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Research Article

Comparative assessment of physicians' and senior medical students' basic knowledge in treatment of chronic obstructive pulmonary disease

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Abstract

Introduction: Chronic obstructive pulmonary disease (COPD) is one of the most common pathologies of the respiratory system. This disease ranks third in the group of the main causes of death in the world. The effective treatment of COPD has been developed by today. However, a significant part of physicians has an insufficient amount of education in this matter.

Materials and methods: The article represents the results of anonymous prospective survey within the ASCO project (full title – "Assessment of Senior Medical Students in the Field of COPD"), aimed at assessing the basic knowledge in the COPD treatment. The survey involved 321 physicians and 221 senior medical students from ten cities of Russia and Ukraine.

Results and discussion: According to the survey, the following levels of correct answers were given by the doctors and students: possible fixed combinations of β2-agonist – 33.9% and 24.5%; the optimal delivery device for a patient – 50.8% and 41.8; the correct drugs for COPD initial therapy with a high risk of exacerbations – 31.7% and 15.3%, and with a low risk – 54.9% and 25.9%, respectively. The correct drugs for COPD aggravation were selected by 43.3% of doctors and 34.5% of students; the right empirical treatment of COPD infectious exacerbation – by 72.4% and 40%, and the correct reserve drugs – by 63.9% and 36.2%, respectively.

Conclusion: The survey showed that the respondents had medium level of knowledge in COPD treatment. Hence, curricula need to be adjusted in medical universities, and additional educational activities are required for medical practitioners in order to improve the quality of their knowledge in this field.

Keywords

COPD, doctors, students, education, questionnaire, treatment.

Introduction

Chronic obstructive pulmonary disease is a challenging problem, which has been relevant for years (Petty 2006). This is due to the constant impact of the main risk factors on the human body – smoking, working in hazardous industries and inhalation of harmful aerosols in cities with an increased level of air pollution (Lopez et al. 2006, Murray and Lopez 1997, Pauwels and Rabe 2004, WHO 2002).

In 2016, there were 251 million cases of COPD in the world (WHO 2016). This pathology ranks third in the structure of the main causes of death, 4.8% of the total number of causes in the world. In Russia, this disease incidence is 2–11% (Chuchalin 2017). Moreover, COPD is one of the main diseases leading to the disability of patients within a short time (Chuchalin 2017, GOLD 2018).

COPD, as one of the leading pathologies in the modern structure of mortality, requires rational treatment aimed at targeting the main components of pathogenesis, at preventing and treating complications, at reducing rates of disease progression, as well as at improving the quality of life of an individual patient (Pauwels and Rabe 2004). However, these measures can be taken only by doctors with a high level of education in the matters of rational therapy of this pathology (de Queiroz et al. 2014, Göktalay et al. 2015, Yawn and Wollan 2008).

The aim of the study: to assess the level of senior medical students' and general physicians' basic knowledge in COPD treatment by using the method of anonymous questioning.

Materials and methods

The doctors and students were surveyed within the ASCO project. The first stage of the project was carried out in 2015–16, the second – ASCO-II – was launched at the end of 2017. To date, the results of questionnaires completed by doctors were collected and analyzed for nine centers: Krasnodar, Saratov, Belgorod, Chelyabinsk, Smolensk, Moscow, Lipetsk, Voronezh and Vladivostok. The study was also conducted among senior students at Belgorod State National Research University (Belgorod, Russia), Voronezh State Medical University named after N.N. Burdenko (Voronezh, Russia), Kuban State Medical University (Krasnodar, Russia), South Ural State Medical University (Chelyabinsk, Russia), and Dnipropetrovsk State Medical Academy (Dnipro, Ukraine).

The method of anonymous questioning was used in this study, for which an original questionnaire was developed on the basis of current clinical recommendations (GOLD 2014, GOLD 2017). The validation of the drafts and the final version of the questionnaire was performed among the co-authors of the paper and pilot groups of students in the regions.

The physicians were asked to specify their specialty, category and years of service in their specialty, indicating whether s/he is taking the questionnaire for the first or the second time. The students were required to specify their year of studies and major. The respondents did not indicate their last names in order to obtain more independent results.

The questions concerning the therapy for COPD are presented below (they are given without variants of answers):

1. Determine the combination of β2-agonist in one additional device with the proposed groups of drugs.
2. Identify the optimal delivery device for a patient with poor coordination and low inspiratory flow rate (<30 liters per minute).
3. Choose drugs for the initial treatment of COPD with advanced symptoms and a high risk of exacerbations.
4. Identify drugs for the basic treatment of COPD with advanced symptoms and a low risk of exacerbations.
5. Define drugs used in case of moderate severity COPD exacerbation.
6. Specify the drugs of choice for empirical antibiotic treatment of infectious exacerbation of COPD.
7. Choose the reserve drugs in case of inefficient antibiotic treatment of infectious exacerbation of COPD.

The respondent was awarded 1 point for each correct answer, from 0.25 to 0.75 – for an incomplete answer, depending on the completeness of the answer and 0 points for the wrong answer. Thus, with all correct answers, the maximum average score was 1.0.

The following averages were assessed in the study: the average score of each respondent, the average for individual questions, the average score for the centers (cities) and the average score for the entire questionnaire. All the information entered into the questionnaires was then entered to an electronic database and processed using Microsoft Excel applications. Statistical data were processed through the analysis of arbitrary contingency tables using the Pearson's chi-square (x2) test.

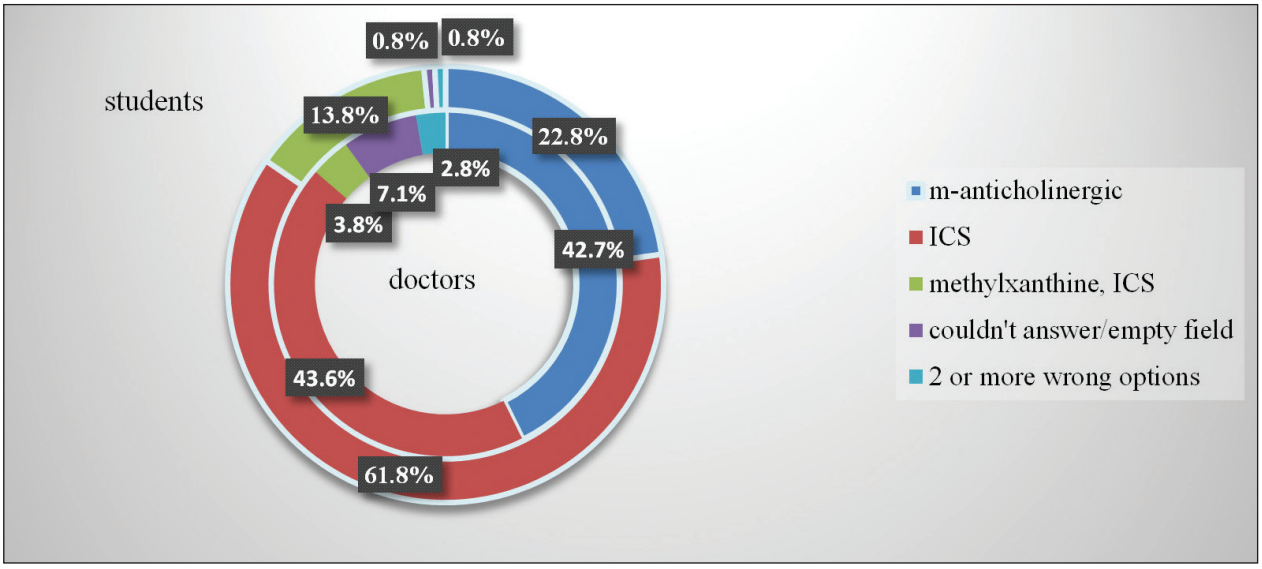

Figure 1. The structure of the incorrect answers to the question about the combination of β2-agonist in one additional device with the proposed groups of drugs.

It is necessary to emphasize that this method of knowledge evaluation is relative, it was specially developed for this study, and cannot fully reflect the general level of doctors' knowledge.

In part, the current results of the study were presented at the Congresses of the European Respiratory Society (2017), the Asia-Pacific Respiratory Society (2015) and published in the corresponding conference proceedings (Bontsevich et al. 2015, Bontsevich et al. 2017); the results of the first part of the ASCO study (knowledge of senior students) were published in *Pharmateca Journal* (Bontsevich et al. 2018a), some intermediate results of the second stage (ASCO-II), concerning the assessment of the knowledge of doctors, were published in *Vrach [Doctor] Journal* (Bontsevich et al. 2018b).

Results and discussion

Three hundred and twenty-one physicians were surveyed during the study in ten Russian cities (25% were from Belgorod, 18% – from Krasnodar, 17% – from Moscow, 11% – from Lipetsk, 9% – from Voronezh, 7% – from Chelyabinsk, 6 % – from Saratov, 5% – from Smolensk, and 2% – from Vladivostok). Two hundred and twenty-one students in their fifth and sixth years in medical institutes from five cities of Russia and Ukraine were surveyed (50% – from Belgorod, 29% – Voronezh, 13% – Dnipro, 5% – Chelyabinsk, and 3% – Krasnodar). Before the survey, all the students had been trained in the standard educational disciplines – "Therapy" and "Clinical Pharmacology".

COPD treatment is based on the administration of various drug combinations depending on a patient's phenotype. At present, there are multiple fixed dosage forms of medications containing a combination of groups of drugs: short-acting β2-agonists (SABA) and m-anticholinergic drugs (MA); long-acting β2-agonists (LABA) and inhaled glucocorticosteroids (ICS), LABA and long-acting MA (LAMA).

The first question required the respondents to identify a possible combination of a β2-agonist in the same delivery device with different groups of drugs (GOLD 2017). So, the right answer was given by 33.9% of doctors and 24.5% of students ($p>0.05$), who correctly chose ICS and m-anticholinergic as the second component of the combination. The incorrect and partially incorrect answers were given by 66.1% of doctors and 55.9% of students, which indicates a low level of the respondents' awareness of combination therapy for COPD. The wrong answers were distributed as follows: the same number of doctors chose only one group of drugs – m-anticholinergic or ICS – 42.7% and 43.6%, respectively, while 3.8% of the doctors chose methylxanthine. The majority of students (61.8%) believed that the only right combination was β2-agonist with ICS (Fig.1).

The main method of drug delivery to patients suffering from COPD is inhalation. The choice of an inhalation device is based on two main criteria – the inspiratory flow rate and the patient's ability to use the inhaler correctly. So, patients with poor coordination or with a low inspiratory rate (<30 liters per minute) are recommended to use a respimat or nebulizer inhaler (GOLD 2017, Chuchalin 2017). The correct answer was given by 50.8% of surveyed doctors and 41.8% of students ($p>0.05$). Most respondents preferred the metered dose inhaler or nebulizer – 61.7% of doctors and 64.2% of students, respectively. Only 16.6% and 18.4% of respondents chose a dry powder inhaler or nebulizer, respectively (Fig. 2).

The next two questions were related to the basic COPD treatment. The treatment of this pathology is known to be

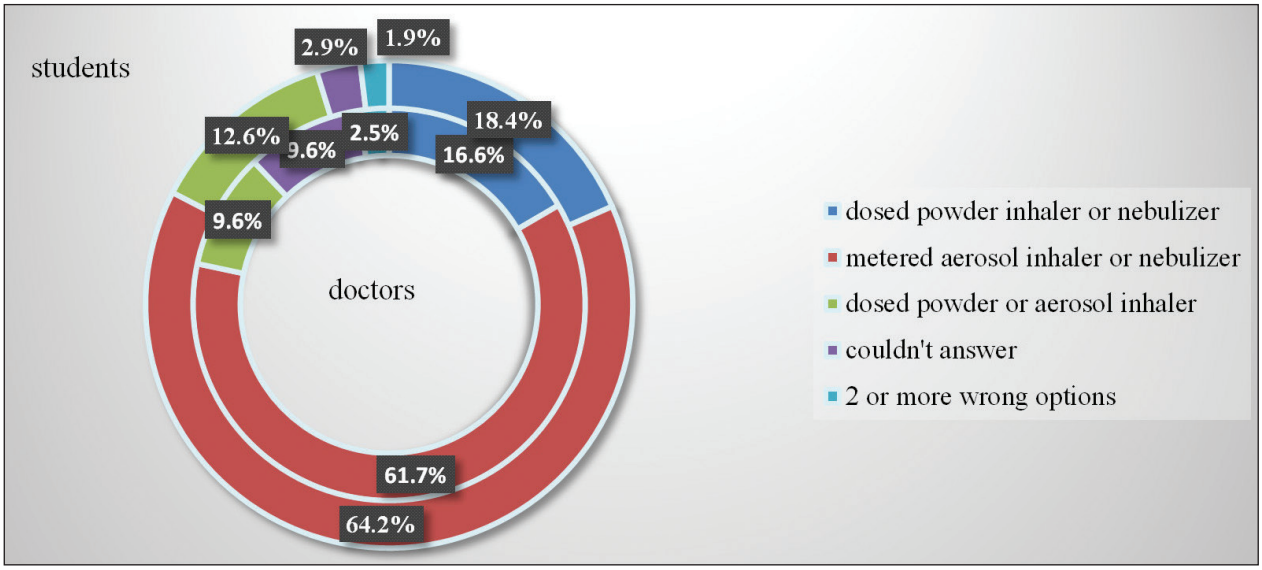

Figure 2. The structure of the incorrect answers to the question about the delivery device.

based on the choice of an optimal drug or a combination of drugs, taking into account the severity of symptoms ("COPD Assessment Test" (CAT) and "modified Medical Research Council" (mMRC) dispnea scores) and risk of exacerbations. The recommendations are made for several groups of patients. Drugs administration is recommended in accordance with the following clinical types: type A implies the initial prescription of bronchodilator for convenience and as selected by a doctor and a patient, type B – LAMA or LABA, type C – LAMA, type D – LAMA + LABA (Fig. 3) (GOLD 2017, Karloh et al. 2016, Mirza et al. 2018, Press et al. 2017).

Until recently, there has been only a combination of LABA with ICS (for example, formoterol + budesonide) to be used as long-acting drugs. To date, more efficient and safe combinations of LABA + LAMA (for example, olodoterol + tiotropium) are available. In the near future, triple fixed combinations are expected to enter the market (LABA + LAMA + ICS), which will be relevant for some clinical groups of patients (those with a severe disease course, frequent exacerbations or with eosinophilic inflammation) (GOLD 2018, Mirza et al. 2018).

The respondents were required to choose both the initial therapy for a COPD patient with advanced symptoms and a high risk of exacerbations (clinical type D) and the basic therapy for a COPD patient with advanced symptoms and a low risk of exacerbations (clinical type B) (GOLD 2017). The first question was correctly answered, by selecting a combination of LAMA and LABA, by 31.7% of doctors and by only 15.3% of students ($p<0.001$). The second question was correctly answered – "long-acting m-anticholinergic or β2-agonist, or a combination of them for a long time" – by 54.9% and 25.9% of doctors and students ($p<0.001$), respectively. The structure of the incorrect answers to these questions is presented in Fig. 4 and Fig. 5. Most often, when answering the first question about basic therapy, the respondents indicated the option "ICS + LABA" – 83.1% in the group of doctors and 73.9% in the group of students, when answering the second question – 36.1% of doctors and 53.3% of students considered that the correct answer was "short-acting m-anticholinergic, or β2-agonist, or a combination of them according to need."A significant part of the respondents also chose the answer "ICS + β2-agonist for a long time" – 36.1% and 31.7%, respectively.

The next set of questions concerned the treatment of COPD exacerbations. When answering them, 43.3% of therapists and 34.5% of students ($p>0.05$) correctly identifiied the drugs for moderate exacerbations of COPD (short-acting β2-agonist + antimicrobial drug and/or systemic glucocorticosteroid). The most common incorrect answer was a combination of β2-agonist with methylxanthine, an antimicrobial drug and a systemic corticosteroid (49.7% of doctors and 43.1% of students). A short-range anticholinergic ± β2-agonist was selected by 20.4% and 26.7% of respondents, respectively, another 14.4% and 24.1% considered the correct answer to be "methylxanthine + systemic corticosteroids + mucolytic" (GOLD 2017, Russian Respiratory Society 2018). The remaining 15.5% of doctors and 6% of students failed to answer this question.

COPD exacerbations are caused by various factors, the main of which is bacterial colonization of the respiratory tract. Such exacerbations require an administration of antibiotic therapy based on the most common infectious agents (pneumococcus, hemophilus, moraxella, etc.). The majority of doctors (72.4%) and 40% of students ($p<0.001$) gave the correct answer to the question about the empirical treatment of an infectious exacerbation of COPD, indicating "amoxicillin / clavulanate, macrolide, or doxycycline" (Chuchalin 2017, GOLD 2014,

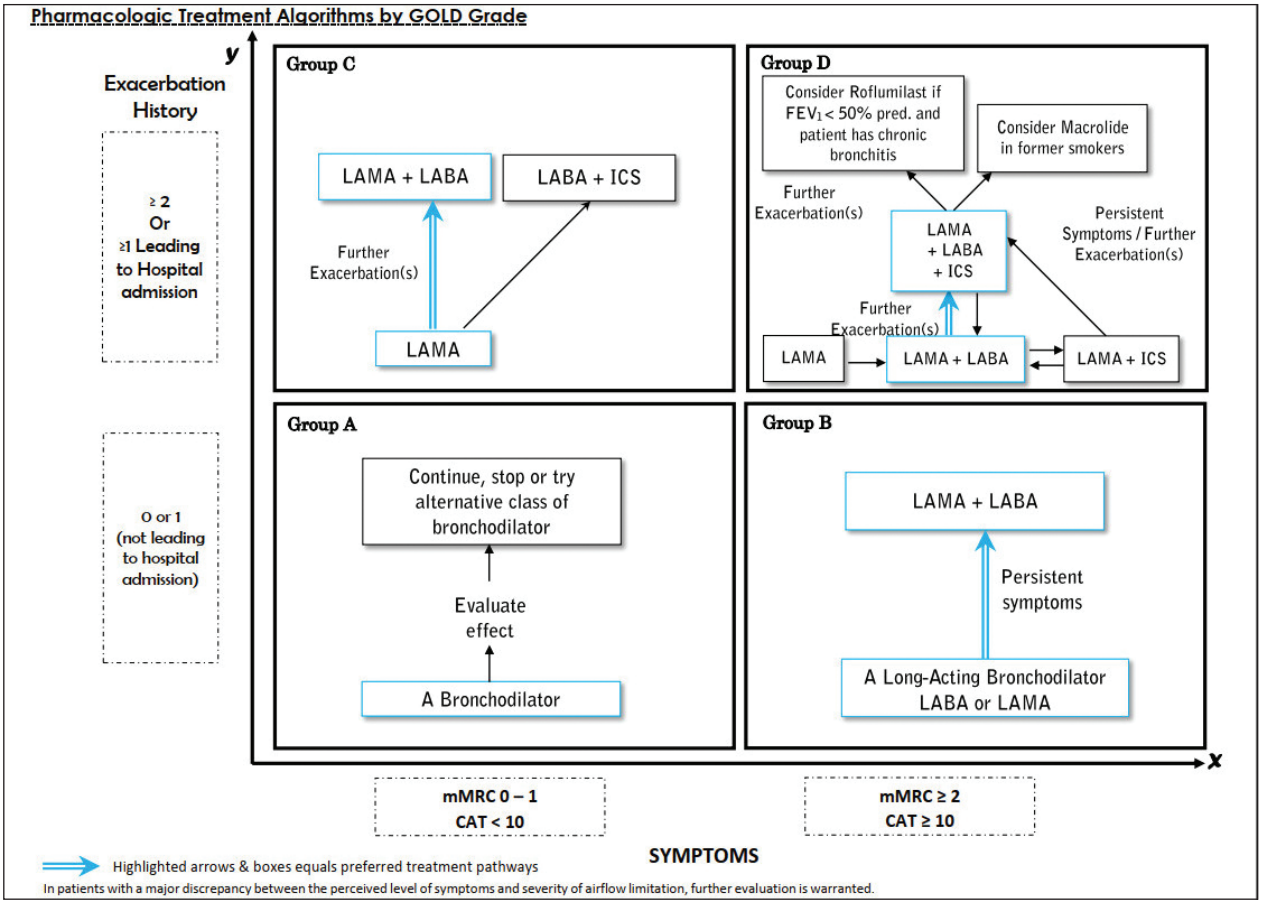

Figure 3. Patient classification and treatment based on integral assessment of symptoms, spirometric classification and risk of exacerbations for individual treatment recommendations (GOLD 2017, Time of care 2019). **Note:** LABA – long-acting β2-agonists, LAMA – long-acting m-anticholinergic drugs, ICS – inhaled glucocorticosteroids, FEV1 – forced expiratory volume in 1 second, CAT – COPD Assessment Test, mMRC – modified Medical Research Council.

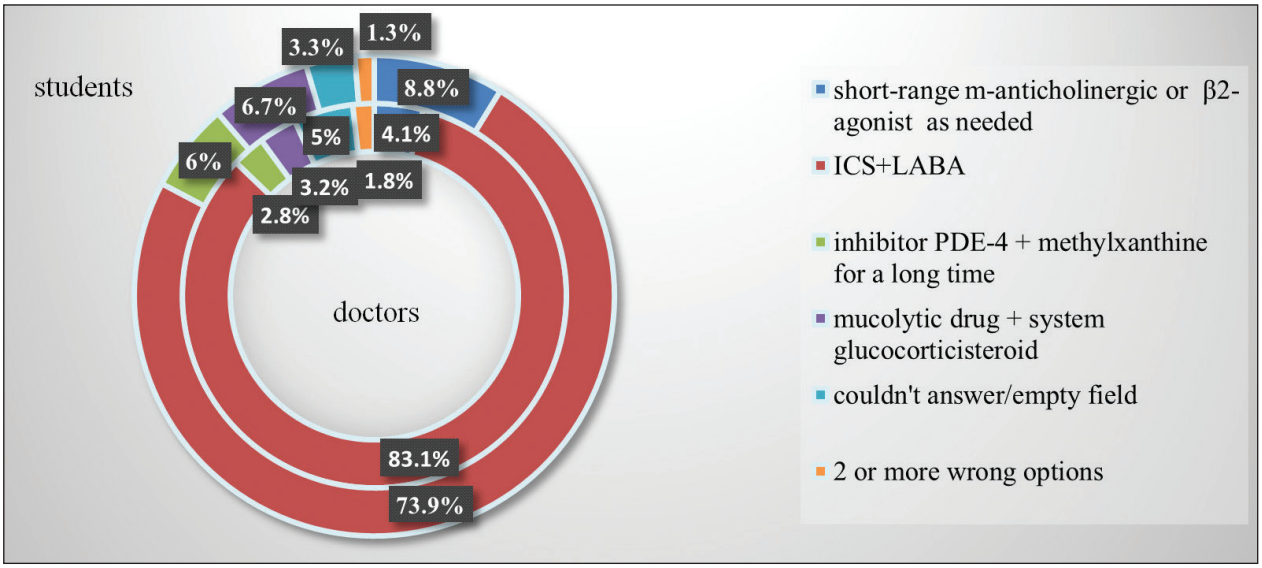

Figure 4. The structure of incorrect answers to the question about the initial therapy for a COPD patient with advanced symptoms and high risk of exacerbations.

GOLD 2017, Russian Respiratory Society 2018). Taking into account the local resistance of microorganisms across the regions, aminopenicillin with beta-lactamase inhibitor remains the only one relevant medication for the initial COPD therapy. The most common erroneous answer – prescribing 2d-3d-gen cephalosporin or doxy-

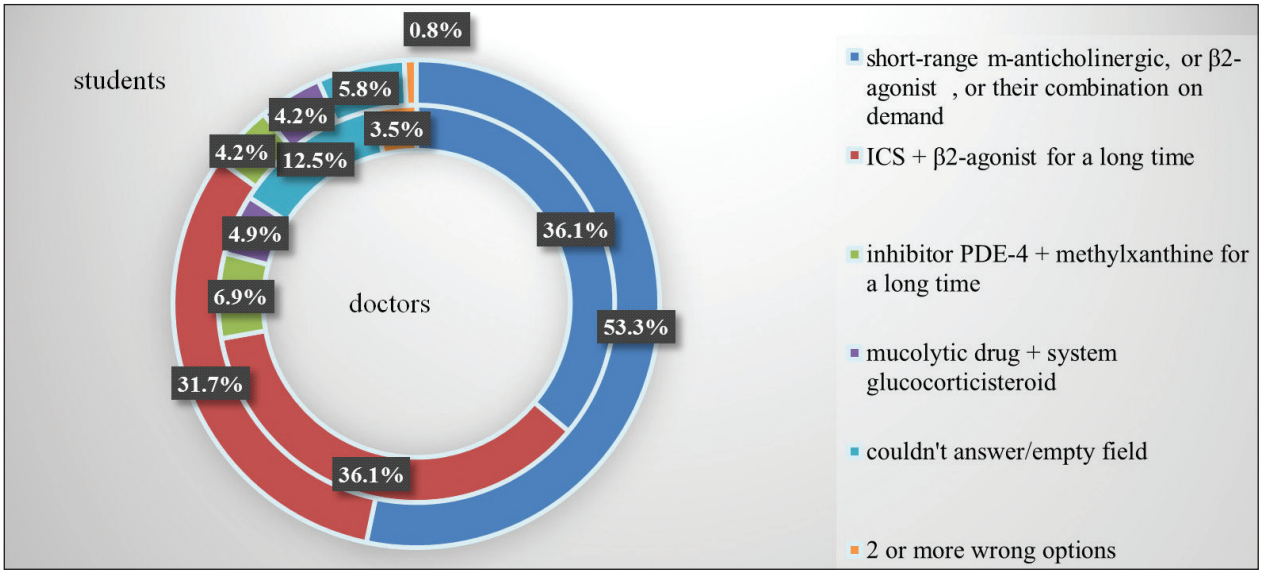

Figure 5. The structure of incorrect answers to the question about the basic treatment of COPD in a patient with advanved symptoms and low risk of exacerbations.

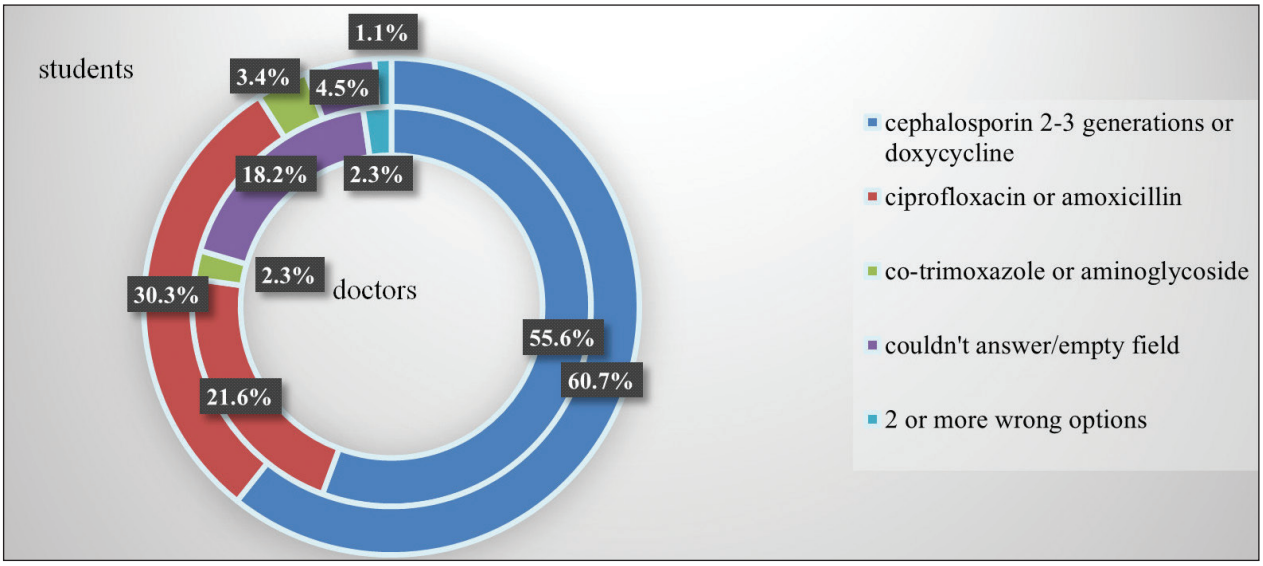

Figure 6. The structure of the incorrect answers to the question about the empirical antibiotic therapy for a COPD infectious exacerbation.

cycline – was given by 55.6% of physicians and 60.7% of students. The significant part of respondents found it difficult to answer this question – 18.2% of doctors and 4.5% of students (Fig.6).

In the last question, the respondents were to identify a reserve drug when an infectious exacerbation proved the antibiotic therapy ineffective. The correct answer – respiratory fluoroquinolones (GOLD 2017, Russian Respiratory Society 2018): moxifloxacin and levofloxacin – was selected by 63.9% of doctors and 36.2% of students ($p < 0.001$). The most common erroneous option among the doctors was "cefotaxime or ceftriaxone parenterally" – 50%. The erroneous answers in the group of students were the following: 33.6% – "cefotaxime or ceftriaxone parenteral", 24.8% – "amoxicillin / clavulanate, clarithromycin", and 34.5% of students chose the option "ciprofloxacin, amikacin" (Fig.7).

Conclusions

The survey revealed an average and, in some cases, even low level of knowledge of rational therapy for COPD among medical majors and physicians (Fig. 8). The most

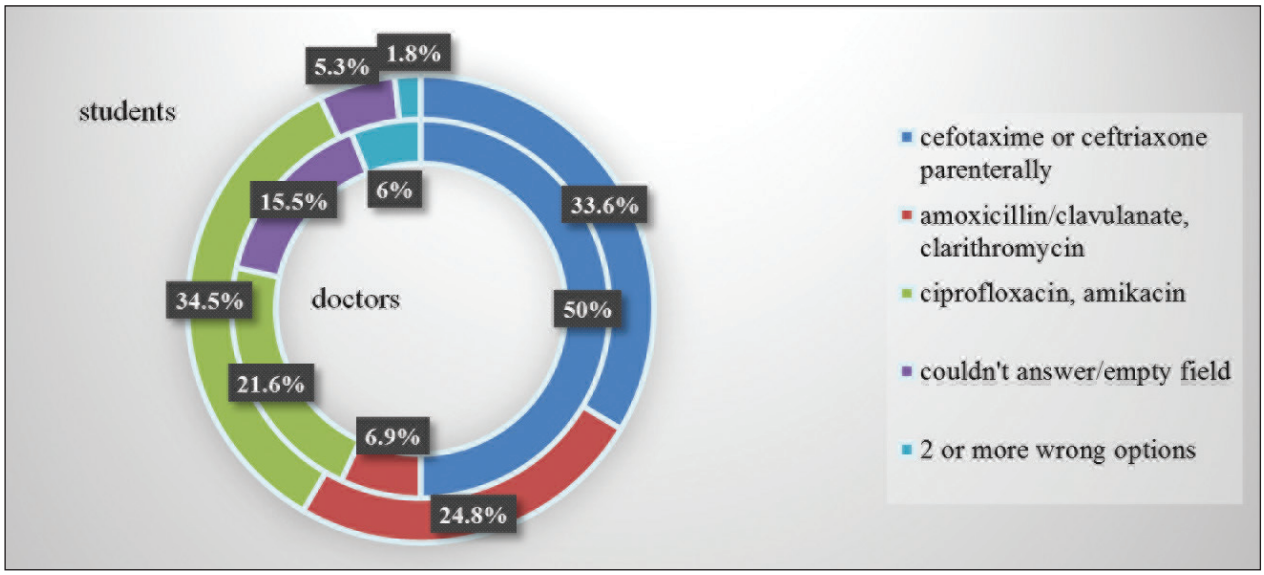

Figure 7. The structure of the incorrect answers to the question about the treatment of COPD infectious exacerbations with the inefficiency of the initial antibiotic therapy.

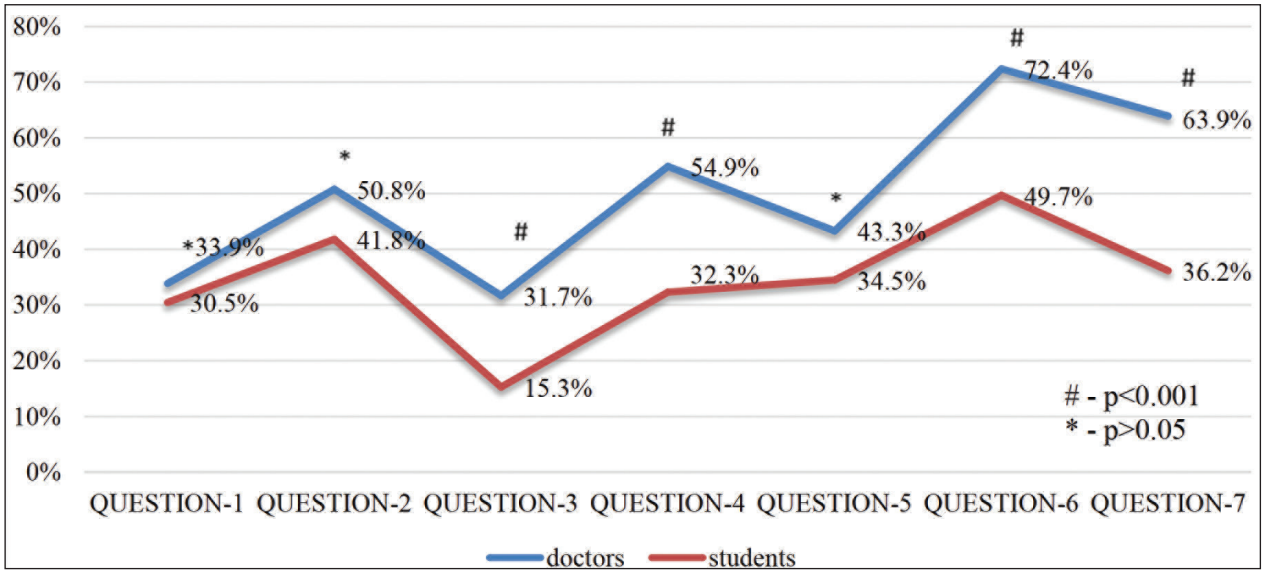

Figure 8. Distribution of correct answers to all questions of the questionnaire among doctors and senior medical students.

difficult were the questions about COPD initial therapy and treatment of exacerbations. A lower level of students' knowledge in this area may be due to lack of their practical experience. However, all the students who answered the questionnaire had been recently trained in standard educational disciplines of therapy, pulmonology and clinical pharmacology and, in the view of the authors of the project, were expected to cope well with COPD basics and be aware of modern clinical guidelines. Thus, it can be assumed that there is either poor understanding and/or poor teaching of this topic in medical universities of Russia and Ukraine.

Since COPD is a wide-spread disease and has high progression rates often causing death and disability of people, it is necessary to take extra measures aimed at improving the educational level of physicians and students in the treatment of COPD.

Conflict of interests

The authors have no conflict of interest to declare. The study was conducted without any sponsors.

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