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THE ASSESSMENT OF PHYSICIANS' AND SENIOR MEDICAL STUDENTS' KNOWLEDGE IN THE FIELD OF COMMUNITY-ACQUIRED PNEUMONIA: PRELIMINARY RESULTS OF THE KNOCAP-II PROJECT (2017-2019)

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Ключевые слова: внебольничная пневмония, фармакотерапия, клинические рекомендации, врачи, студенты, фармакоэпидемиология

Ключові слова: негоспітальна пневмонія, фармакотерапія, клінічні рекомендації, лікарі, студенти, фармакоепідеміологія

Abstract. The assessment of physicians' and senior medical students' knowledge in the field of community-acquired pneumonia: preliminary results of the KNOCAP-II project (2017-2019). Bontsevich R.A., Gavrilova A.A., Vovk Y.R., Adonina A.V., Goncharova N.Y., Prozorova G.G., Kompaniets O.G., Barysheva V.O., Ketova G.G., Bochanova E.N., Mironenko E.V., Shagiyeva T.M., Kirichenko A.A., Krotkova I.F., Shabanov E.A., Tilekeyeva U.M., Luchinina E.V., Galkina I.P., Maksimov M.L., Nevzorova V.A. Community-acquired pneumonia (CAP) is one of the most relevant problems of modern medicine. Today, CAP takes 4th place in the structure of mortality (after cardiovascular, cerebrovascular diseases and malignant neoplasms) and 1st place among all deaths from infectious diseases. The aim of the study is to assess the level of general physician' and senior medical students' basic knowledge in CAP treatment. The article represents the results of anonymous prospective surveys within the framework of the second stage of KNOCAP multi-centered research project (full name of the project «The assessment of physician' and students' knowledge of community-acquired pneumonia basics») aimed at accessing the knowledge and preferences of doctors and students on the fundamental issues in diagnosis and treatment of community-acquired pneumonia. The survey conducted in 2017-2019 involved 588 physicians and 394 students from seventeen Russian, Kyrgyzstan and Ukrainian centers. The method of anonymous questioning was used in this study, for which an original questionnaire was developed on the basis of current clinical recommendations. The following fundamental questions caused the greatest difficulties in the respondents: terms for a repeated X-ray examination in positive dynamics of CAP treatment, the choice of main diagnostic criteria of CAP, the choice of the typical mistakes of CAP treatment, the choice of the initial antimicrobial therapy. In general, the respondents' knowledge in CAP patients' management deviates significantly from the current clinical guidelines, as of 2010, and from the new clinical guidelines draft, 2018-2019. Currently, there is a need to increase the level of knowledge and improve the professional activities of therapists and senior medical students, as a multicenter section of the knowledge and preferences of specialists in many issues revealed their insufficient level for the correct management of patients with CAP.

Реферат. Оценка знаний врачей и студентов старших курсов медицинских вузов в области внебольничной пневмонии: предварительные результаты проекта KNOCAP-II (2017-2019 гг.). Бонцевич Р.А., Гаврилова А.А., Вовк Я.Р., Адонина А.В., Гончарова Н.Ю., Прозорова Г.Г., Компаниец О.Г., Барышева В.О., Кетова Г.Г., Бочанова Е.Н., Мironenko Е.В., Шагиева Т.М., Кириченко А.А., Кроткова И.Ф., Шабанов Е.А., Тилекеева У.М., Лучинина Е.В., Галкина И.П., Максимов М.Л., Невзорова В.А. Внебольничная пневмония (ВП) относится к одной из самых актуальных проблем современной медицины. На сегодняшний день ВП занимает 4 место в структуре смертности (после сердечно-сосудистых, цереброваскулярных заболеваний и злокачественных новообразований) и 1 место среди всех смертей от инфекционных заболеваний. Цель – оценка уровня знаний врачей терапевтического профиля и студентов старших курсов медицинских вузов в вопросах ведения пациентов с ВП. В рамках многоцентрового исследования KNOCAP (полное название проекта – «The assessment of physician and students' knowledge of community-acquired pneumonia basics») представлены результаты анонимного проспективного опроса по оценке знаний и предпочтений врачей терапевтического профиля и студентов старших медицинских курсов в вопросах ведения пациентов с ВП. По итогам первого периода проекта (2017-2019 гг.) получены и проанализированы результаты анкетирования 588 врачей терапевтического профиля и 394 студентов-медиков из 17 центров России, Украины и Кыргызстана. За основу взят метод анонимного анкетирования, для чего была разработана оригинальная анкета на основании актуальных клинических рекомендаций. Наибольшие сложности вызвали следующие вопросы: сроки проведения повторного рентгенологического исследования при положительной динамике лечения, выбор основного диагностического признака при ведении пациента с ВП, указать типовые ошибки фармакотерапии ВП и выбор стартовой антимикробной терапии у пациентов с факторами риска и без них. В целом исследование показало значимое несоответствие знаний в вопросах ведения пациентов с ВП актуальным клиническим рекомендациям 2010 г. и проектом новых клинических рекомендаций 2018-2019 гг. В настоящее время существует необходимость в повышении уровня знаний и совершенствовании профессиональной деятельности врачей терапевтического профиля и студентов старших медицинских курсов, так как проведенный многоцентральный срез знаний и предпочтений специалистов во многих вопросах выявил их недостаточный уровень для корректного ведения пациентов с ВП.

In the epidemiological studies it was found that more than 25.0% of patients' visits to the doctor are associated with respiratory diseases, one third of them are infections of the lower respiratory tract. Therefore, community-acquired pneumonia (CAP) is one of the most relevant problems of modern medicine. Only one third of patients with pneumonia are timely and correctly diagnosed, despite the high prevalence [4, 5]. Therefore, early diagnosis, rational pharmacotherapy (the correct administration of antibacterial drugs) determines the course and

prognosis of the disease. Today, CAP takes the 4th place in the structure of mortality (after cardiovascular, cerebrovascular diseases and malignant neoplasms) and the 1st place among infectious diseases [2, 12]. The group of especially high risk includes children under 5 years old and adults over 65 years old, therefore, the problem of CAP is no less relevant in pediatric practice and gerontology. In elderly people this situation is associated with inhibition of the cough reflex, with the concomitant chronic diseases, with weakening of immune system

and with frequent subtle diseases. And in children, it is caused by immaturity of protective mechanisms, which also increases the risk of serious complications [13, 15]. Thus, raising the level of senior medical students' and physicians' knowledge in taking care of patients with CAP, their high-quality professional training is a priority in practical medicine. To this end, additional lecture series have been introduced into the educational program in medical universities to study the main sections of pharmacology and clinical pharmacology; doctors should strive to improve in their professional activities [8, 10].

The aim of the study – to assess the level of physicians' and senior medical students' knowledge in management of CAP patients.

MATERIALS AND METHODS OF RESEARCH

Within the framework of the second stage of the multicenter study KNOCAP (full name of the project «The assessment of physicians and students' knowledge of community-acquired pneumonia basics») the results of an anonymous prospective survey on the assessment of knowledge and preferences of the physicians and senior medical students in management of CAP patients are given. In this period of the project (2017-2019), the results of a survey of 588 physicians and 394 medical students from 17 centers of Russia: Belgorod, Voronezh, Lipetsk, Tambov, Krasnodar, Saratov, Chelyabinsk, Vladivostok, Samara, Kazan, Smolensk, Moscow, Kursk, Krasnoyarsk and Dnipro, Kyiv, Bishkek were obtained and analyzed.

The method of anonymous questioning was used in this study, for which an original questionnaire was developed on the basis of current clinical recommendations [4, 14]. The respondent was awarded 0 points for an incorrect answer; depending on the completeness of the answer, for an incomplete or partially correct answer – from 0.25 to 0.75 points; for a correct answer – 1 point. Therefore, with all correct answers, the maximum average score was 1.0. The study compared the data obtained from students and physicians: average values of each respondent, average values for the entire questionnaire and average values for individual issues. The average value of correct, partially correct and incorrect answers was characterized as the “average level of response completeness” (ARC), which is an equivalent for the average level of correct answers. The patterns of answers to individual questions were also analyzed. Statistically non-systemic omissions to answers were allowed. For questions required a mandatory “written” response (question No. 12 and 13), when none was provided, 0 points were assigned.

All questionnaire information was entered into an electronic database and processed using application

programs Microsoft Excel 2016 (product id: 00339-10000-00000-AA597) for Windows 7 Professional (product id: 00371-OEM-9091385-31631), IBM SPSS Statistics Campus Editions (contract number: AU-EP-129/2014/245 from 29.12.2014; invoice number: 060315/1 from 06.03.2015). Statistical processing showed that the analyzed distribution of data from a sample of physicians is expectedly normal: Kolmogorov-Smirnov test $d=0.03592$, $p>0.20$; Lilliefors test $p<0.10$, similar results were obtained from senior medical students (Kolmogorov-Smirnov test $d=0.04982$, $p>0.20$; Lilliefors test $p<0.05$). The statistical significance of the differences when comparing these samples was recorded at a bilateral level of $p<0.05$ based on the analysis of arbitrary contingency tables using the Pearson's chi-square (χ^2) test [7].

It should be emphasized that this methodology for assessing knowledge cannot fully reflect the general level of doctors' competence, or students' knowledge in universities, and is designed exclusively for this study.

Intermediate results of the study were presented at the congresses of the Interregional Association for Clinical Microbiology and Antimicrobial Chemotherapy in 2015 and the European Respiratory Society (ERS) in 2017. In the journal “Research Result in Pharmacology” a fragment of the study on the assessment of knowledge among doctors and students on issues of CAP pharmacotherapy is presented [8]. At the Congress of the European Respiratory Society (ERS) in 2019, the report on the analyzed topic was presented [9]. Currently, the journals «Pharmateca» and «Scientific Results of Biomedical Research» are publishing articles dedicated to a detailed analysis of exclusively pharmacotherapy and the treatment of patients with CAP based on the intermediate results of this study.

RESULTS AND DISCUSSION

Mycoplasma pneumoniae and *Chlamydia pneumoniae* are most relevant in young and middle-aged people with a detection frequency of up to 30.0% [4]. In 3-40.0% of cases a combination of typical and atypical pathogens of pneumonia is noted [5, 6]. In young people, the disease proceeds as a monoinfection, and in people over 65 it is caused by a combination of gram-positive and gram-negative flora. However, the most prevalent causative agent of CAP is pneumococcus – *Streptococcus pneumoniae*, the detection rate of which reaches up to 76.0%. The ARC of this question is 56.3% among doctors and 53.9% among students ($p<0.05$).

Prevention of the CAP development is one of the main components of the strategy to reduce morbidity and mortality [3, 11]. Immunization against pneumococcus and influenza is currently the most effective

way to prevent CAP. On the issue of preventing the development of CAP, ARC was 84.1% among doctors and 71.3% among students ($p<0.001$).

A positive attitude towards vaccination was expressed by 85.3% of the interviewed specialists and 67.4% of medical students, for various reasons it was ambiguous attitude – 18.3% and 12.0%, respectively, “I’ve never heard” about this method of prevention – 1.8% of doctors and 5.3% of medical students, and a “negative” attitude to pneumococcal vaccine was indicated by 1.0% of specialists and 8.9% of students.

The next question concerned the choice of the main diagnostic sign on examination of a patient with CAP and suggested the only one correct answer – syndrome of induration of lung tissue, which is characterized by infiltration, darkening on X-ray, and a complex of clinical manifestations (crepitation, bronchophonia, increased vocal trembling, dullness of percussion sound) [12]. The ARC for this question is 33.7% among the doctors and 38.2% – the students ($p<0.05$).

The diagnostic minimum of mild CAP includes two mandatory examinations: a general blood test and X-ray of a chest in two projections [1, 4]. Respondents were additionally offered the following response options: X-ray in one projection, biochemical blood test, sputum examination, microbiological sputum examination and “Not sure”. Respondents had to choose only two primary mentioned examinations from the indicated ones. The ARC of doctors was only 53.5% and 50.4% of the students surveyed ($p>0.05$).

In the next question from the proposed list (absence of temperature and leukocytes, absence of X-ray examination, absence of lung tissue induration syndrome, absence of cough, absence of pulmonary rales), the respondents had to choose criteria without which the diagnosis of CAP cannot be confirmed [6]. The inaccessibility or absence of X-ray confirmation of focal lung infiltration (chest photofluorography or X-ray of the chest) makes the diagnosis of pneumonia inaccurate or uncertain [1, 4]. The ARC of doctors is 61.3%, a similar indicator in students is 52.9% ($p<0.05$).

Control X-ray examination in positive dynamics is advisable not earlier than in 14 days [2, 4]. For most doctors and senior medical students this issue was difficult: respondents mistakenly believe that this period can take less time. The ARC of doctors is 28.9%, and of students is 24.9% ($p>0.05$). In the next question, it was necessary to indicate the possible reasons for the delay in the beginning of antimicrobial therapy (AMT) with a confirmed diagnosis of CAP. Despite the importance of obtaining laboratory material (blood,

expectoration) before prescribing antibiotics, its absence should not be the reason for the delay in AMT [1]. The ARC is 84.0% in the group of doctors and 63.5% – in the group of students ($p<0.001$).

The necessary criteria for AMT cessation in mild CAP is a stable normalization of body temperature for 48-72 hours combined with a positive clinical picture [13]. The ARC to the question of the adequate duration of AMT is 38.5% in the group of students and 53.6% in the group of doctors ($p<0.05$).

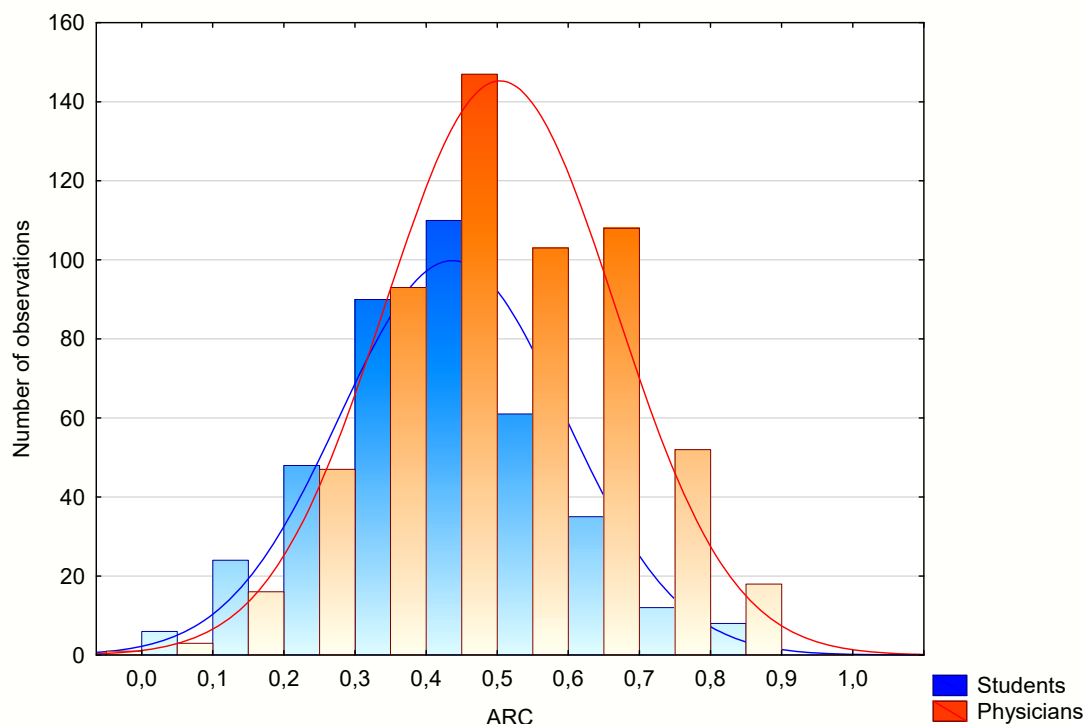
The next question was aimed at assessing the respondents’ knowledge about “stepwise therapy” in management of CAP patients. The main idea of a stepwise therapy for the administration of antimicrobial drugs (AMD) is to reduce the duration of parenteral AMT due to the transfer of patients to tableted drugs [15]. In practice, the transition to the oral form of antimicrobial drugs (AMD) occurs on average in 2-3 days after the start of treatment [4, 13]. Despite the importance of this treatment tactic, ARC in the group of doctors and in the group of students is 63.2% and 57.8%, respectively ($p<0.05$).

In the question about typical errors in starting antibiotic therapy for mild CAP in patients without risk factors, the respondents were offered the choice of the following AMD: ampicillin + oxacillin («Am-piox»); ciprofloxacin; cefazolin; ampicillin per os; respiratory fluoroquinolones. The ARC on this issue is 37.0% for doctors and 31.0% among senior medical students ($p<0.001$).

The last questions have been aimed at determining the level of knowledge about the choice of starting AMT in the management of patients with mild CAP with the presence or absence of risk factors. Respondents had to enter a treatment regimen in the field indicating the dosage, frequency and mode of administration. The authors made the following conclusions: at the decision-making stage on administration of starting AMT for patients with mild CAP, both students and doctors make a significant number of mistakes. Detailed comments and preliminary results on these issues are discussed in the article on the CAP’ pharmacotherapy.

In the last question of the questionnaire, it was necessary to indicate the presence or absence of a subjective need for educational programs on the management of patients with CAP. So, the majority of respondents (68.0% of doctors and 63.0% of students) are for the need for such activities.

For an integrated assessment of this research, the authors calculated the average level of answers’ completeness for each respondent in the group of students and doctors on all questions of the questionnaire as a whole. The results of this analysis are presented in Figure.



Comparing physicians' and students' summary knowledge according to the average distribution of response level

CONCLUSIONS

1. It has been established that both senior medical students and physicians need additional educational activities to improve knowledge on the rational management of patients with CAP, because a sufficient number of questions on this topic cause difficulties both for practicing specialists and for future doctors.

2. Most of incorrect answers were made in the following questions: terms for a repeated X-ray examination in positive dynamics of CAP treatment, the choice of main diagnostic criteria of CAP, the

choice of the typical mistakes of CAP treatment, the choice of the initial antimicrobial therapy.

3. The results of the study also found a significant discrepancy between the respondents' knowledge of both the relevant clinical guidelines and the draft of new clinical guidelines for CAP.

4. The additional studies in this problem are recommended, this will help to increase the efficiency of medical care and to reduce morbidity and mortality from CAP.

Conflicts of interest. The authors have no conflict of interest to declare.

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