

# Training and practice in bronchoscopy A national survey in Italy

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**ABSTRACT:** *Training and practice in bronchoscopy. A national survey in Italy. N. Facciolongo, R. Piro, F. Menzella, M. Lusuardi, M. Salio, L. Lazzari Agli, M. Patelli.*

**Background and Aim.** Bronchoscopy is performed in a variety of different settings in Italy. The surveys conducted so far have highlighted the heterogeneity of the procedures and the frequent inability to adhere to the guidelines. The aim of this survey was to analyse procedures, training, and opinions of Italian respiratory physicians performing interventional bronchology in the clinical practice.

**Methods.** The study was conducted retrospectively on 300 pulmonologists. From January to June 2008, these were invited to participate in an email survey to be sent out monthly to each participant for four consecutive months.

**Results.** Two hundred and one respiratory physicians took part in the study, most of whom (83.5%) work in ei-

ther Pulmonology or Interventional Pulmonology Units. The year before the survey, 21.2% of the participants had performed fewer than 100 examinations, 42.3% 100 to 300, and 36.6% more than 300 bronchoscopies; 53.9% were familiar with the international guidelines on the topic. Among the responders, 34.1% had received less than 6 months training, 55.3% considered further training in rigid bronchoscopy, laser procedures and thoracoscopy, invaluable for their professional activity. Adequate training for transbronchial needle aspirates, was reported by 49.6% of respondents.

**Conclusions.** Our data show that interventional bronchoscopy procedures are regularly performed according to current recommendations by over half of the Italian Pulmonologists participating in our survey. The need for more comprehensive basic education and training was put forward by the majority of physicians.

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## Introduction

Interventional pulmonology (IP) is an area of pulmonary medicine that focuses on the use of advanced minimally invasive diagnostic and therapeutic techniques for the treatment of patients with airway and pleural disorders.

Bronchoscopy, introduced in 1887 by Killian, has seen its applications modified over the last forty years thanks to the use of the flexible bronchoscope [1]. The introduction of additional advanced methods has considerably extended its potential, providing pulmonologists with fundamental support in both diagnosis and therapy. Different scientific societies have published guidelines for bronchoscopy, focusing in particular on methodology and safety issues [2-4].

The surveys on bronchoscopy conducted so far have highlighted the heterogeneity of the procedures implemented by individual operators [5, 6] and the frequent failure to adhere to guidelines [7, 8].

In Italy, apart from Pulmonology Units, bronchoscopies are performed in a variety of different settings, as well as for referral or secondary care centres. The practices for IP in Italy have never been studied systematically, nor have they been compared with the reference guidelines.

The aim of our survey was to analyse training, procedures and expert opinions from the respiratory physicians performing interventional bronchoscopy throughout Italian hospitals.

## Materials and Methods

### Participants

The study was conducted retrospectively on 300 pulmonologists enrolled in the "Interventional Pulmonology" study group of the Italian Association of Hospital Pulmonologists (AIPO), that represent a significant group of Italian respiratory endoscopists from all the country. Through the peri-

od January-June 2008, an e-mail was sent out to each pulmonologist inviting them to participate in an e-mail survey.

**Design and methods**

The study was approved by the Scientific Review Board of AIPO. The survey consisted of an anonymous questionnaire, written in Italian, with 64 multiple-choice questions to be completed online at a dedicated website (www.surveymonkey.com). The questions were drafted by a board of experts consisting of three pulmonologists nominated by the Interventional Pulmonology AIPO study group and who were then approved by the members of the same group. The survey was divided into five sections: general information, training, organization, flexible bronchoscopy, and rigid bronchoscopy.

The data collected were stored in the website database and then exported to Microsoft Excel Worksheets for analysis of the percentages relative to the replies given for each question.

**Results**

**General data**

Of the 300 respiratory endoscopists invited, 201 (67.0%) participated in the study. Of these, 91.5% were male, 34.1% aged between 35-50 years and 62.5% over 50 years of age. The regional distribution is shown in tab. 1.

The majority of the participating physicians (83.5%) work in Pulmonology Units, the remainder in Internal Medicine or other departments. Seventy-four percent of the doctors participating in the study had been performing bronchoscopy for at least 10 years.

Table 1. - Regional distribution of participants

North Italy	59.1%
Center Italy	15.9%
South Italy	25%

Throughout the year prior to the study period, 21.2% had performed fewer than 100 bronchoscopy examinations; 42.3% had performed 100 to 300, and 36.6% more than 300 examinations. Familiarity with the national AIPO guidelines was reported by the 68.8% of participants, while 53.9% were also familiar with international (ATS/ERS, ACCP) guidelines. Guidelines were rated as definitely useful by 72.3% of the responders, while 27.7% agreed only in part.

**Training**

Out of those taking part in the survey, 34.1% had received at most 6 months training, 32.6% had received between 6 and 12 months training, and 33.3% had received more than a year's training.

Table 2 illustrates the specific training that participants received in interventional pulmonology techniques. For flexible bronchoscopy, only a minority had attended a post-graduate course and/or trained during their residency period. The same was true for rigid bronchoscopy, for which 30.5% had received on-the-job training, 46.1% were trained at a referral centre, and only 11.3% attended a specific training course during residency.

Among the global group of responders, 55.3% considered a formal training program necessary for rigid bronchoscopy, laser procedures and thoracoscopy. Further training was considered useful for electrocautery (43.3%), biopsy and bronchoalveolar lavage (17.7%), and flexible bronchoscopy (9.2%). The remaining 9.2% did not report any need for further training.

Training in performing transbronchial biopsies (TBB) was considered as sufficient by 52.8% of participants, while 24.4% and 22.8% of responders reported training as insufficient or incomplete, respectively. Comparable data were obtained for transbronchial needle aspirates, since 49.6% of the participants reported that they had received sufficient training, while 29.3% believed it was insufficient and 21.1% incomplete.

Of the 59 pulmonologists performing rigid bronchoscopy, 65.4% stated that their post-graduate training did not actually include rigid bronchoscopy and, as a consequence, they had not received sufficient training for stent positioning, and laser procedures.

Table 2. - Modalities of training for interventional pulmonology techniques (data presented as percentage of physicians)

	During Internship	Post-graduate Course	Attendance at a referral centre	On-the-job Training	None
Flexible bronchoscopy	36.2	36.2	58.2	74.5	0.
Rigid bronchoscopy	11.3	14.9	46.1	30.5	30.5
Stent positioning	5.0	8.5	37.6	30.5	44.0
Laser electrocoagulation	6.4	7.8	34.8	34.0	45.4
Thoracoscopy	9.2	18.4	32.6	37.6	36.9

Opinions regarding the minimum quantitative criteria for acquiring adequate skills for performing a bronchoscopy, both flexible and rigid, and the minimum criteria necessary for maintaining competence are summarised in table 3, which compares data with the guidelines standard.

### Organizational framework

29.3% of participants work at Centers that perform over 1000 bronchoscopies per annum, 26.8%, 22.8% and 21.1% work at Centers that perform between 500-1000, 250-500 and < 250 bronchoscopies per annum, respectively. 57.4% of the responders involved in the survey had a reference population between 50,000 and 300,000.

According to 50.4% of participants, diagnostic flexible bronchoscopy should be performed in all hospitals, while 45.4% consider it necessary only in referral centres. Only 2.1% consider therapeutic bronchoscopy necessary to be carried out in all hospitals, while the vast majority believed it should only be available in district (41.1%) or referral centers (46.7%).

88.6% of responders performed flexible bronchoscopy in a dedicated endoscopy suite; the remaining 8.9% in multiple procedure rooms (endoscopic suite). Fifty-nine percent of operating doctors were assisted by two nurses during the endoscopy procedure and 38.2% by only one nurse; only 1.6% have had the assistance of three nurses. In 67.5% of cases, staff nurses have acquired specific experience working in the Interventional Pulmonology departments only, while 29.3% of nurses work in other endoscopy services too.

Video-bronchoscope is routinely (i.e., in more than 80% of the procedures) used to perform the examination by 60.2% of the respiratory specialists.

### Flexible bronchoscopy

#### Monitoring, premedication, and sedation

A venous access is always prepared before the examination by 71.5% of responders, 98.4% of which monitor the oxyhaemoglobin saturation, 32.5% monitor the arterial blood pressure, and 35.0% monitor the electrocardiographic tracing.

Among the participating bronchoscopists, 13.8% always sedate the patients, 24.4% administer sedation frequently (over 80% of cases), and 60% only occasionally (less than 20% of cases). Midazolam or diazepam are the drugs of choice by 70.7% and 23.6% of operators, respectively, 82% preferring the intravenous and 13.8% the intramuscular route of administration.

Fifty-two percent of the pulmonologists do not premedicate with Atropine, while 28.5% premedicate in less than 20% of patients. Lidocaine as a local anaesthetic is used by 94% of participants.

Oxygen supplementation is administered to all patients by 28.5% of the bronchoscopists; 23.6% administer O<sub>2</sub> to 80% of the patients, while 39.8% administer oxygen only if the oxyhaemoglobin saturation falls below 90%.

Before the procedure, bronchoscopists request the evaluations shown in table 4.

#### Transbronchial Biopsies

During the 12 months prior to the survey, 28.5% of responders had performed fewer than 10 TBB, 43.9% 10 to 50, and 27.6% more than 50.

Thirty percent of respiratory physicians never use fluoroscopic guide when performing TBB, 12.8% use it occasionally, 22.0% always, while 15.4% use it only when localised peripheral lesions are present.

Table 3. - Opinion about minimum training quantitative criteria (number of procedures) for performing bronchoscopy (data presented as percentage of physicians) - comparison with international and national guidelines

No of procedures	Flexible Bronchoscopies to acquire competence	Flexible Bronchoscopies to maintain competence	Rigid bronchoscopies to acquire competence	Rigid bronchoscopies to maintain competence
< 10	1.6	0.0	4.4	14.9
10 to 20	1.6	1.6	17.7	23.8
21 to 50	22.8	23.6	42.7	40.3
51 to 100	39.0	41.5	29.4	11.9
> 100	35.0	33.3		
Do not know	–	–	5.9	9.0
Guidelines' standard	ACCP 100 AIPO 100	ACCP 25 AIPO 100	ACCP 20 ATS/ERS 20	ACCP 10 ATS/ERS 15 AIPO 30

Abbreviations: ACCP = American College of Chest Physicians, ATS = American Thoracic Society, ERS = European Respiratory Society, AIPO = Associazione Italiana Pneumologi Ospedalieri.

Table 4. - Patients' evaluations requested before performing bronchoscopy (data presented as percentage of physicians)

Evaluations	
Chest X-ray	66.7
Platelet count	69.1
Prothrombin time	70.7
Total blood count	62.6
ECG	67.5
Blood gas analysis	22.0
Laboratory tests (nitrogen, creatinine, electrolytes, etc.)	31.7
Spirometry	8.9
Chest CT	52.0
All above	15.4
<b>According to clinical history and programmed procedures</b>	43.9

Forty-four percent of physicians routinely request a chest X-ray after performing TBB, and 71.6% keep the patient under observation outside the endoscopy room for 1 to 3 hours.

The percentage of endoscopists reporting adequate expertise in the performance of diagnostic and therapeutic procedures during endoscopy is shown in table 5.

**Rigid bronchoscopy**

Rigid bronchoscopy is performed by 49.6% of endoscopists, 67.8% of whom have been performing it for more than 5 years. Sixty-five percent perform these examinations in the operating room and 31.6% in endoscopy suites.

General anaesthesia with controlled ventilation is used by 53.4% of responders and 43.1% use profound sedation in spontaneous breathing.

In the 12 months preceding this survey 79.6% had performed therapeutic procedures during rigid bronchoscopy, 75.5% using a laser technique.

Eighty-four percent of the study participants hospitalised patients for therapeutic bronchoscopy.

Table 6 shows performance data for rigid bronchoscopy procedures.

**Discussion**

This survey, aimed at studying the behaviour and orientation of Italian respiratory specialists performing interventional bronchoscopy, made it possible to evaluate the situation in Italy for the first time. We conducted this study interviewing only the pulmonologists registered at AIPO, bear-

ing in mind that this group may not be representative of all the physicians that perform bronchoscopies in Italy. Our data show that Italian pulmonologists in our series have acquired expertise in bronchoscopy mainly through a long period of practice in the field for at least 10 years, since 2 out of 3 are aged 50 years and older this would lead to suggest some difficulties in generation turnover. The main reason may be due to an access difficulty to residency programs; a reduction has been observed in more recent years in the number of those attending pulmonology post-graduate schools, and regrettably, only a small part of these residents are trained in bronchoscopy.

The majority of Italian pulmonologists are satisfied with the national (68.8%) and international (53.9%) guidelines and they firmly believe in their usefulness. However, that which is published does not not always reflect that which is applied in clinical practice, according to our survey.

The data about training show serious gaps. Most responders declared that they had received their background "on the job" and not during their post-graduate education course. In Italy, postgraduate schools did not have a core curriculum until a formal decision made by the Ministry of Education, Universities and Research for its introduction in 2005. It is for this reason that training on respiratory endoscopy was very heterogeneous over the past thirty years as highlighted by our study. Nowadays, every new pulmonologist has to have performed at least thirty broncoscopies. This standard may be insufficient as the number indicated is lower than that suggested by scientific societies and that considered necessary by the physicians participating in our study. As a matter of fact 30 procedures is deemed insufficient to acquire adequate competence, 100 being considered as an appropriate target, a number similar to that proposed by the scientific societies [9-11].

In addition, it is possibly considered more important the introduction of quantitative criteria. Two articles published in 2010 [12, 13] showed how difficult it is to certify the skills in IP, thus highlighting that the minimum number of proce-

Table 5. - Endoscopic advanced procedures during fiberoptic bronchoscopy (data presented as percentage of physicians with specific expertise)

Bronchoscopy with aspirate and brushing	100.0
Bronchial biopsy	97.6
Transbronchial biopsy	86.2
Transbronchial needle aspirate	84.6
Broncho-alveolar lavage	96.7
Bronchoscopy with autofluorescence	31.7
Echoendoscopy with radial and linear probes	8.9

Table 6. - Rigid bronchoscopy: percentage of physicians performing a definite number of procedures per year

	< 5 procedures	5-30 procedures	> 30 procedures
Rigid bronchoscopy	26.8	44.6	28.6
Therapeutic bronchoscopy	18.8	45.9	25.0
Stent positioning	56.3 ( $\leq$ 20 procedures)		16.7 ( $>$ 20 procedures)

dures cannot be reliable as a quality standard. The article by Lamb [13] provides important indications on the evaluation methods useful for the certification of an IP curriculum. In their large prospective study, Wahidi *et al* [12] focused their attention on the training methodology on IP with simulators that would allow a more rapid and complete education as compared to conventional training [14-15]. Other authors have agreed on the same conclusions, suggesting the use of simulators on much larger cohorts to confirm these results [16-19].

Our data underline the need for additional training in the manoeuvres that are more complex to perform. As an example, rigid bronchoscopy is almost completely absent in institutional post-graduate education and the vast majority of the responders expressed the need for more complete training. As a consequence, only 49% of responders were able to perform procedures with the rigid bronchoscope. A prospective study on safety in IP showed an increase in complication incidence with advanced methods such as TBB in centres performing few examinations, with operators presumably unable to maintain adequate skills [20]. Therefore, it would be necessary to define which level of competence and expertise is appropriate for an interventional pulmonologist, with the aim of updating university and post-university training criteria.

Recent clinical practice guidelines form the Thoracic Society of Australia and New Zealand underline that training for advanced IP procedures should not be simply based on theoretical case numbers, but should also take into account the type of hospital where the physician will operate (e.g. major city versus provincial hospital) with regard to probability of performing definite procedures according to the actual prevalence of conditions and the organization of the centre, in order to update one's skills and maintain adequate efficacy and safety standards [21].

To date there is no unanimous agreement regarding training courses [22]; we believe that the scientific societies must play a more prominent role in stimulating and proposing appropriate curricula within universities.

The organisational framework described is for the most part satisfactory. Approximately 70% of centres carry out more than 250 bronchoscopies per year and 30% perform more than one thousand procedures. This reasonably ensures that operators are highly skilled and experienced. Fur-

thermore, they work in dedicated endoscopy suites with the assistance of trained staff. As regards pre-endoscopic tests, in absence of literature evidence about their ability to predict complications, 70% of study participants nevertheless request a coagulation test, total blood and platelet counts. Of those interviewed, 50% request a Computed Tomography of the Chest (CT) before performing a bronchoscopy, and only 22% and 9% ask for a blood gas analysis and a spirometry, respectively. This is quite a negative point, given the high percentage of patients undergoing bronchoscopy affected by COPD, who may pose a significant risk of complications when FEV<sub>1</sub> < 40% predicted or < 1.0 L, such as acute hypercapnia in case of oxygen administration [23].

Several studies suggest that sedation should always be proposed as it improves the performance of procedures and acceptance by the patient [24-26]. According to our survey, midazolam is most commonly used but only 40% of endoscopists routinely administer it. Since this survey was conducted in 2008, no data are reported about new technologies (such as EBUS - Bronchial thermoplasty-Electromagnetic navigation, etc.), not yet largely available back then.

Fifty-one percent of participants believe that bronchoscopy must be performed in all hospitals, while 45% consider that it should be a prerogative only of provincial referral centres. In our opinion, the most appropriate model should be a close network where the basic procedures can be carried out in secondary care hospitals, while the more complex manoeuvres must be performed only in regional referral centres. This type of organisational model would improve the efficiency in the utilisation of the human and technological resources, assuring patients adequate efficacy and safety. It would also allow institutions to improve their strategic planning of investment in technology implementation and training.

In conclusion, the data we collected from a cohort representing a large number of Italian respiratory physicians performing bronchoscopy, show that, despite a certain non-uniformity of behaviour, the results are in line with the standards of the major international guidelines in over half of participants. A strong demand appears for more comprehensive training that would stimulate a greater commitment for scientific and academic institutions. For this purpose, an ad hoc international scientific board could ensure greater uniformity and quality of training criteria for IP.

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