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ORIGINAL ARTICLE

Results of AIPO Italian survey on sustainability in Interventional Pulmonology

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ABSTRACT

BACKGROUND: Sustainability in medicine is gaining increasing importance. In interventional pulmonology only few studies demonstrated the impact of mechanisms involved in CO_2 equivalent production; moreover, operators' sensitivity to sustainability and each center's recycling processes are highly variable. We conducted a national survey among interventional pulmonologists on perception of sustainability resulting from their work, and how endoscopic activity impacts the production of recyclable material.

METHODS: A 26-item questionnaire was sent to each AIPO member registered in the interventional pulmonology study group. Items were divided in four topics: demographic data, perception of the problem, measures in place to improve sustainability and potentially feasible measure to improve the problem.

RESULTS: We obtained a 16.2% response rate and majority of participants work in high volume centers. Climate change was perceived as an important problem but responders though that physicians are few involved mainly due to lack of awareness of the problem. Recycling programs are widely available with differentiation between recyclable and potentially contaminated material. The disposable bronchoscopes use was perceived to increase carbon footprint. Most critical interventions to improve sustainability suggested were: optimization of separate waste collection, instrument reprocessing procedures, adherence to guidelines to reduce unnecessary procedures and improving staff awareness. Most participants believed that scientific societies should establish a working group on climate change.

CONCLUSIONS: The sustainability of daily activity in interventional pulmonology is a cause for concern among interventional pulmonologists while the lack of awareness remains the main reason for the poor perception of the problem; sustainability represents a need and an opportunity for interventional pulmonologists to align with other disciplines, but this concept can also be extended to all areas of pneumology.

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KEY WORDS: Pulmonary medicine; Program evaluation; Surveys and questionnaires.

Environmental impact and sustainability are topics of growing interest in international literature.[1] In the pneumological field, some studies have been conducted and demonstrated the environmental impact of the use of different inhaler devices and how the propellant contained significantly contributes to the production of greenhouse gases (GHGs).[2] Moreover, raising the awareness of medical staff represents a crucial aspect in the process of optimizing resources to reduce the environmental impact and sustainability of our daily work.[3]

In the field of interventional pulmonology, there are few studies that have addressed these topics, demonstrating how many processes are involved in the production of CO_2 equivalent (CO_2-e): the use of reusable instruments generates high quantities of CO_2-e especially during reprocessing of the instruments,[4] while the use of disposable instruments generates greater quantities of recyclable material,[5] although their use is economically sustainable if a limited number of procedures are performed[6].

The use of disposable and reusable instruments, as well as the recycling procedures of the material used during endoscopy sessions, are presumably very different in each center; moreover, each operator's sensitivity to the sustainability impact of their work is different and, in any case, strictly dependent on the procedures adopted in each center. To date, as representatives of the Interventional Pneumology study group, we have decided to survey interventional pulmonologists on the perception of sustainability resulting from our work, and how endoscopic activity impacts the production of recyclable material. We, therefore, briefly report the survey results conducted among Italian interventional pulmonologists.

Materials and methods

In November 2023, we surveyed Associazione Italiana Pneumologi Ospedalieri (AIPO) members registered in the interventional pulmonology study group; an email was sent to each member requesting participation in a 26-item questionnaire; a second email was sent in December 2023 to increase participation in the survey. The questionnaire was structured into four sections: the first concerned the participant's demographic data (operator age, years of work experience, type of activity, number of procedures performed per year); the second the perception of the problem; the third evaluated the measures already in place to improve sustainability; the fourth investigated potentially feasible measures to improve sustainability.

The data was collected anonymously, and no potentially identifiable information was requested; participation in the survey was voluntary, and each participant could interrupt it at any time. There was no incentive for participation or completion. The AIPO study center collected the data and then analyzed it.

Statistical analysis

The categorical variables are expressed as proportions and percentages, and continuous variables are expressed as mean and standard deviations.

Results

The complete results and images are provided in Supplementary Digital Material 1 (Supplementary Figure 1-22).

The invitation to participate in the survey was forwarded to all 315 AIPO members registered in the interventional pulmonology study group, and we obtained 51 participants (16.2% response rate).

Most participants were male (73%) and worked in centers in northern Italy (especially Lombardy, Piedmont, and Liguria). The age of the participants was evenly distributed across all age groups, from 25-35 years to 56-65 years, and most of them were pulmonologists (90%). Most participants worked in tertiary referral hospitals (51%) with a dedicated high-volume interventional pulmonology facility (59% of responders) in hospitals that, in most cases (40%), perform more than 1000 bronchoscopies per year.

Most participants thought climate change is an important issue (score of 8.5±1.99 on a scale of 1-10) and attributable primarily to human activities (71%). 60% of participants stated that they had partially modified their personal activities to reduce environmental impact, but this percentage dropped significantly when only work activities were considered (45%), also stating that this was not feasible in 8% of cases. When participants were asked about their motivations for physicians to be so few involved in issues relating to climate change, they identified a lack of awareness of the problem (56%), the belief that the healthcare sector is not capable of changing its practices (48%), and the lack of organization and resources (48%) as the main responsible. However, most participants considered the issue of climate change a rising priority (89%).

In most of the facilities where the survey participants work, there is a recycling program (71%), and most of the time, a differentiation is made between recyclable and potentially contaminated material (87%); despite representing the minority, 11% of participants reported that in the facility where they work, it is not possible to recycle waste. In the interviewed sample, the use of disposable bronchoscopes was reserved for those cases in which the risk of cross-contamination was high (48%) or for uses outside the endoscopy room (48%) or in emergencies (43%); the majority of participants thought that the use of disposable bronchoscopes was related to a more significant carbon footprint, especially if used in facilities with a high volume of procedures (>350 procedures/year, 36% participants) and regardless of the type of sampling that would be carried out (32%). When asked to indicate what the most critical interventions were to improve sustain-

ability, the survey participants indicated optimization of separate waste collection where possible (60%), optimization of instrument reprocessing procedures (47%), adherence to guidelines by reducing the number of unnecessary procedures (34%) and improving staff awareness (34%). It should be noted that the reduction of electricity consumption and air conditioning of rooms occupy the last positions among the desirable interventions. Redesigning, rethinking, and researching were considered the best paradigms for improving ecological impact (43%), while reducing waste production and recycling accounted for only 26% and 23%, respectively. In conclusion, most survey participants believed that scientific societies should establish a working group on climate change (51%) and produce an official document on practices for environmental sustainability in Interventional Pulmonology (65%).

Discussion

The healthcare system contributes significantly to the emission of GHGs, being responsible for 4.4% of total emissions.[7] Interventional Pulmonology, with its high level of technology used, generates large quantities of consumable material and energy consumed to utilize the necessary instrumentation. Starting from this assumption, as members of a study group in interventional pulmonology, we investigated the perception of sustainability of our work among our society's interventional pulmonology members, which could be the main criticisms and the unmet needs.

The survey we have launched confirmed that climate change is a cause for concern among interventional pulmonologists and that this issue has changed our way of life; however, lack of awareness remains the main reason for the poor perception of the problem; these results are in line with other surveys conducted in the past by other medical specialties.[8] To answer this problem, at least partially, an increase in awareness and knowledge can be pursued through education programs by creating climate action groups and local or national committees.

Although the recycling of materials is only one, and perhaps a minority, of the crucial aspects on which to take action, the majority of participants proved to be very careful in managing potentially recyclable material. In other circumstances, despite high levels of awareness and advocacy on the issue, participants in other surveys indicated the presence of various impediments (professional and personal) that limited the possibility of optimizing time and resources.[9]

The use of disposable bronchoscopes has become increasingly widespread, and this is due to the high ease and reliability of the instruments;[10] nevertheless, although instruments are often produced with material partly coming from the recycling chain,[11] their use in high-volume performance facilities should be carefully considered.[6, 12] The participants' responses to our survey align with the indications for the use of disposable bronchoscopes, confirming their use in well-specified circumstances, although they think that their use is generically related to increased production of CO_2-e.

Finally, the concept of a more ecologically sustainable doctor has been known for some time, and, among its denotations, there is also the least possible use of technologies that produce CO_2-e.[13] Despite health professionals belongs to a work category that recognizes climate change as an essential cause of health harm,[9] only a few medical societies produced official documents on the sustainability of their activities.[14, 15] Gastroenterologists recently published national and international official documents that critically review many aspects of daily clinical practice to conduct a more environmentally sustainable endoscopic activity.[14, 15] Although there is growing evidence in the literature about environmental impact linked to drugs and devices used in the pneumological field,[16-18] only at the last European Respiratory Society congress some aspects regarding climate change and sustainability have been discussed.[19] Our survey confirms the need of most participants to establish a study group that deals explicitly with the sustainability policies of interventional pneumology activity, with some specific focuses on the management of waste produced during clinical activity.

Surveys conducted on physicians on sustainability and climate change have a low participation rate worldwide (usually below 10%)[9, 20] and, although below the expectations, our survey had higher participation (16%), including a significant percentage of members working in high-volume interventional pulmonology centers; for this reason, our results can be defined as adequately representative of the Italian interventional pulmonologists members.

Conclusions

In conclusion, the sustainability of daily activity in interventional pulmonology represents a need for us as interventional pulmonologists to align ourselves with what has already been done by international gastroenterological societies. This concept can also be extended to all areas of pneumology to make our work increasingly green and eco-sustainable.

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Conflicts of interest
The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Authors' contributions
Paolo Solidoro and Emanuela Barisione share senior authorship. Conception and design of the work: Filippo Patrucco, Alberto Fantin, Emanuela Barisione. Acquisition, analysis, and interpretation of data, drafting the article: Filippo Patrucco, Alberto Fantin, Emanuela Barisione. Revision of the manuscript: all the authors. Final approval of the manuscript: all the authors.

History
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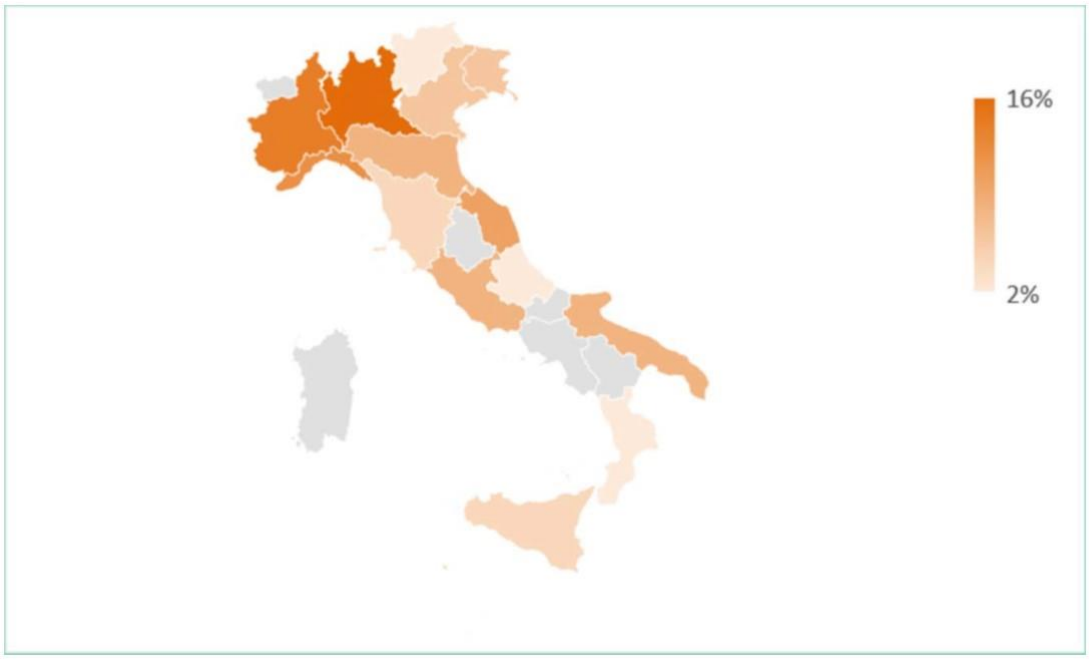
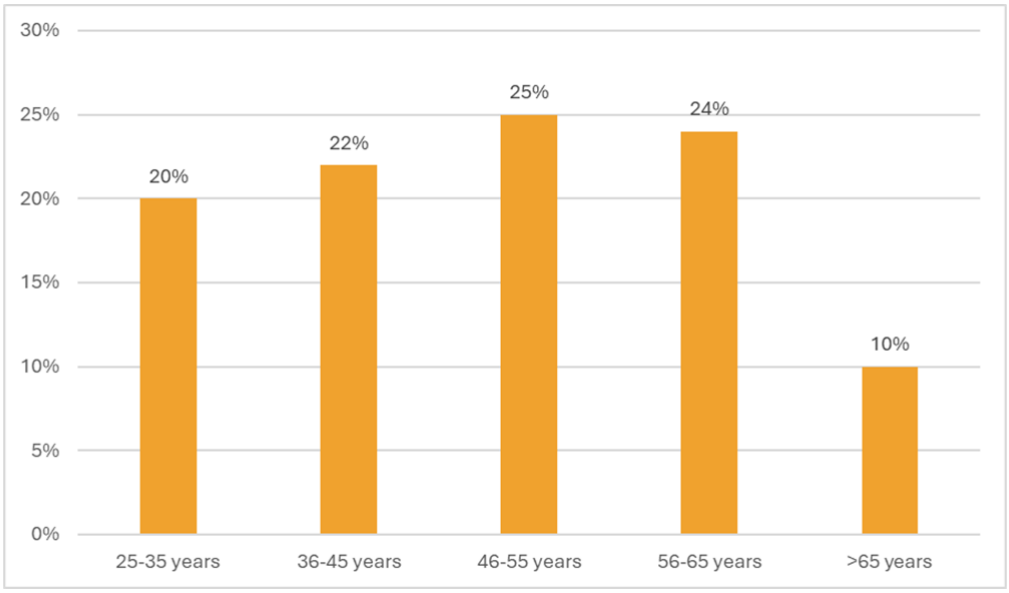
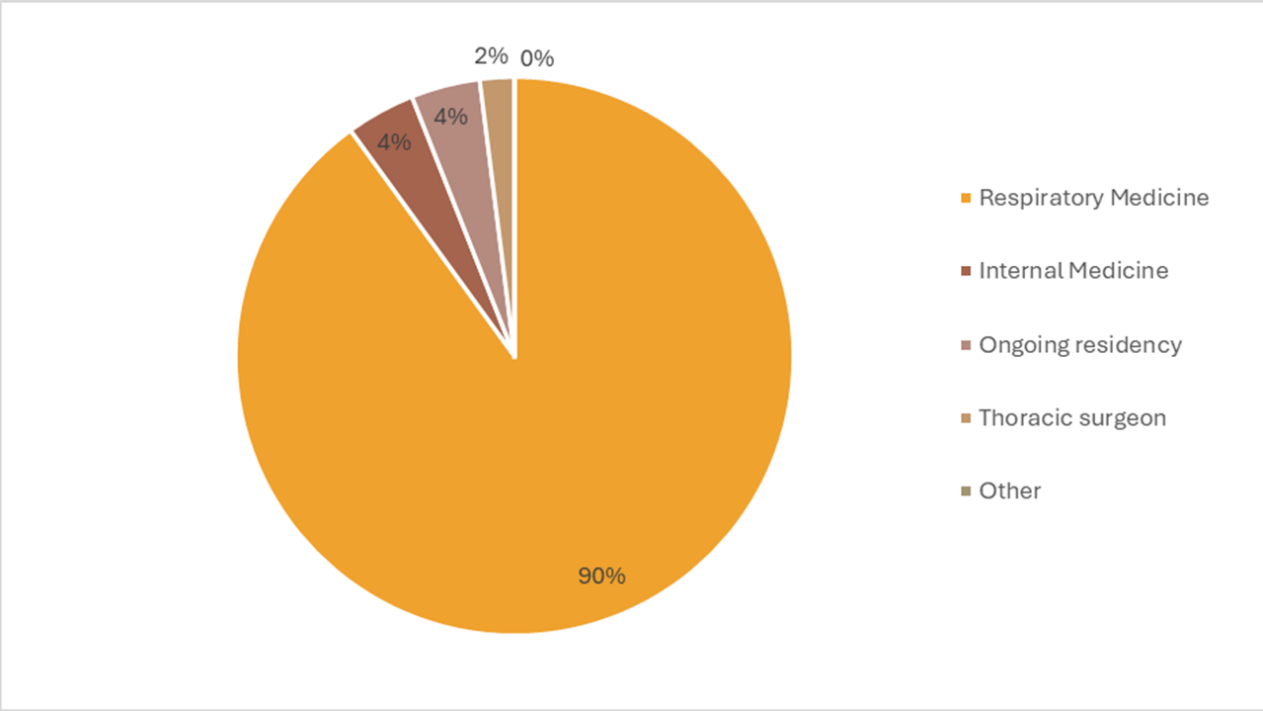
SUPPLEMENTARY DIGITAL MATERIAL 1



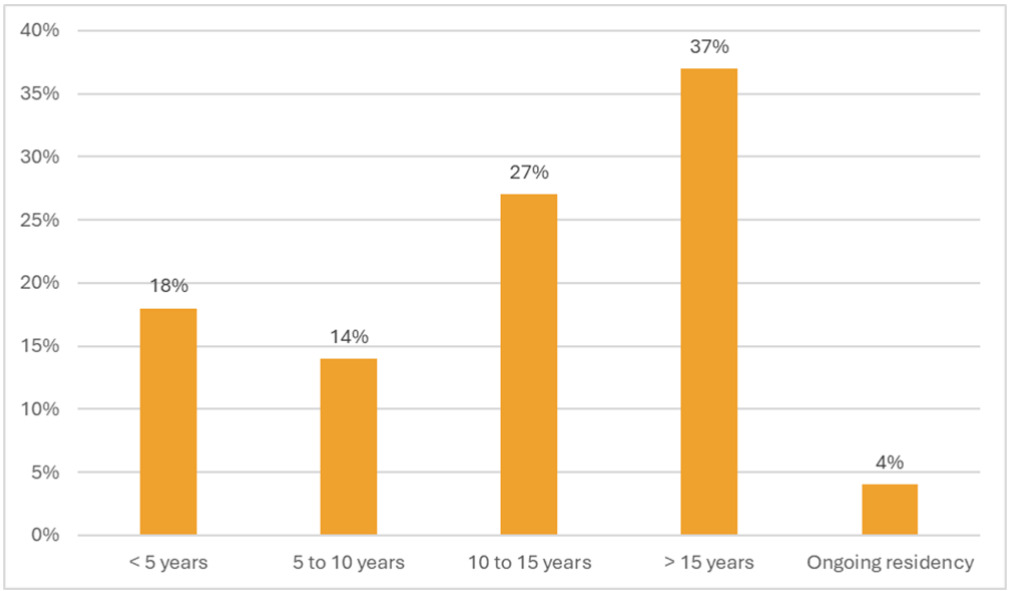
Supplementary Figure 1.—Geographical origin of the participants.



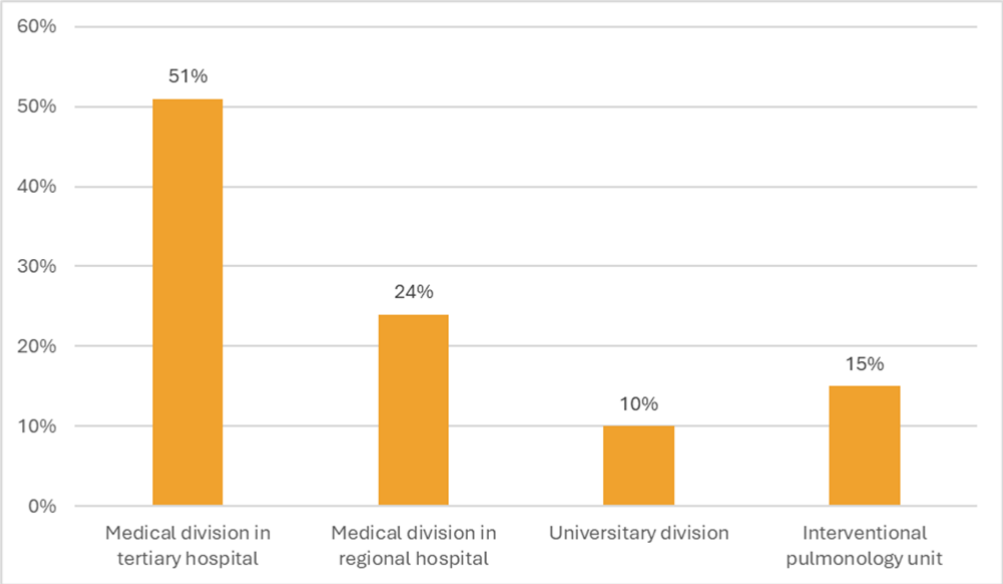
Supplementary Figure 2.—Age ranges of participants.



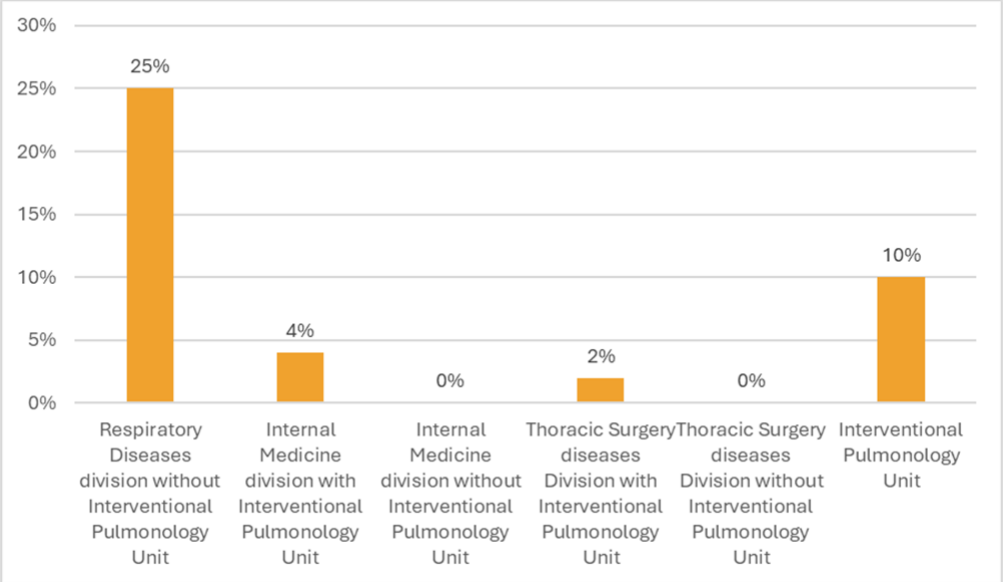
Supplementary Figure 3.—Medical specialization of the participants.



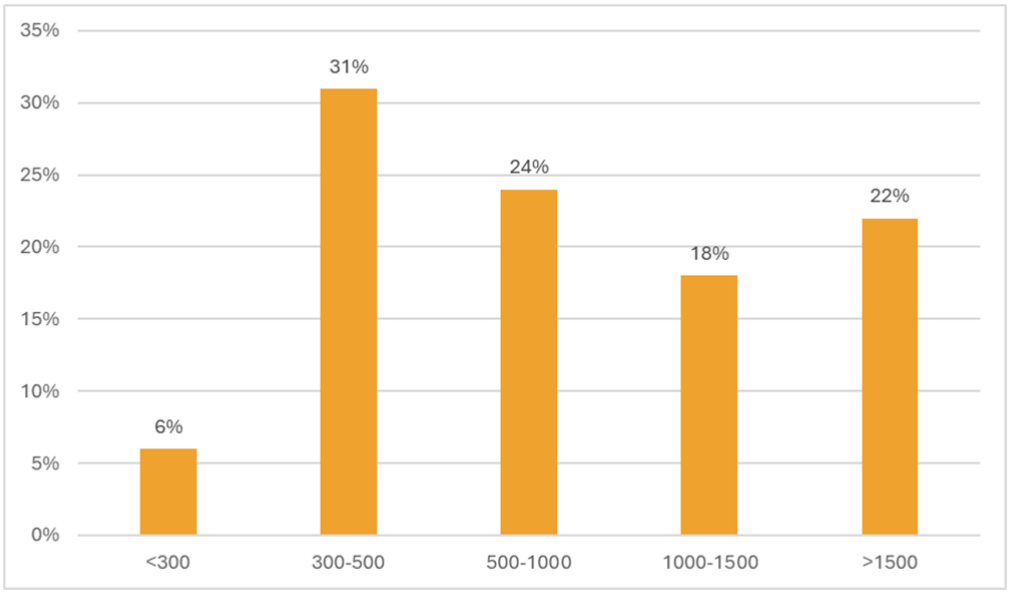
Supplementary Figure 4.—How many years have you been working as Interventional Pulmonologist?



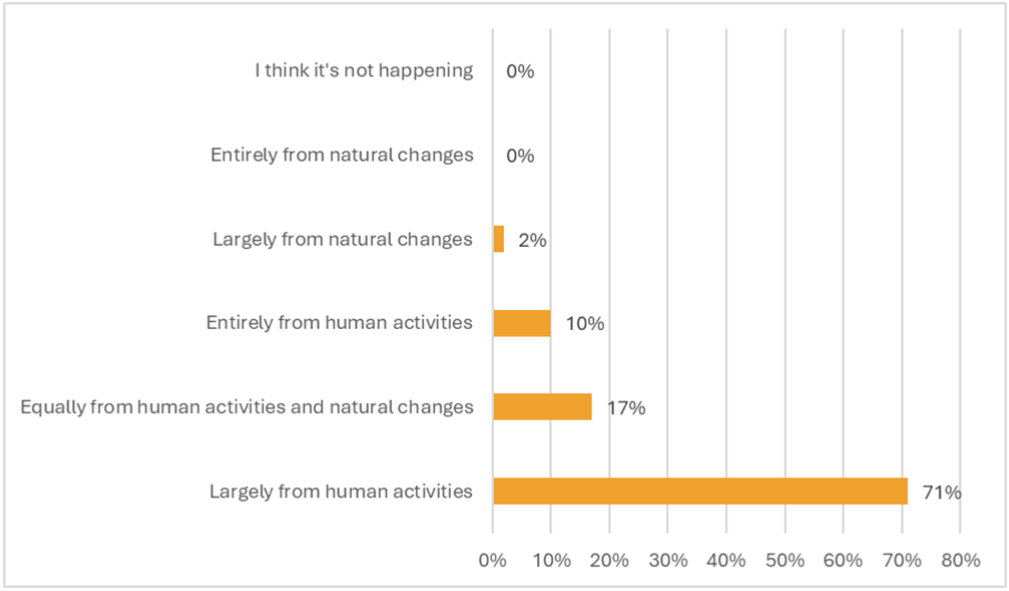
Supplementary Figure 5.—In which kind of hospital structure do you work?



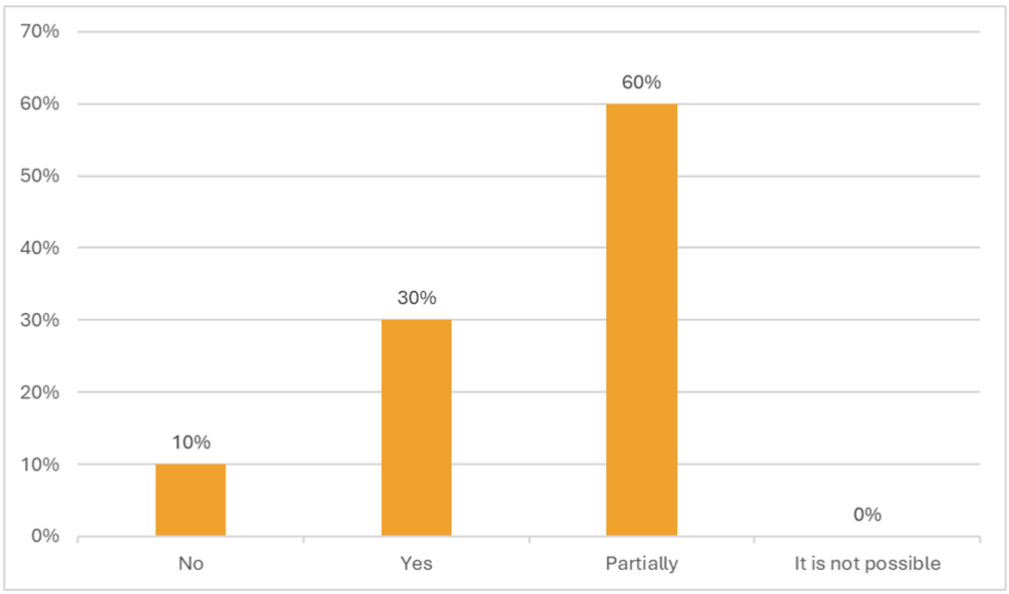
Supplementary Figure 6.—Where do you work?



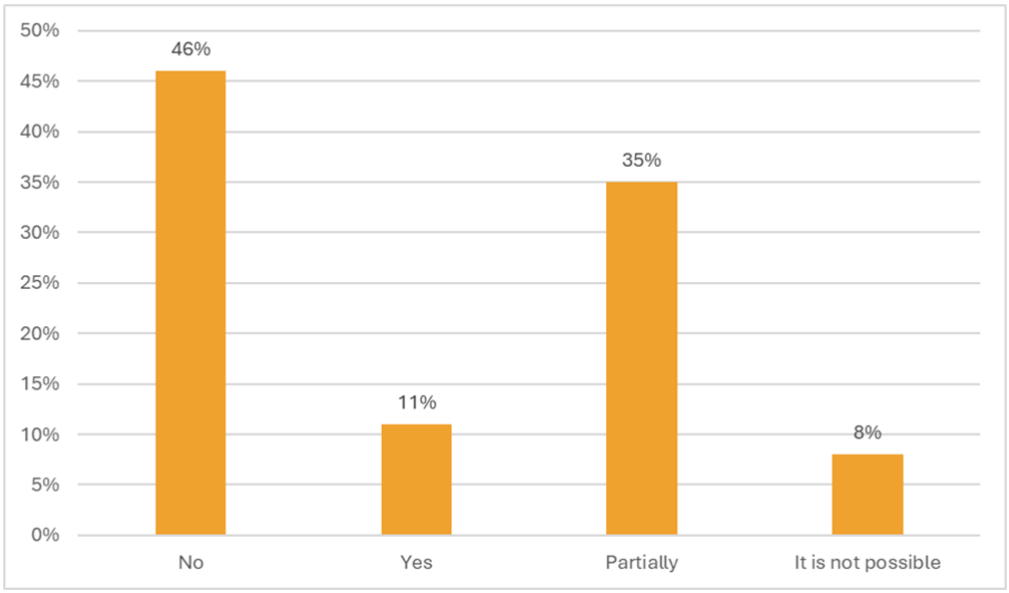
Supplementary Figure 7.—In your hospital how many endoscopic and interventional pulmonology procedures are carried out annually?



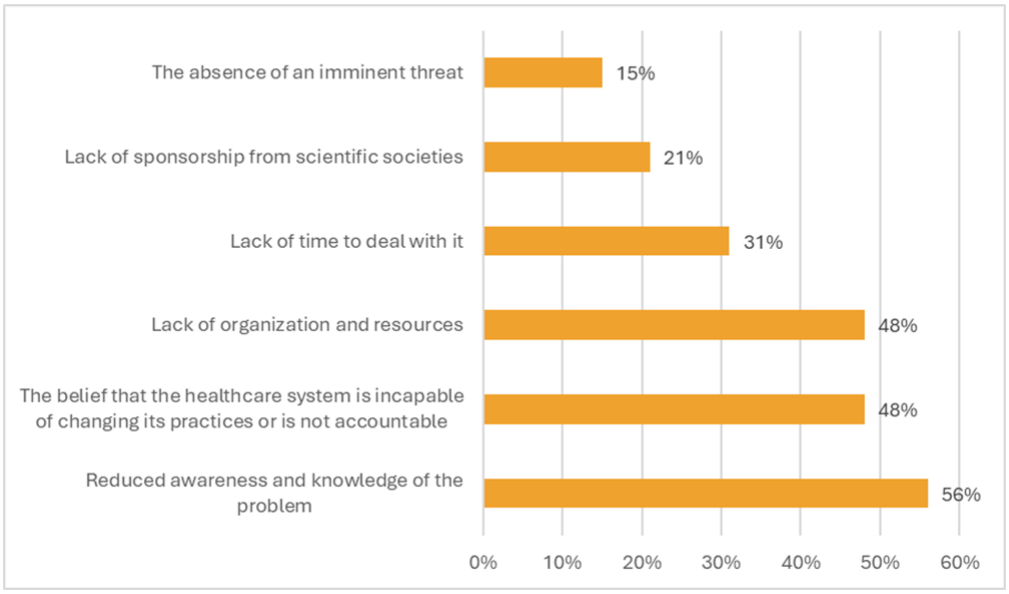
Supplementary Figure 8.—Assuming climate change is happening, what do you think it is caused by?



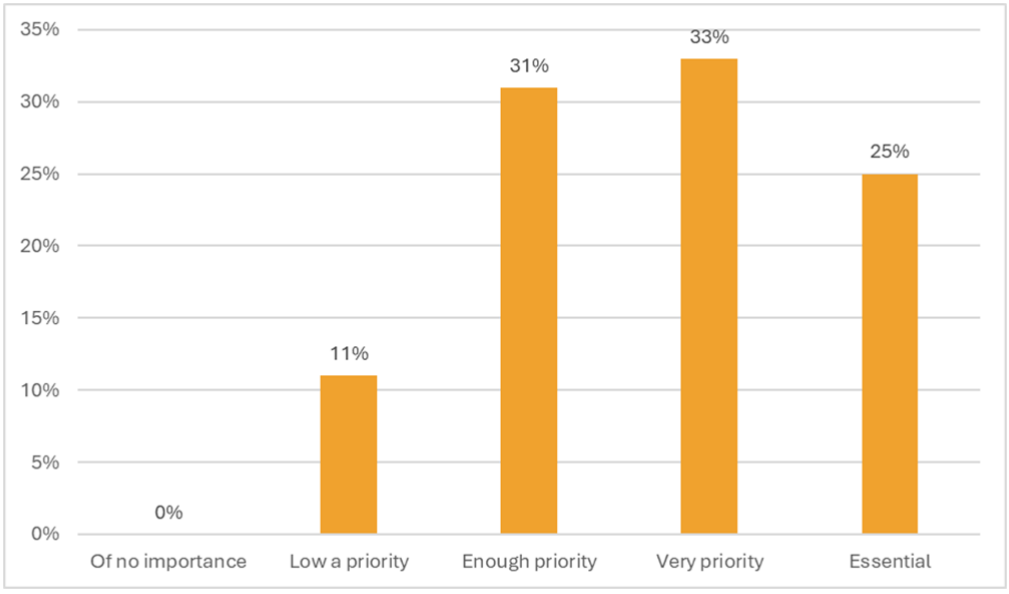
Supplementary Figure 9.—Do you have modified your personal activities, such as reducing car use, air travel, home heating, to reduce your carbon footprint?



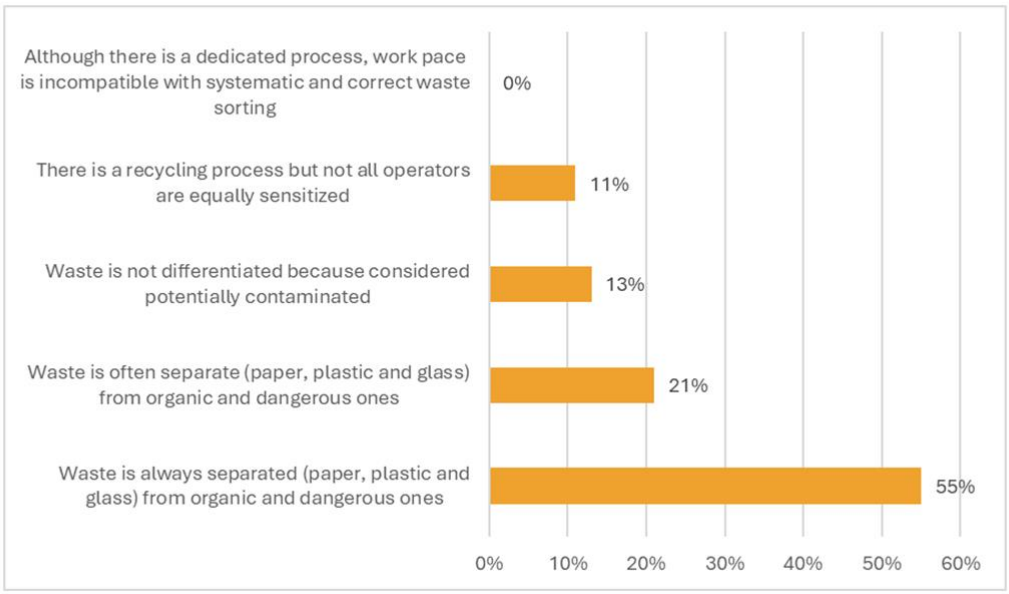
Supplementary Figure 10.—Have you changed your professional activities, such as reducing energy use, modifying the choices of medications, prescribing tests to reduce the carbon emissions?



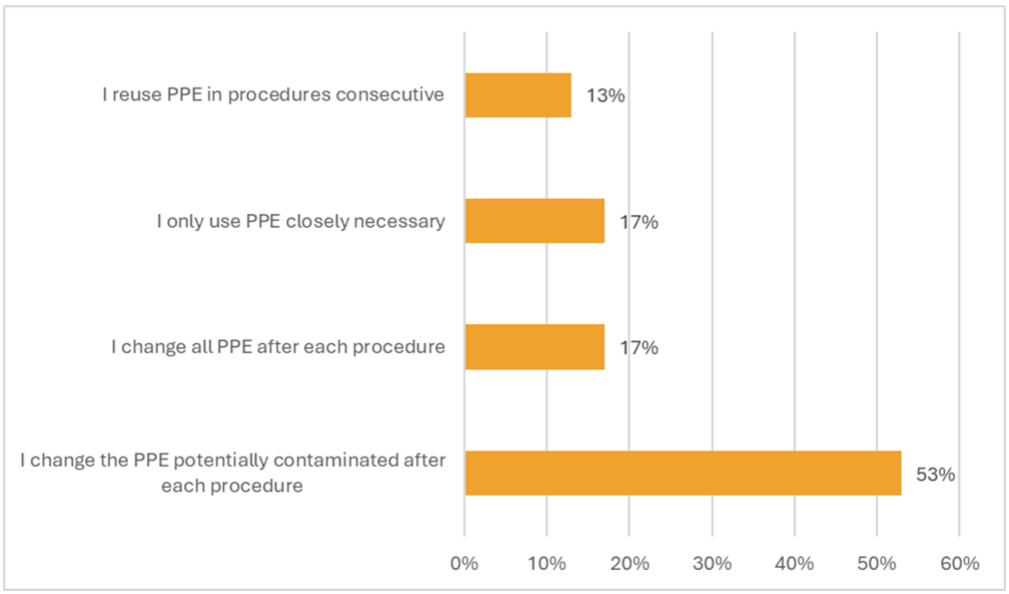
Supplementary Figure 11.—What do you think are the reasons why medical doctors are professionally little involved in issues relating to climate change? Up to three answers.



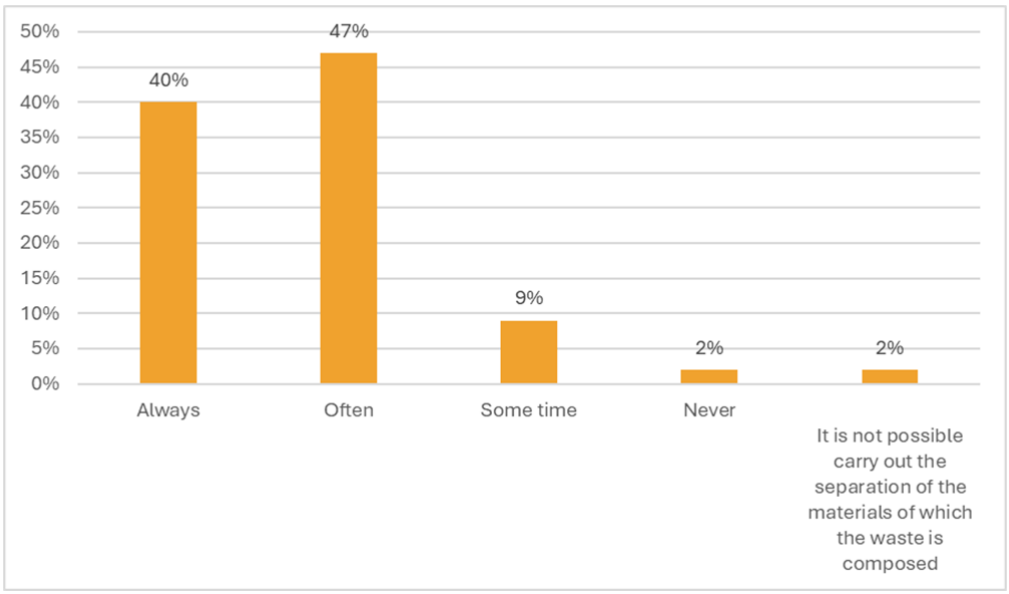
Supplementary Figure 12.—How much priority do you give to the issue of climate change, compared to all other needs?



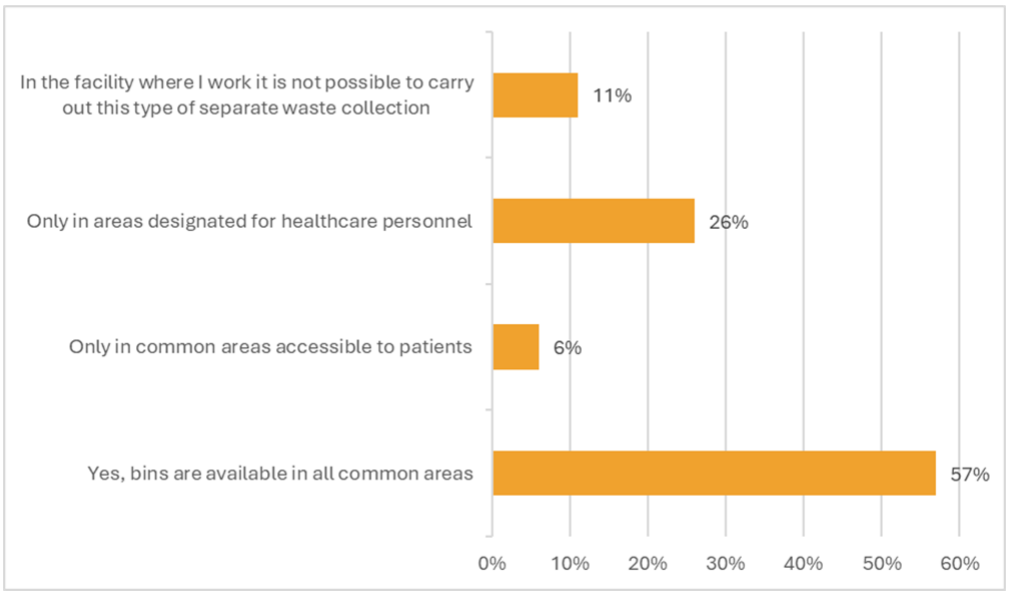
Supplementary Figure 13.—Where you work, how is the waste produced in the endoscopic room managed?



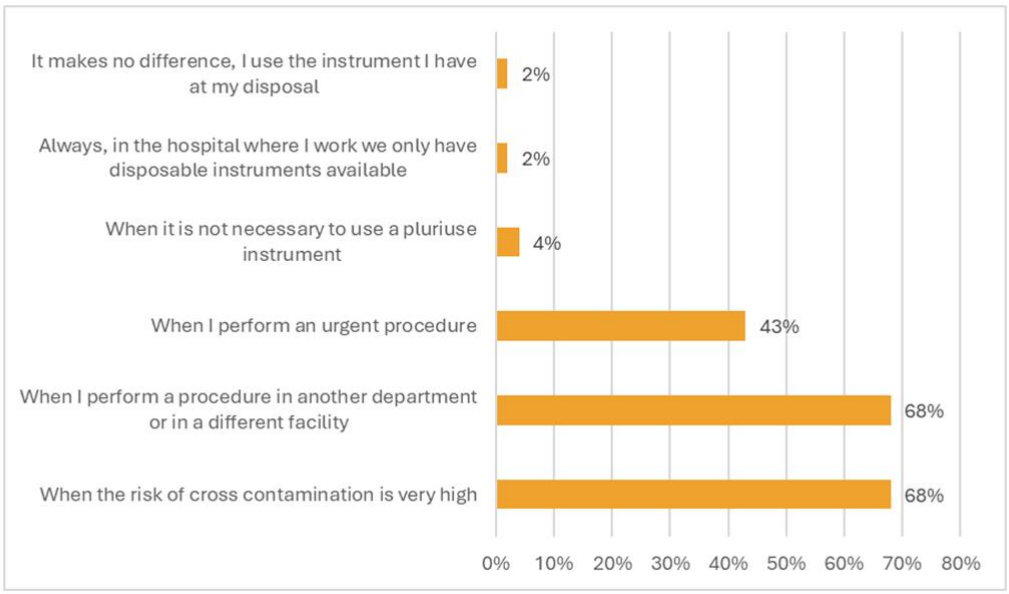
Supplementary Figure 14.—How do you manage the use of personal protective equipment (PPE)?



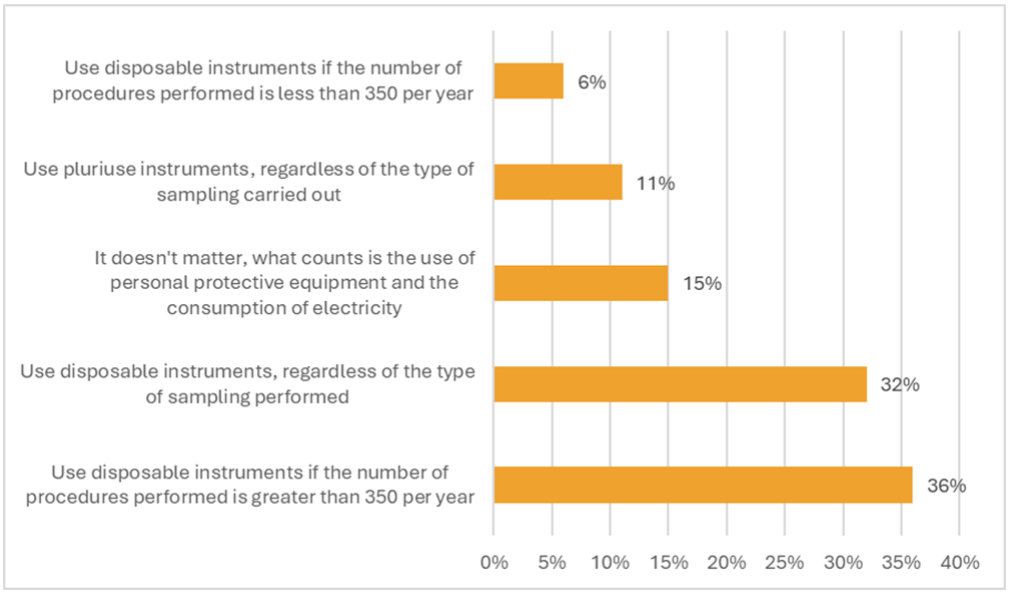
Supplementary Figure 15.—When I generate non-biological waste during my clinical activity (paper sheets, plastic packaging), do I pay attention to recycling the materials correctly?



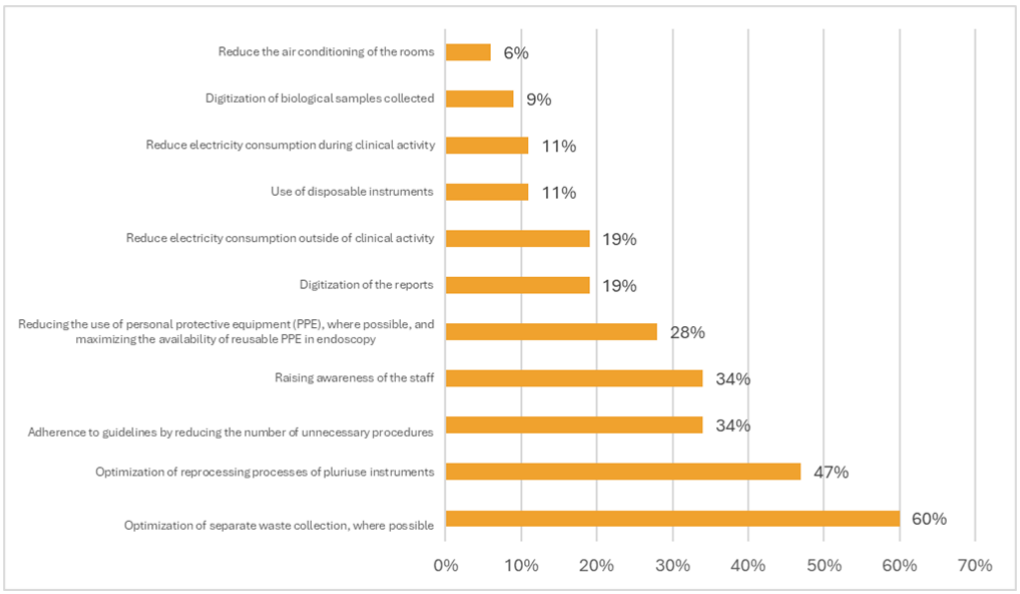
Supplementary Figure 16.—In waiting rooms and in common spaces, is it possible to differentiate the waste?



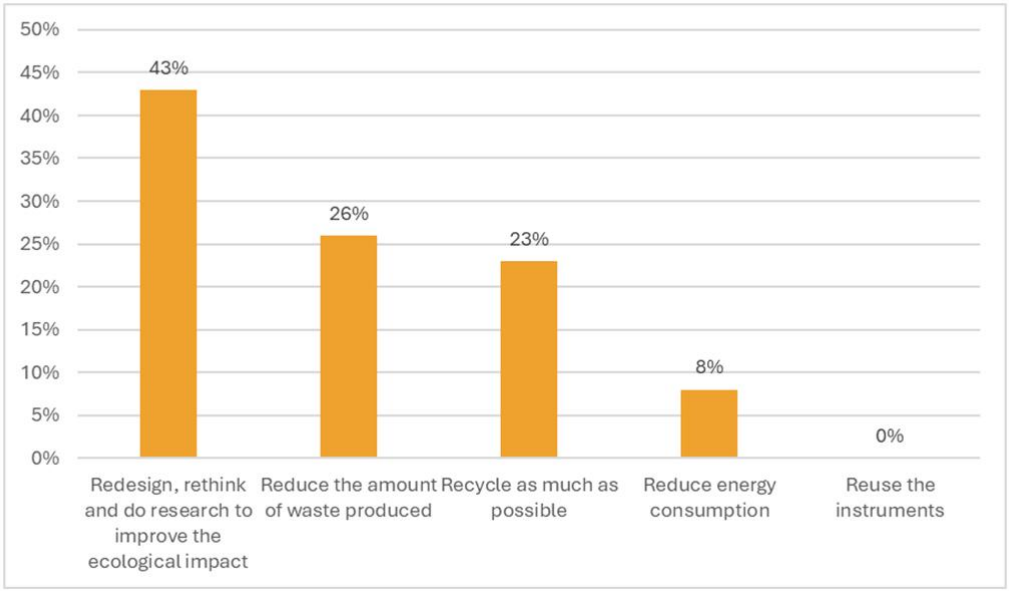
Supplementary Figure 17.—When I use a disposable endoscopic instrument? Up to three answers.



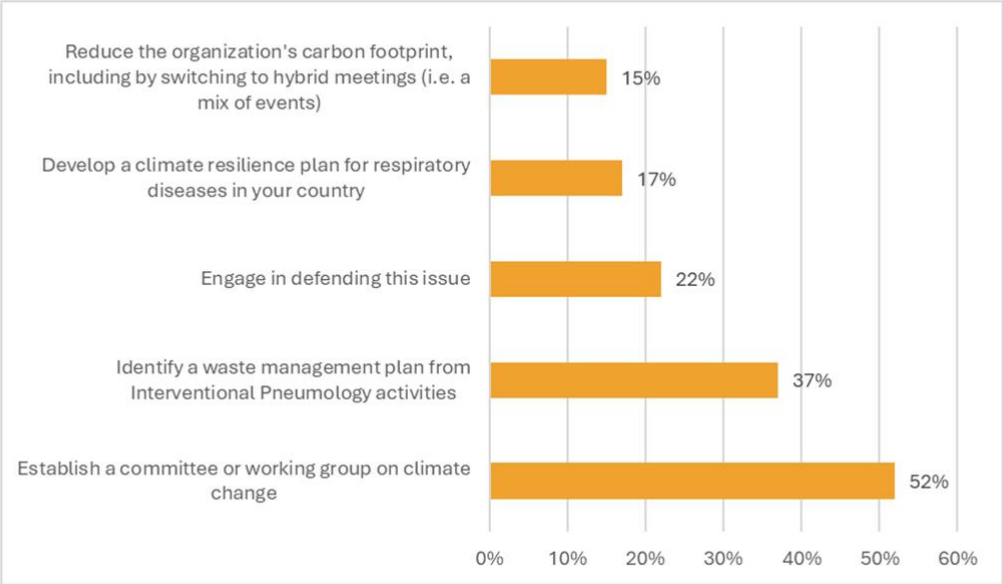
Supplementary Figure 18.—Which of the following situations/procedures do you think generates a larger carbon footprint?



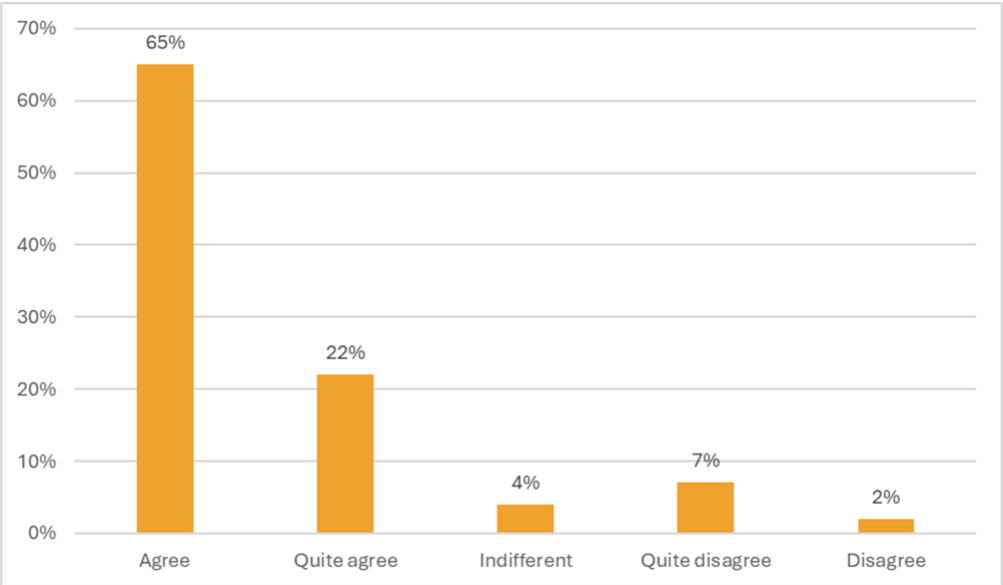
Supplementary Figure 19.—Which of the following points do you think are important for improving sustainability? Up to three answers.



Supplementary Figure 20.—Which of the following paradigms do you think is most important?



Supplementary Figure 21.—Which of these choices should be implemented by AIPO-ITS/ETS in the next 1-2 years? Up to two answers.



Supplementary Figure 22.—Should AIPO-ITS / ETS, in your opinion, produce an official document on practices for environmental sustainability in Interventional Pulmonology?