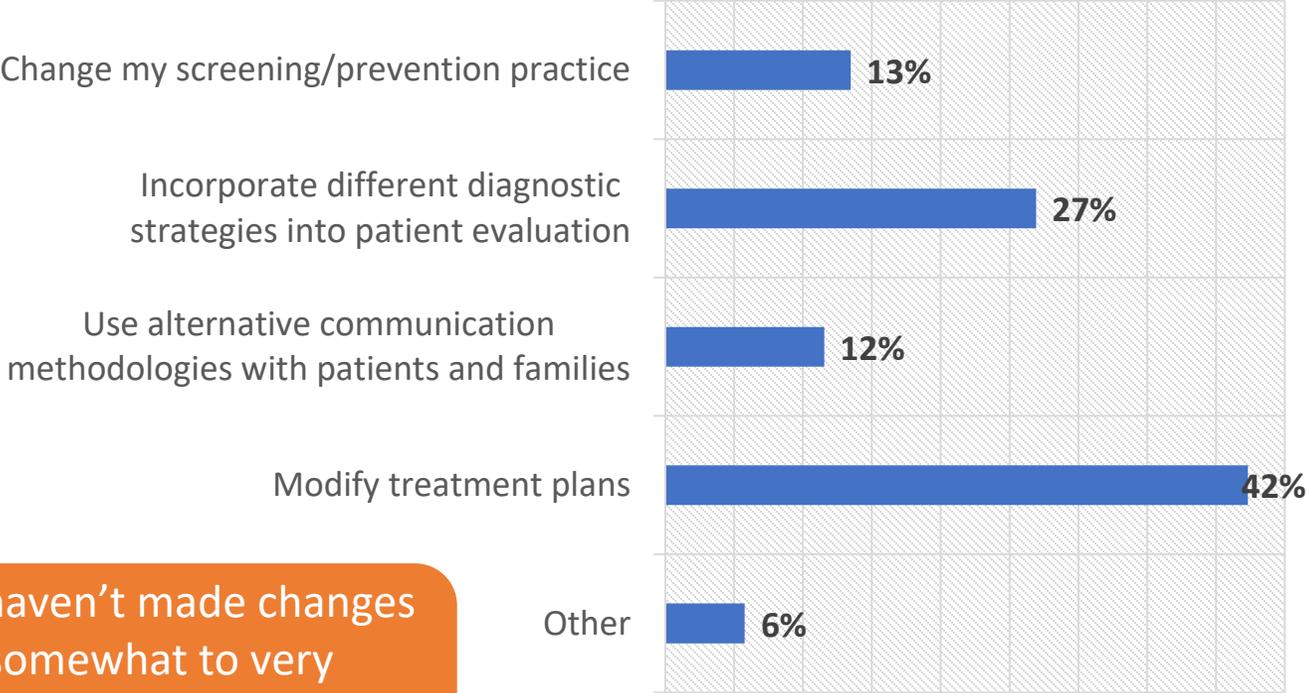
- Yes
- Haven't had an opportunity to implement changes in practice

N=40

Those who haven't made changes yet are somewhat to very committed to make changes (100%)

What change will you incorporate into your practice as result of the knowledge acquired during the activity?

N=52

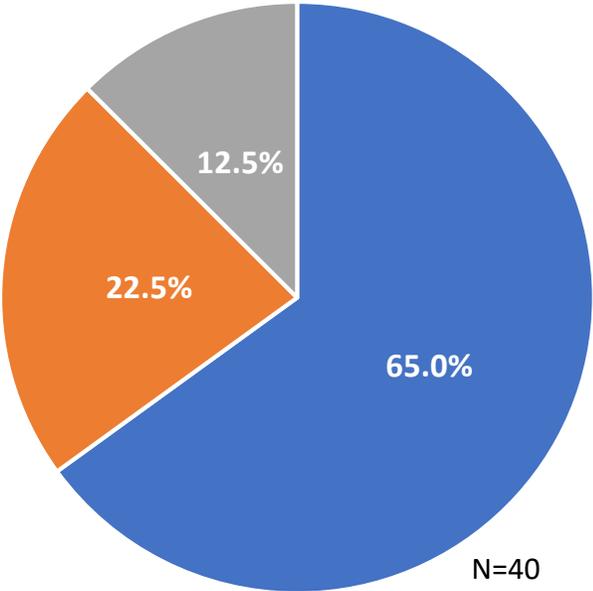


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[Final Live Report]

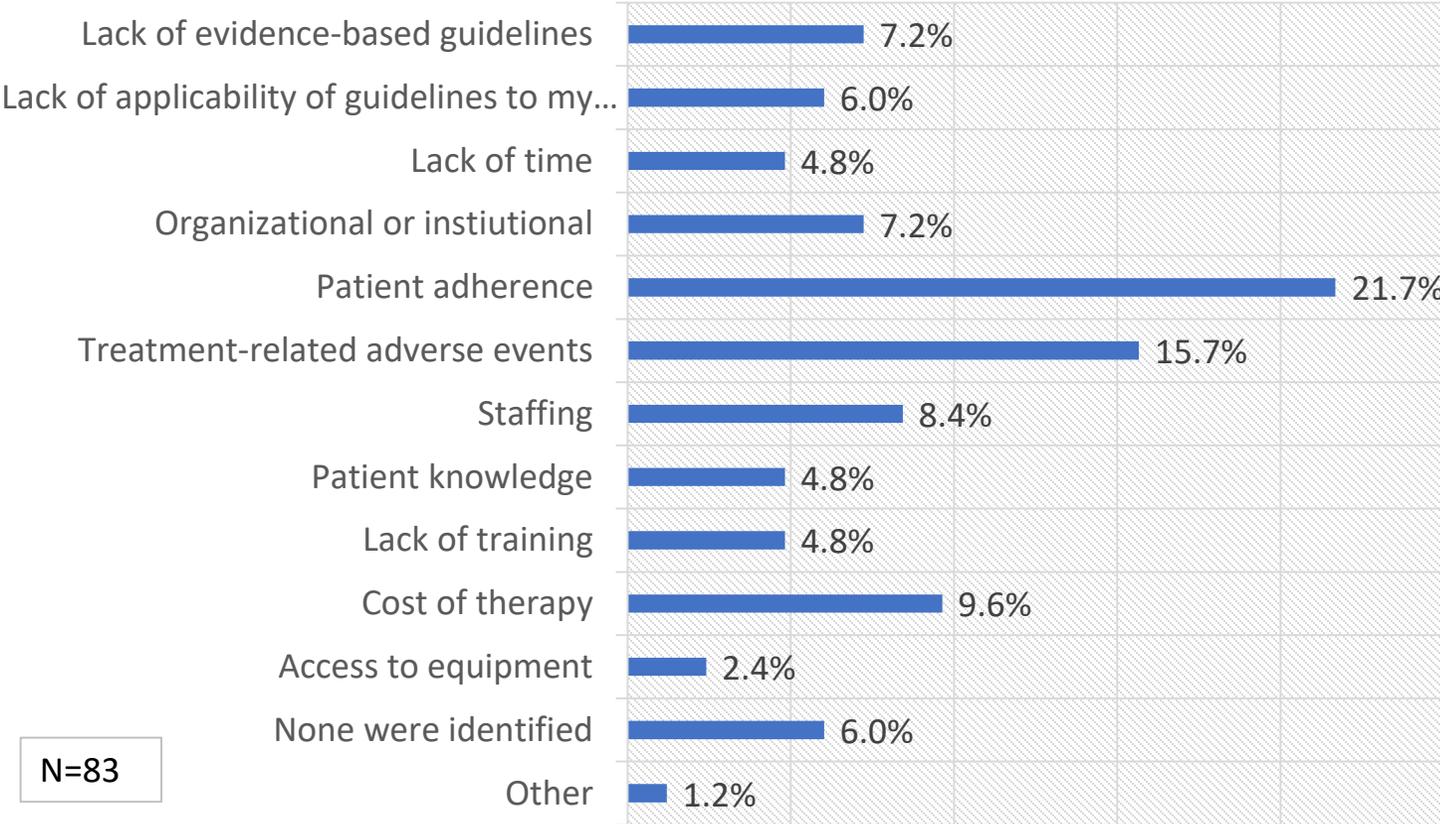
Self-Reported Performance (Live Symposium)

Did the activity provide information, education, tools or resources to be able to address any of those barriers?



■ Yes ■ No ■ I did not experience any barriers

What barriers have you experienced since this activity that may impact patient outcomes or optimal patient care?



N=83

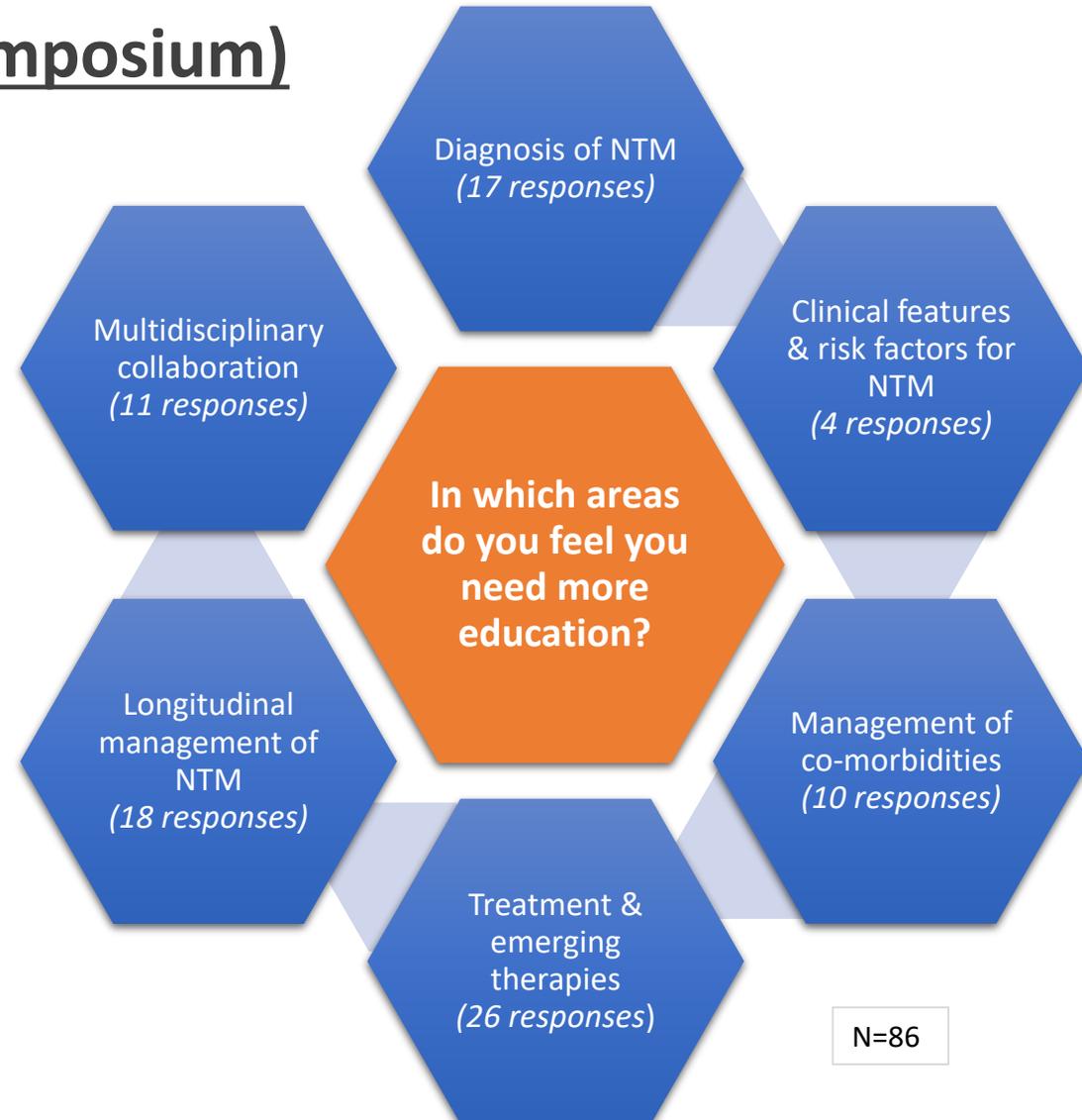
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[Final Live Report]

Self-Reported Performance (Live Symposium)

2,418

Patients have benefited so far from this educational activity
[Reported 6 weeks following activity]



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Accreditation

NJH is accredited 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.

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