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Awareness of bronchiectasis and NTM among general practitioners: A cross-sectional survey in Rome

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ABSTRACT

Background: Bronchiectasis is a chronic respiratory disease presented with the irreversible bronchial dilatation at chest computed tomograph scan and by a vicious vortex characterized by mucus accumulation, chronic inflammation and recurrent infections. Bronchiectasis is often linked to non-tuberculous mycobacteria (NTM). The aim of this survey is to know the awareness of general practitioners (GPs) about bronchiectasis and NTM to build a link between specialist and general doctor and improve the management of each patient with diagnosis of bronchiectasis and/or NTM, preventing the exacerbation and the progressive decline.

Methods: A cross-sectional, Internet-based questionnaire-survey on the bronchiectasis and NTM was conducted between January 2025 and May 2025. The survey was sent to GPs working in the local health authority (ASL) Rome 1, district 13 and 14, which are adjacent to the San Filippo Neri Hospital, where there is the bronchiectasis and NTM clinic. The total number of doctors for both districts is 205. Standard descriptive statistics were used for analyzing the data.

Results: Among 205 GPs, 33 responded. The completion rate was 100% and typical time spent 1 m 43 sec. All colleagues (100%) reported to be familiar with bronchiectasis, whereas 4 of them (12%) have never heard of NTM. As regards NTMs, almost all GPs (90%) considered them contaminants, however many of them (77%) were unaware of treatment and its timing. Discussion In this survey we collected data about the awareness of bronchiectasis and NTM among GPs. Even though the time required to complete the survey was minimal and the questions were quite simple, only 15% of recipients responded. In Italy the absence of the unified healthcare system and the centralized sharing health records could be one of the major obstacles to the awareness of the less common disease, as bronchiectasis and NTM infections.

Conclusion: This study highlights significant gaps in GPs knowledge of NTM infections and, to a lesser extent, bronchiectasis, emphasizing the need for improved training. It is crucial promoting collaboration among specialists and clinical practitioners to enhance both diagnosis and management of patients with bronchiectasis and NTM infections.

Keywords: bronchiectasis, NTM, general practitioners

INTRODUCTION

Bronchiectasis is a chronic respiratory disease presented with the irreversible bronchial dilatation at chest computed tomograph scan and by a vicious vortex characterized by mucus accumulation, chronic inflammation and recurrent infections [1]. Epidemiology is not clearly understood due to the lack of world registry and mandatory notification. In the last years the diagnosis of bronchiectasis has been rapidly growing, probably correlated to the major awareness of clinicians, microbiological and radiological techniques progress and the raising attention of the most important scientific committees. Incidence and prevalence of bronchiectasis are increasing, even in the absence of a clear data by the low-income countries. Prevalence in the general population ranges from 52.3 to more than 1,000 per 100,000 and incidence ranging between 9.4 and 48.1 new cases per 100,000 person-years [2]. In Italy prevalence is 163 per 100,000 population, whereas annual incidence is 16.3 per 100,000 person-years [3]. Both incidence and prevalence increase with age and are higher in women. The pathophysiology is better described by the Cole's vicious cycle, noted since 1986 and then renamed in vicious vortex, to highlight the interconnection between the different components: airway infections, inflammation, mucociliary dysfunction and structural lung damage (**Figure 1**) [4].

The chronic airway inflammation is the cornerstone of the pathophysiology of bronchiectasis. Although bronchiectasis is primarily considered a neutrophil-mediated disease, recent studies showed the eosinophilic involvement in a subset of patients with diagnosis of bronchiectasis. Both kinds of inflammation are sustained by the multiple infections, with the pseudomonas aeruginosa the most frequent bacteria in the sputum sample. The inefficacy of mucociliary clearance leads

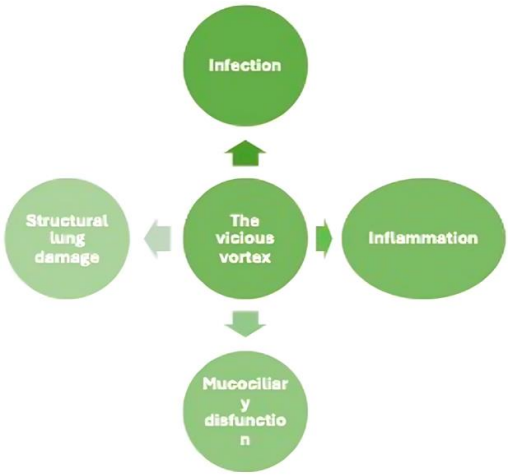


Figure 1. The vicious vortex (Source: Authors)

to the mucus accumulation in the airway favoring the mucus hypersecretion and causing the inflammation and infection perpetuations [5].

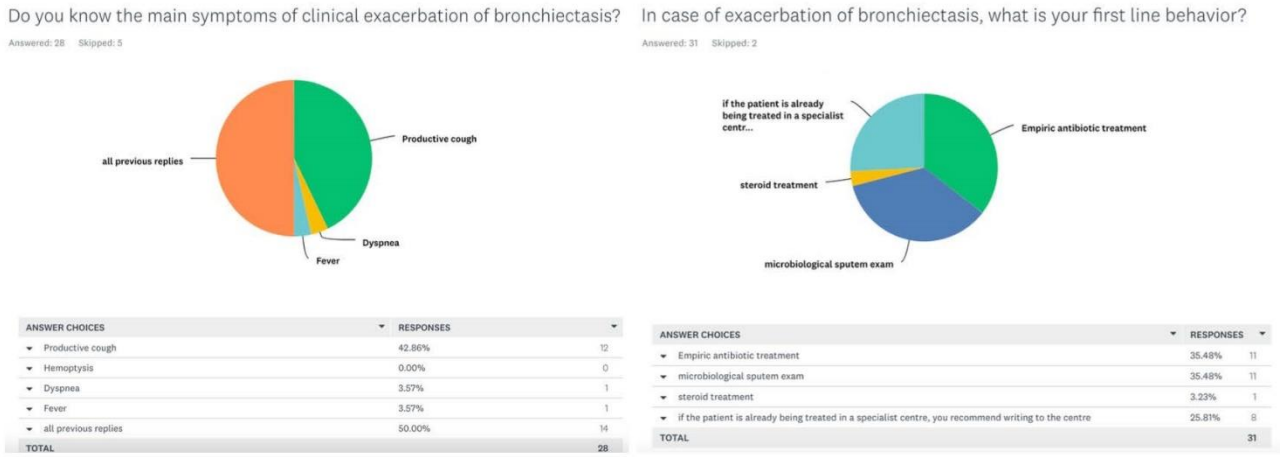
Bronchiectasis is a heterogeneous disease with an unknown cause in around 30-40% of patients, identifying the idiopathic pattern. In the remain 60% of cases the main causes to evaluate are previous infections, immunodeficiency (primary or secondary), genetic disease such as cystic fibrosis and primary ciliary dyskinesia, congenital causes, autoimmune diseases, chronic respiratory diseases [1]. Cough, sputum production and breathlessness are the most frequent symptoms, but fatigue, haemoptysis and thoracic pain are also common [6]. To confirm the diagnosis of bronchiectasis the gold standard is the chest CT scan, where the presence of dilated airways, broncho-arterial ratio > 1, lack of airway tapering towards the periphery and airways being visible within 1 cm proximity of the pleura, confirm the diagnosis. Bronchiectasis is often linked to non-tuberculous mycobacteria (NTM). The evidence of sputum sample positive for NTM in bronchiectasis increased worldwide, either as a single bacterium or as a co-infection. The incidence and prevalence of NTM infections vary considering the geographic areas and environmental features, but, as for bronchiectasis, are recognized to be increasing [7]. In 2020 four international societies (ATS/IDSA/ERS/ESCMID) published recommendations on the management of NTM pulmonary disease (NTM-PD) including criteria for the diagnosis and treatment of the four commonest NTM species (M. avium complex, M. kansasii, M. xenopi, and M. abscessuss) [8]. It is important to distinguish infection and disease because management and path of patients are different. As highlighted by the last guideline, the NTM-PD is recognized when clinical, microbiological and radiological criteria are present at the same time and patients could be candidate for treatment. If one of them is absent we are faced with the infection and patient could be followed-up with radiological and clinical exams. Both bronchiectasis and NTM are progressive diseases which requires of a multidisciplinary team, including the general practitioners (GPs). When the patient has any symptoms, the first doctor to whom he refers is the practitioner. With shortness of breath or persistent cough and sputum, GPs are frequently faced with a broad range of differential diagnoses, either lung disease or extrapulmonary disorder. Even when the focus is more likely on lung disease, bronchiectasis and NTM should be considered as a possible differential diagnosis, with asthma or COPD [9]. The aim of this survey is to know the awareness of GPs about bronchiectasis and NTM to build a link between specialist and general doctor and improve the management of each patient with diagnosis of bronchiectasis and/or NTM, preventing the exacerbation and the progressive decline.

METHODS

A cross-sectional, Internet-based questionnaire-survey on the bronchiectasis and NTM was conducted between January 2025 and May 2025. The questionnaire was designed with closed-ended questions and distributed using the SurveyMonkey® platform. The survey was sent to GPs working in the local health authority (ASL) Rome 1, district 13 and district 14, which are adjacent to the San Filippo Neri Hospital, where there is the bronchiectasis and NTM clinic. The total number of doctors for both districts is 205. We requested information about the knowledge of bronchiectasis and NTM, if they have in clinic patients with diagnosis of bronchiectasis and/or NTM. Furthermore, we requested information about their knowledge on clinical presentation and what they manage a probable exacerbation. Last question, but not least, regarding their knowledge about the presence of a dedicate clinic in the nearby hospital and, if not, if they would like to know more information on the access. The questionnaire was developed by an investigator who sent the survey to other two investigators, namely the references of the district 13 and district 14, which forwarded the e-mail to all GPs. The survey was voluntary, with no incentives offered to participants and did not require a mandatory answer. Ethical review and approval were waived for this study, due to the use of data that did not contain any identifiable information. Response rates were calculated as the number of GPs from which an answer was recorded divided by the number of surveys sent out. Both completed and partially completed questionnaires were analyzed using the number of completed responses per item as the denominator. Standard descriptive statistics were used for analyzing the data. Questionnaires are available in **Appendix A**.

RESULTS

Among 205 GPs, 33 responded. The completion rate was 100% and typical time spent 1 m 43 sec. All colleagues (100%) reported to be familiar with bronchiectasis, whereas 4 of them (12%) have never heard of NTM. Patients with diagnosis of bronchiectasis were followed by 28 (82.85%) GPs. Among them, disparity was present in the question on the main symptoms related to bronchiectasis: half of them considered productive cough, hemoptysis, dyspnea and fever as the clinical presentation of bronchiectasis exacerbation, whereas 12 GPs (42%) linked productive cough to exacerbation and 1 practitioner (4%) associated, respectively fever or dyspnea to exacerbation. The same trend was found in the next question about the prescription in case of exacerbation: 11 colleagues (36%) prescribed a microbiological test before starting on empiric treatment and the same percentage, on the other hand, suggested an antibiotic treatment without a sputum sample; in only one case (3%) there was a steroid prescription; 8 (25%) of them referred patients to the bronchiectasis referral center (**Figure 2**).



ANSWER CHOICES	RESPONSES	
Productive cough	42.86%	12
Hemoptysis	0.00%	0
Dyspnea	3.57%	1
Fever	3.57%	1
all previous replies	50.00%	14
TOTAL		28

ANSWER CHOICES	RESPONSES	
Empiric antibiotic treatment	35.48%	11
microbiological sputem exam	35.48%	11
steroid treatment	3.23%	1
if the patient is already being treated in a specialist centre, you recommend writing to the centre	25.81%	8
TOTAL		31

Figure 2. Different GPs approach to bronchiectasis exacerbation (Source: Authors)

Physiotherapy is the most important treatment for the 78% of respondents, while two colleagues prescribe steroids. As regards NTMs, almost all GPs (90%) considered them contaminants, however many of them (77%) were unaware of treatment and its timing. The last question of the survey had the aim to evaluate the interest to know more information about the specialistic service for bronchiectasis and NTM patients. Fortunately, no one choice "No, I don't care". 10 (36%) and 11 (46%) practitioners didn't know, respectively, about the bronchiectasis and NTM clinics, but they were very interested to have more information as center's contact, prescription and how to access the service.

DISCUSSION

In this survey we collected data about the awareness of bronchiectasis and NTM among GPs. Even though the time required to complete the survey was minimal and the questions were quite simple, only 15% of recipients responded. In preparation for the 2024 world bronchiectasis day, Barbara Crossley of European Lung Foundation, reported the patients experiences of gaps in bronchiectasis care [10]. Patients consistently report difficulties in diagnosis and in the management of exacerbation, particularly among GPs, with long delays to diagnosis and suboptimal treatment. The economic burden of these diseases has been estimated to be similar to common obstructive disease; this increases with disease severity, hospitalizations for exacerbation, use of inhaled antibiotics and multiple different exams [6]. No data in literature reported the assessment of GPs knowledge regarding bronchiectasis and NTM. Nevertheless, a recent cross-sectional study conducted in Northwest Ethiopia in 2024 on the assessment of healthcare professionals' knowledge regarding NTM infections was published. Kiros et al. conducted the study in a single center, where 294 among nurses, doctors and other healthcare workers responded at 29-items questionnaire predominantly structured into evaluating general knowledge, transmission dynamics, laboratory diagnosis, treatment, and control strategies of pulmonary NTM infections. Just over half showed good knowledge about NTM and the 52.4% distinguished between NTM and mycobacterium tuberculosis infections [11]. In Tanzania, the researchers in [12] conducted a face-to-face questionnaire interview using a structured questionnaire on the demographic characteristics of the study participants, their awareness on transmission, diagnosis, and management of NTM infections. Healthcare workers involved in TB care in 29 hospitals in Tanzania formed the study population for this survey. Among 120 respondents only 24.1% were found to be knowledgeable about NTM infections [12]. These disparities can be ascribed to many factors, such as variations in healthcare systems, resource accessibility, educational initiatives, and socioeconomic circumstances. In Italy the absence of the unified healthcare system and the centralized sharing health records could be one of the major obstacles to the awareness of the less common disease, as bronchiectasis and NTM infections. As reported by the Lancet Regional Health Europe, a nationalization of the Italian health public system, without discrepancies between different regions, could be essential to support the interoperability among the healthcare professionals, avoiding duplicated exams, delay in diagnosis and a health data network available for the GPs too [13]. Considering our results, the gaps are located either in the GPs awareness of bronchiectasis and NTM infections and in the availability to collaborate with specialists to improve the patient's quality of care. This survey aims to assess the knowledge about bronchiectasis and NTM infections among GPs and to establish a network between them and a referral center located in their health local authority. As NTM infections increasingly pose a public health concern, all healthcare workers should improve their knowledge about these items. This study has its limitations; it is a single-center, cross-sectional study with a small sample size, which may not accurately reflect the national figure regarding knowledge gaps among GPs in the country.

CONCLUSION

This study highlights significant gaps in GPs knowledge of NTM infections and, to a lesser extent, bronchiectasis, emphasizing the need for improved training. It is crucial promoting collaboration among specialists and clinical practitioners to enhance both diagnosis and management of patients with bronchiectasis and NTM infections. Organizing regular interdisciplinary workshops and discussion of clinical cases can facilitate knowledge sharing and improve diagnostic accuracy among healthcare workers. Defining detailed pathways could avoid delay in diagnosis, unhelpful exams and suboptimal treatment, improving the quality of care and the patient's clinical stability.

Author contributions: EI: conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing – original draft, writing – review & editing; **MM, CC, & LT:** funding acquisition, investigation, methodology, project administration, resources, supervision, validation, visualization, writing – original draft, writing – review & editing. All authors agreed with the results and conclusions.

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Ethical statement: Ethical review and approval were waived for this study, due to the use of data that did not contain any identifiable information.

AI statement: No Generative AI or AI-based tools were used in this study.

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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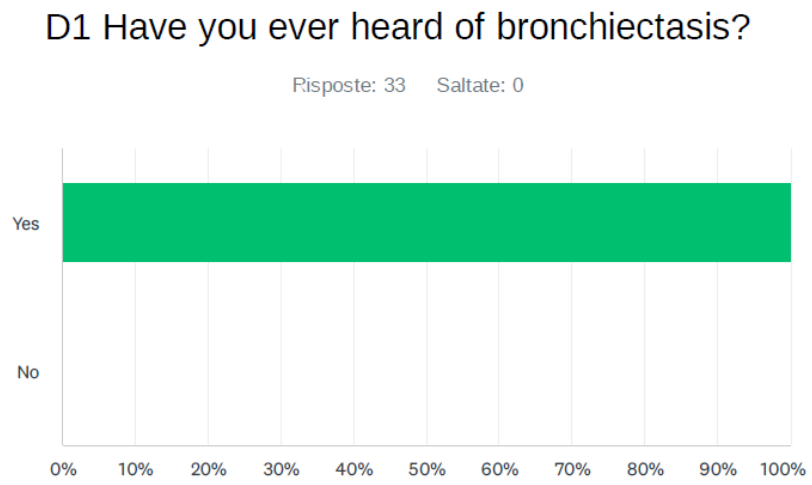
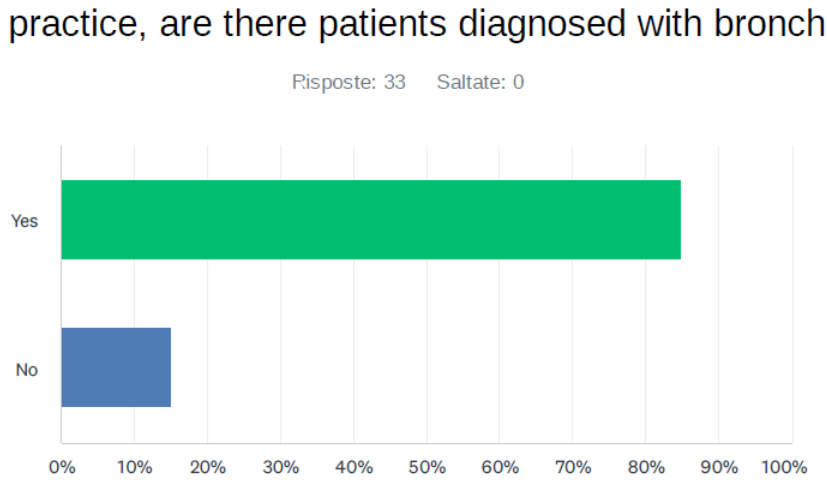
APPENDIX A



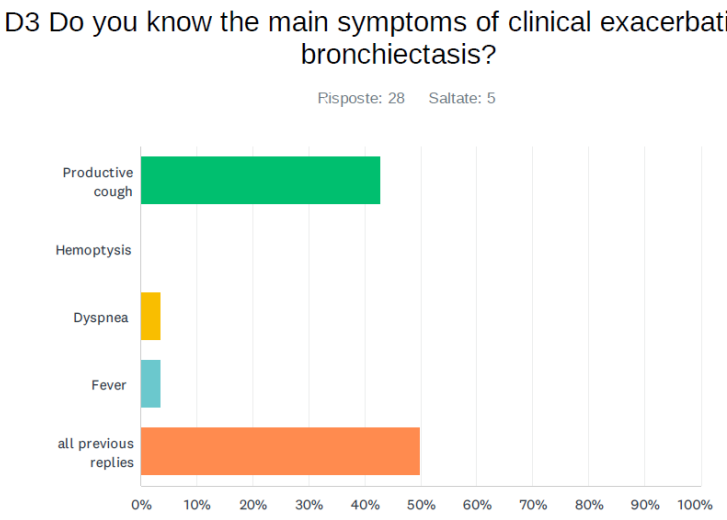
OPZIONI DI RISPOSTA	RISPOSTE	
Yes	100.00%	33
No	0.00%	0
TOTALE		33

Figure A1. D1 Have you ever heard of bronchiectasis? (Source: Authors)



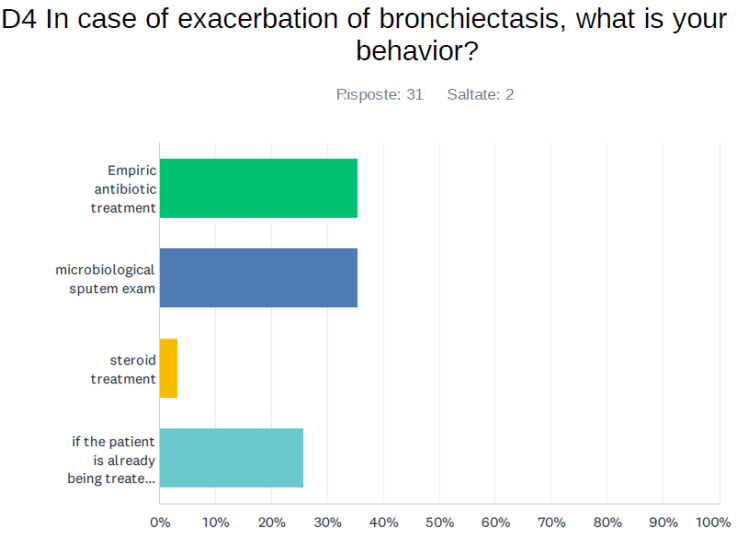
OPZIONI DI RISPOSTA	RISPOSTE	
Yes	84.85%	28
No	15.15%	5
TOTALE		33

Figure A2. D2 In your practice, are there patients diagnosed with bronchiectasis? (Source: Authors)



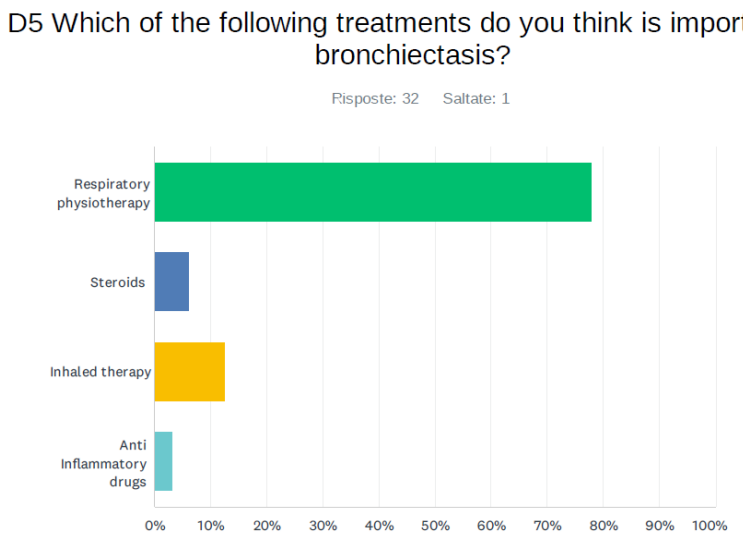
OPZIONI DI RISPOSTA	RISPOSTE	
Productive cough	42.86%	12
Hemoptysis	0.00%	0
Dyspnea	3.57%	1
Fever	3.57%	1
all previous replies	50.00%	14
TOTALE		28

Figure A3. D3 Do you know the main symptoms of clinical exacerbation of bronchiectasis? (Source: Authors)



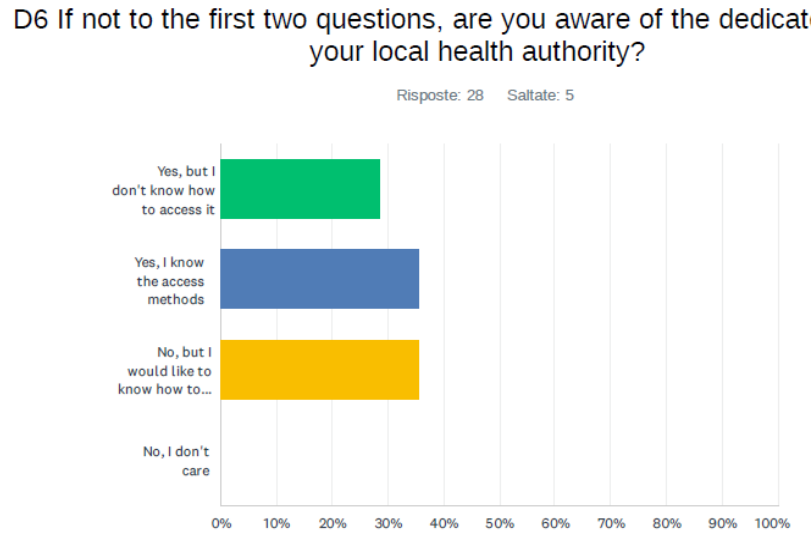
OPZIONI DI RISPOSTA	RISPOSTE	
Empiric antibiotic treatment	35.48%	11
microbiological sputem exam	35.48%	11
steroid treatment	3.23%	1
if the patient is already being treated in a specialist centre, you recommend writing to the centre	25.81%	8
TOTALE		31

Figure A4. D4 In case of exacerbation of bronchiectasis, what is your first linebehavior? (Source: Authors)



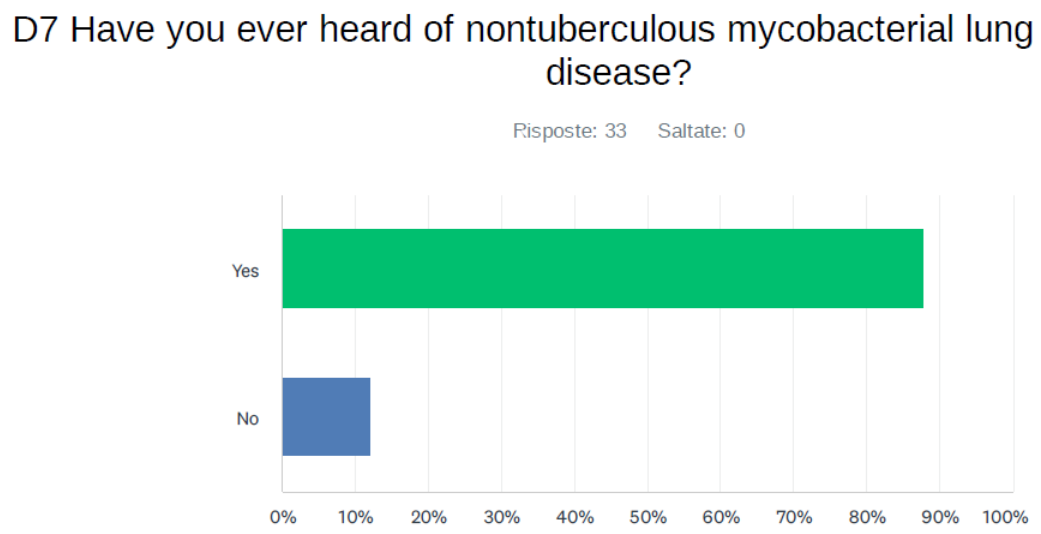
OPZIONI DI RISPOSTA	RISPOSTE	
Respiratory physiotherapy	78.13%	25
Steroids	6.25%	2
Inhaled therapy	12.50%	4
Anti Inflammatory drugs	3.13%	1
TOTALE		32

Figure A5. D5 Which of the following treatments do you think is important inbronchiectasis? (Source: Authors)



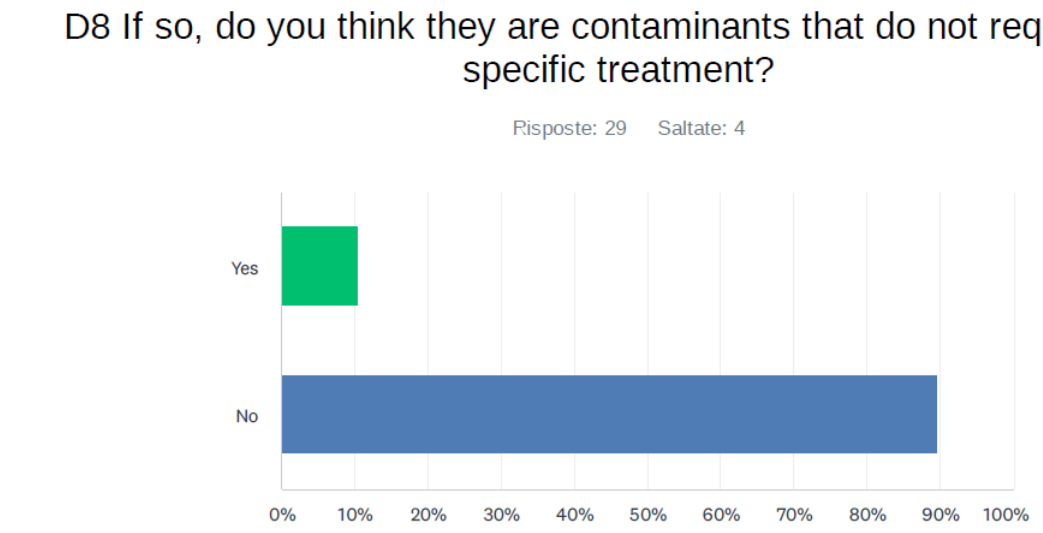
OPZIONI DI RISPOSTA	RISPOSTE	
Yes, but I don't know how to access it	28.57%	8
Yes, I know the access methods	35.71%	10
No, but I would like to know how to access it	35.71%	10
No, I don't care	0.00%	0
TOTALE		28

Figure A6. D6 If not to the first two questions, are you aware of the dedicated clinic atyour local health authority? (Source: Authors)



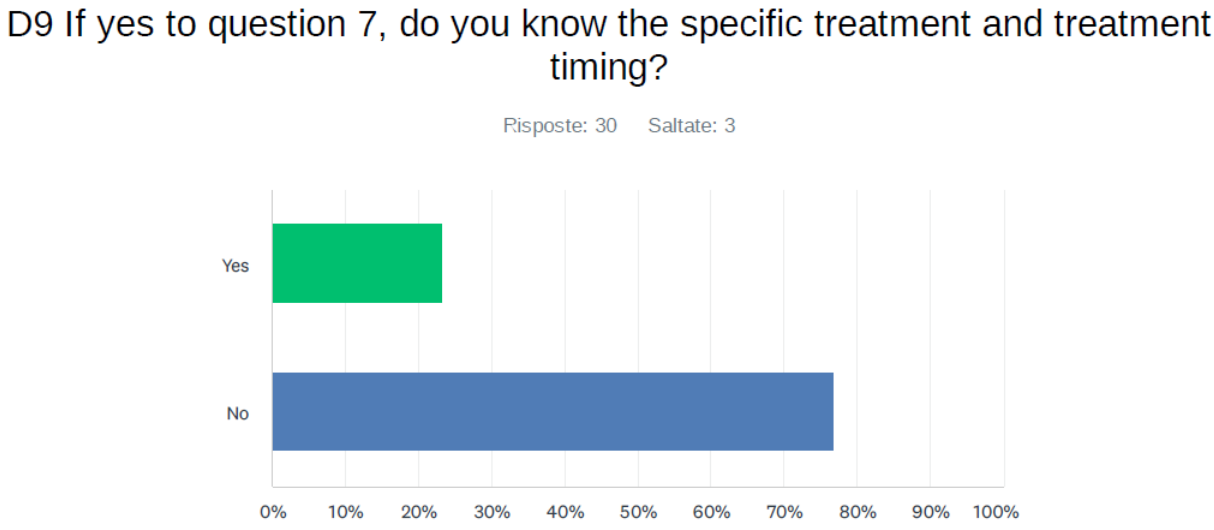
OPZIONI DI RISPOSTA	RISPOSTE	
Yes	87.88%	29
No	12.12%	4
TOTALE		33

Figure A7. D7 Have you ever heard of nontuberculous mycobacterial lung infection ordisease? (Source: Authors)



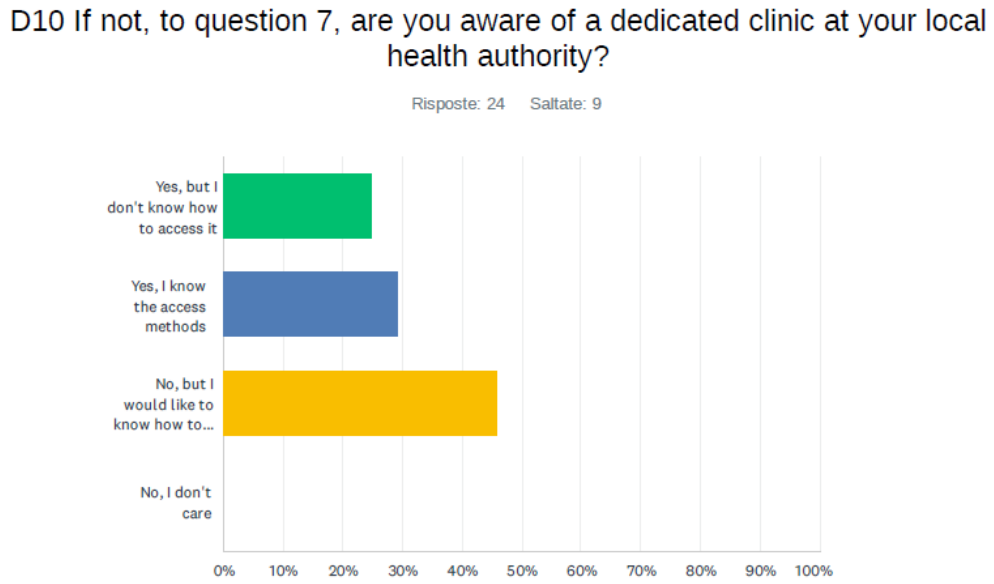
OPZIONI DI RISPOSTA	RISPOSTE	
Yes	10.34%	3
No	89.66%	26
TOTALE		29

Figure A8. D8 If so, do you think they are contaminants that do not require any specific treatment? (Source: Authors)



OPZIONI DI RISPOSTA	RISPOSTE	
Yes	23.33%	7
No	76.67%	23
TOTALE		30

Figure A9. D9 If yes to question 7, do you know the specific treatment and treatment timing? (Source: Authors)



OPZIONI DI RISPOSTA	RISPOSTE	
Yes, but I don't know how to access it	25.00%	6
Yes, I know the access methods	29.17%	7
No, but I would like to know how to access it	45.83%	11
No, I don't care	0.00%	0
TOTALE		24

Figure A10. D10 If not, to question 7, are you aware of a dedicated clinic at your local health authority? (Source: Authors)