FIRST-LINE THERAPY PRESCRIPTIONS IN AZERBAIJAN: RESULTS FROM THE EUROPEAN REGISTRY ON HELICOBACTER PYLORI MANAGEMENT (HP-EUREG)

[1]Babayeva G.H.*, [2]Mahmudov U.R., [1,3]Mammadov E.E., [4]Guliyev F.V., [5]Verdiyev E.Kh., [6]Machanov U.R., [7]Ibishev R.F., [8]Huseynov H.M., [9]Zalov Z.S., [10]Ismayilova S.Y., [1,11]Hasanov R.A., [12]Ibrahimli H.I., [13]Cano-Català A., [14]Parra P.P., [15]Moreira L., [14]Nyssen O.P., [16]Mégraud F., [17]O'Morain C., [14]Gisbert J.P.

[1]Azerbaijan State Advanced Training Institute for doctors named after A.Alıyev, Department of Therapy, Baku, Azerbaijan;
[2]Modern Hospital, Department of Gastroenterology and Endoscopy, Baku, Azerbaijan;
[3]MediLand Hospital, department of Gastroenterology and Endoscopy, Baku, Azerbaijan;
[4]National Centre of Oncology, Department of Invasive Diagnosis and Treatment, Baku, Azerbaijan;
[5]Central Hospital, Department of Gastroenterology and Endoscopy, Baku, Azerbaijan;
[6]Ganja International Hospital, Department of Gastroenterology and Endoscopy, Ganja, Azerbaijan;
[7]Zafaran Hospital, Department of Gastroenterology and Endoscopy, Baku, Azerbaijan;
[8]Azerbaijan Medical University, Oncology clinic, Department of Gastroenterology and Endoscopy, Baku, Azerbaijan;
[9]Istanbul NS Klinika, Department of Gastroenterology and Endoscopy, Baku, Azerbaijan;
[10]StarLab Medical Center, Department of Gastroenterology and Endoscopy, Baku, Azerbaijan;
[11]German Hospital, Department of Gastroenterology and Endoscopy, Baku, Azerbaijan;
[12]Azerbaijan State Advanced Training Institute for doctors named after A.Alıyev, Department of Health Organization, Baku, Azerbaijan;
[13]GOES Research Group, Althaia Xarxa Assistencial Universitària de Manresa, Manresa, SPAIN;
[14]La Princesa University Hospital, Princesa Health Research Institute (IIS-Princesa), Autonomous University of Madrid (UAM), and Network Biomedical Research Center for Liver and Digestive Diseases (CIBERehd), Madrid, Spain;
[15]Hospital Clínic de Barcelona, Center for Networked Biomedical Research in Liver and Digestive Diseases (CIBERehd), IDIBAPS (Institut d'Investigacions Biomèdiques August Pi i Sunyer),University of Barcelona, Barcelona, Spain;
[16]INSERM U1312, University of Bordeaux, Bordeaux, France;
[17]Trinity College Dublin, Dublin, Ireland

Background. Gastric lesions associated with Helicobacter pylori, eradication issues in terms of the choice of antibiotics and duration of therapy continue to remain one of the most pressing topics in modern healthcare. **Methods.** Data were collected from the European Registry on Helicobacter pylori Management (Hp-EuReg) and quality reviewed from January 2020 to May 2023 at AEG-REDCap. All treatment-naïve cases were assessed for choice of regimens and duration, as well as dosing of proton pump inhibitor therapy. **Results.** The study included 3,898 patients (67% reported dyspepsia). Triple regimens were most often prescribed (82%), the PPI-clarithromycin-amoxicillin scheme being used in 54% of patients. Duration of treatment was of 14 days (56%), 10 days (27%) and 7 days (17%). **Conclusion.** The prescribed H. pylori eradication regimens during the period 2020–2023 in Azerbaijan adhered partially to the Maastricht recommendations.

Keywords: Hp-EuReg, Helicobacter pylori, antisecretory therapy, first-line treatment, bismuth, eradication rate.

Background. One of the most pressing problems in therapeutic gastroenterology for many years has been the issues of prevention and treatment stomach and duodenum ulcer diseases, as well as chronic gastritis, as well as prevention stomach cancer. To date, it has been established that these diseases in most cases are caused by *Helicobacter pylori (H. pylori)* infection and fundamentals of modern diagnostics and treatment of *H. pylori* infection from the standpoint of evidence-based medicine was formulated in the Maastricht consensuses [1, 2], which are the basis for many national recommendations on this issue. The problem of H. pylori resistance to antibiotics is a major factor for the effectiveness of eradication therapy. *H. pylori* resistance prevalence to amoxicillin (A), tetracy-

*e-mail: ghbabayeva@gmail.com

cline (Tc) and rifabutin can be neglected, since it usually does not exceed 2%; whereas bismuth (B) *H. pylori* resistance is absent. Resistance to antimicrobial drugs such as clarithromycin (C), fluoroquinolones, metronidazole (M), occurs quite often and is one of the main problems in the eradication of *H. pylori* infection.

The need for optimization of *H. pylori* eradication therapy is determined by the ineffectiveness of treatment in patients receiving first-line therapy [1-3]. In accordance with the recommendations of Maastricht V [2], with a level of clarithromycin resistance exceeding 15% in many areas, in the use of triple therapy regimens is not recommended.

In our country, there is no official published data on bacterial resistance to antibiotics; therefore, the choice of eradication therapy regimen is carried out empirically, assessing the effectiveness, which should be at least 90%.

In cases of high clarithromycin resistance, international guidelines recommend classical quadruple bismuth therapy as a first-line treatment option [1, 2].

All over the world, there has been a widespread increase in the resistance of *H. pylori* to other antibiotics, primarily to macrolides [4, 5].

In order to achieve optimal effectiveness [2, 6], it has been recommended to increase the duration of the eradication regimens to 14 days. Additionally, the synergism of bismuth preparations with antibiotics provided better results, showing resistance of *H. pylori* to clarithromycin and levofloxacin (L) was overcome [2].

At the initiative of the European Helicobacter and Microbiota Study Group (EHMSG), a prospective multicentre observational study of the European Helicobacter pylori Registry (Hp-EuReg) has been conducted since 2013 to evaluate the implementation of clinical recommendations of specialists in diagnosis and treatment, as well as the effectiveness of prescribed eradication regimens for infection. H. pylori [7]. In Azerbaijan, data collection is carried out in more than 10 centers. This article presents an analysis of data on prescribed first-line regimens collected in the registry from January 2020 to May 2023.

Study aim. The aim of the current analysis was to evaluate the prescription rate and duration of empirical first-line treatments for the treatment of H. pylori infection in Azerbaijan.

Methods. ***European registry on H. pylori management.*** This is a sub-study of the "European Registry on H. pylori Management" (Hp-EuReg), an international (38 countries), multicenter (up to 300 investigators), prospective, non-interventional registry promoted by the European Helicobacter and Microbiota Study Group (www.helicobacter.org) that started in 2013 and that includes currently over 70,000 records. The study was conducted according to the guidelines of the 1975 Declaration of Helsinki and was approved in 2012 by the Ethics Committee of La Princesa University Hospital (Madrid, Spain), that acted as reference Institutional Review Board, was classified by the Spanish Drug and Health Product Agency, and was prospectively registered at ClinicalTrials.gov (NCT02328131) [7]. Participating investigators were gastroenterologists who routinely manage patients in whom *H. pylori* eradication treatment was indicated.

Information is collected and managed using an electronic database hosted on the servers of the Spanish Association of Gastroenterology (Asociación Española de Gastroenterología, AEG; www.aegastro.es). REDCap (Research Electronic Data Capture) is a secure web application designed to support the collection of research data.

Following demographic information is collected: age, gender, ethnicity, symptoms and diagnosis that led to indications for *H. pylori* eradication, information about any potential previous failed therapy, the method for diagnosing *H. pylori* post and pretreatment, the treatment scheme used (with length and drug dosages).

Recruiting investigators. The recruiting investigators were gastroenterologists attending an adult population in a gastroenterology outpatient clinic treating patients infected with H. pylori. Patients were managed and registered following routine clinical practice. Azerbaijani recruiting investigators were authors GB, UM, EM, FG, EV, MU, RI, HH, ZZ, SI, RH and HI.

Data extraction and analysis. Data for this study was collected at the Department of Therapy Azerbaijan State Advanced Training Institute for Doctors named after A. Aliyev. It is the main Hp-EuReg center in Azerbaijan and gatheres data from the remaining participating hospitals (10 centres in total).

Further information on variables is presented in the published protocol [7]. All patient data were

anonymized. The main outcome was confirmed eradication at least 4 weeks after treatment. Data were collected up to May 2023.

Data management. After extracting the data and prior to the statistical analysis, the database was reviewed for inconsistencies and subsequent data cleaning. The data quality review process evaluated whether the study selection criteria had been met and whether data were correctly collected, ensuring the study was conducted according to the highest scientific and ethical standards. Data discordances were resolved by querying the investigators and through group emailing.

Statistical analyses. *Variables categorization and definition.* The variable treatment length was assessed using three categories, corresponding with the most frequently prescribed treatment durations: 7, 10, and 14 days.

The variable proton-pump inhibitor (PPI) dose was grouped into three categories as reported by Graham and Kirchheiner [8, 9]: low dose, when the potency of acid inhibition was between 4.5 and 27 mg omeprazole equivalents given twice a day; standard dose, between 32 and 40 mg omeprazole equivalents given twice a day; and high dose, between 54 and 128 mg omeprazole equivalents given twice a day.

Continuous variables were presented as the arithmetic mean and the respective standard deviation (SD). Qualitative variables were presented as percentages and absolute frequencies, and 95% confidence intervals (CI) were provided. The significance level was established at a p-value $p<0.05$.

The treatments schemes evaluated in current cohort were categorized in 7 categories as the most frequent first-line empirical therapies in Azerbaijan: 1) triple therapy with a PPI, amoxicillin and levofloxacin, henceforth reported as PPI-A+L; 2) triple therapy with PPI, clarithromycin and amoxicillin, henceforth reported as PPI+C+A; 3) triple therapy with PPI, clarithromycin and metronidazole, henceforth reported as PPI+-C+M; 4) triple therapy with PPI, amoxicillin and tetracycline, henceforth reported as PPI+A+Tc; 5) quadruple therapy with PPI, clarithromycin, metronidazole and bismuth, henceforth reported as PPI+C+M+B; 6) quadruple therapy with PPI, clarithromycin, amoxicillin and bismuth, henceforth reported as PPI+C+A+B; and 7) "other" therapies encompassing the remaining treatment schemes.

Data analysis. Univariate sub-analyses were performed according to the treatment duration (7, 10 and 14 days), PPI doses (low, standard, high) and line of treatment. Differences between groups were analysed using the Chi-square test.

Results. Baseline characteristics. The following analysis has been performed in 3,898 patients, all baseline demographic data show in Tab. 1 and the participating centres in Azerbaijan with the number of recruited patients (Figure).

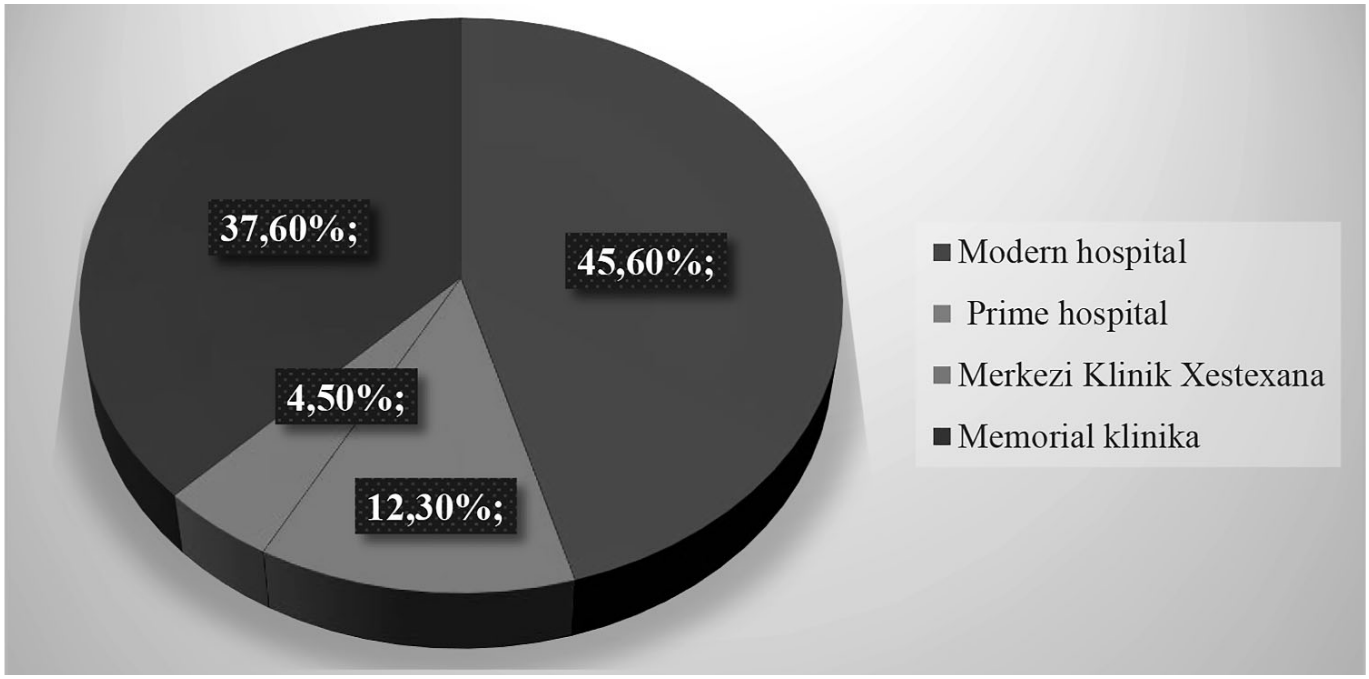

Figure. The participating centers in Azerbaijan with the number of recruited patients (n, %).

In 1.9% of the patients recruited at least one type of allergy was reported, where 1.6% to penicillin. 226 patients (5.8%) received some concurrent medication: Proton pomp inhibitors (PPI) (200 patients (5.1%) received PPI on demand, 2 patients (0.1%) received PPI daily), Aceltylsalicylic acid (46 patients (1.2%) received Aceltylsalicylic acid on demand, 8 patients (0.2%) received Aceltylsalicylic acid daily), NSIADs (50 patients (1.3%) received NSAIDs on demand, 1 patients (0.0%) received NSAIDs daily), Statins (46 patients (1.2%) received Statins on demand, 3 patients (0.1%) received Statins daily).

The most frequent indication was dyspepsia (with normal endoscopy, that is no ulcerative or neoplastic finding was reported) in 2,610 patients (67%) (Tab. 1).

Table 1

Baseline data

	N	%
Ethnic Background		
Caucasian	3,872	99.3
Black	15	0.4
Asian	5	0.1
Other	3	0.1
Unknown/Not available	3	0.1
Gender male 2,207 56,6		
Gender female	1691	43.4
Age (mean and SD) *	42.11 (13.08)	
Indications for H. pylori eradication treatment		
Non-Investigated Dyspepsia	16	0.4
Dyspepsia with normal endoscopy	2, 610	67
Duodenal Ulcer	424	10.9
Gastric Ulcer	348	8.9
Other	497	12.8
Preneoplastic lesions (atrophic gastritis or intestinal metaplasia)	1	.0
NSAIDs (or aspirin) treatment	1	.0
Long-term treatment with PPIs	1	.0
Methods for detecting H. pylori		
Serology	4	0.1
Stool Antigen Monoclonal Test	28	0.7
Stool Antigen Polyclonal Test	5	0.1
Histology	11	0.3
Rapid urease test	3,853	98.8
Urea breath test Helik	3	0.1
Diagnostics tests used after eradication therapy		
Stool PCR test	1	0.1
Stool Antigen Monoclonal Test	2,661	68.3
Stool Antigen Polyclonal Test	866	22.2
Histology	1	.0
Rapid Urease Test	54	1.4

Diagnosis of Helicobacter pylori infection. The distribution of *H. pylori* detection methods is presented in Tab. 1. In total, 3,853 patients (99%) have been diagnosed using the rapid urease test. This test was the most used in the diagnosis of the infection. In 3,864 patients (99%) an endoscopy was performed to diagnose the infection, in the examined patients, the determination of resistance to antibiotics was not carried out. To confirm the effectiveness of the eradication therapy following test were simultaneously used: Stool Antigen Monoclonal Test, Stool Antigen Polyclonal Test, Rapid Urease Test. (Tab. 1). In 2,661 (68%) patients the stool antigen monoclonal test was

used, which was the most frequent. Additionally, in 55 (1.4%) patients was performed an endoscopy to confirm the eradication.

First-line prescriptions. The triple regimen was the most frequently prescribed, which was received by 3,193 patients (82% of the total). A complete list of all first-line eradication therapy regimens used in Azerbaijan presented in Tab. 2.

Table 2

First-line treatment prescriptions in Azerbaijan

	N	%
Triple-C+A	2,117	54.3
Triple-C+M	760	19.5
Quadruple-C+A+B	610	15.6
Triple-A+L	159	4.1
Triple-A+Tc	75	1.9
Quadruple-C+M+B	44	1.1
Quadruple-A+L+B	12	.3
Quadruple-C+A	8	.2
Triple-A+M	5	.1
Dual-A	4	.1
Triple-C	3	.1
Triple-C+M+B	2	.1
Quadruple-C+A+L	2	.1
Quadruple-A+Tc+B	2	.1
Triple-M	1	.0
Triple-L	1	.0
Triple-A+M+B	1	.0
Quadruple-A+M+B	1	.0
Quadruple-A+L	1	.0
Quadruple-A+B	1	.0
Total	3,809	100.0
Total	3,898	100.0

Most prescribed treatment scheme in treatment-naïve patients was the triple therapy with PPI-C+A, which was received by 2,117 patients (54% of the total) (Tab. 2).

In the overall analyses -accounting all years, the most frequently prescribed treatment was triple therapy encompassing a PPI-C+A/M.

The lengths of the treatments prescribed in first-line treatment in Azerbaijan: 14 days in 2,132 patients (56%)-this is the most frequently used length in therapy, 10 days in 1,041 patients (27%) and 7 days in 650 patients (17%).

The PPI potency of acid inhibition of the treatments prescribed in Azerbaijan: low-1,891 (49%) patients -this is the most frequently used PPI dose, standard- 1,102 (28%) patients and high- 888 (23%) patients. The use of the different PPI potency of acid inhibition in each treatment scheme presented in Tab. 3.

The most frequent PPI dosages were reported in the following treatments below: PPI-A+L: standard in 89 (56%) patients, PI-C+A: low in 1,040 (49.5%) patients, PPI-C+M: low in 424 (56%) patients, PPI-A+Tc: standard in 45 (60%) patients, PPI-C+M+B: low in 28 (64%) patients and PPI-C+A+B: low in 240 (39%) patients. According to the Pearson's chi-squared test, there are statistically significant differences ($p<0.001$) between the prescribed treatment dosages.

In our cohort, a total of 957 patients (25%) received probiotics concomitantly with the eradication therapy.

Treatment duration. In the next analyses, only the 6 most frequently prescribed first-line treatments (encompassing over 98% of the prescriptions) were used to facilitate the interpretation of the tables/data: PPI-C+A, PPI-C+M, PPI-C-A-B, PPI-A+L, PPI-A+Tc, PPI-C+M+B. In all treatment categories, at least 40 patients were treated. The length of each treatment scheme in Azerbaijan per treatment scheme presented in Tab. 4.

Table 3

The use of the different PPI doses in therapy.

First-line therapy		Low-dose*	Standard dose*	High dose*	Total
Triple-A+L	N	64	89	6	159
	%	40.3%	56.0%	3.8%	100.0%
Triple-C+A	N	1040	596	467	2103
	%	49.5%	28.3%	22.2%	100.0%
Triple-C+M	N	424	107	226	757
	%	56.0%	14.1%	29.9%	100.0%
Triple A+Tc	N	30	45	0	75
	%	40.0%	60.0%	0.0%	100.0%
Quad-C+M+B	N	28	8	8	44
	%	63.6%	18.2%	18.2%	100.0%
Quad-C+A+B	N	240	195	175	610
	%	39.3%	32.0%	28.7%	100.0%
Other	N	65	62	6	133
	%	48.9%	46.6%	4.5%	100.0%
Total	N	1891	1102	888	3881
	%	48.7%	28.4%	22.9%	100.0%

Note: * - PPI doses defined as: low-dose, when the potency of acid inhibition was between 4.5 and 27 mg omeprazole equivalents given twice a day; standard-dose, between 32 and 40 mg omeprazole equivalents given twice a day; high-dose, between 54 and 128 mg omeprazole equivalents given twice a day.

Table 4

Most frequently used first-line prescriptions by treatment duration (7, 10 or and 14 days).

	Triple-A+L	Triple-C+A	Triple-C+M	Triple A+Tc	Quad-C+M+B	Quad-C+A+B	Other	Total
7 days	69 43.4%	321 15.3%	147 19.5%	62 82.7%	0 0.0%	3 0.5%	48 36.6%	650 17.0%
10 days	84 52.8%	528 25.2%	223 29.6%	13 17.3%	11 29.7%	144 25.3%	38 29.0%	1041 27.2%
14 days	6 3.8%	1250 59.6%	383 50.9%	0 0.0%	26 70.3%	422 74.2%	45 34.4%	2132 55.8%
Total	159 100.0%	2099 100.0%	753 100.0%	75 100.0%	37 100.0%	569 100.0%	131 100.0%	3823 100.0%

The most frequent prescriptions' lengths were as follows: PPI-A+L – 10 days in 84 (53%) patients, PPI-C+A – 14 days in 1,250 (60%) patients, PPI-C+M – 14 days in 383 (51%) patients, PPI-A+Tc – 7 days in 62 (83%) patients, PPI-C+M+B – 14 days in 26 (70%) patients, PPI-C+A+B – 14 days in 422 (74%) patients. According to the Pearson's chi-squared test, there are statistically significant differences ($p<0.001$) between the prescribed treatment lengths.

Evolution of prescriptions. In the analysis of evolution, the use of triple therapies (mainly PPI-C+A/M) decreased from 80% of the total prescriptions in 2022 to 43% in 2023. The triple therapy with PPI-A+L (levofloxacin) increased from 0% in 2022 to 23% in 2023 and the triple with PPI-A+Tc (tetracycline) increased likewise from 0% in 2022 to 8% in 2023.

The use of quadruple therapy mainly with PPI-C+A+B remained similar during the period studied representing around 15-16% of prescriptions each year. Overall, 7-day prescriptions increased from 0% in 2020 to 33.5% in 2023 and 14-day prescriptions decreased from 99% of the total of prescriptions in 2020 to 13% in 2023.

In the last two years (2022 and 2023), over half of the prescription (54% and 62%, respectively) used standard PPI doses.

Low-dose PPIs use decreased from 80% in 2020 to 33% in 2023; similarly, the high-dose PPIs prescriptions represented 20% of the total of treatments in 2020 while 5% in 2023.

Discussion. This study examined Hp-EuReg data for Azerbaijan for 2020-2023 year taking into account the frequency of prescription of various first-line *H. pylori* eradication regimens, We would like to begin the discussion of the results of this study with methods for confirming the presence of *H. pylori* infection; unfortunately, the fact was revealed that confirmatory tests before and after eradication of *H. pylori,* recommended in international protocols, were not always part of standard routine clinical practice in our country (lack of data according to the C13-urease test and 14 C-breath tests, PCR test of stomach tissue, PCR test of stool, biochemical resistance test, culture test), the most commonly used diagnosis before eradication was carried out by endoscopic examination (in 3864 patients (99%) using a rapid urease test (in 3,853 patients (99%), and to confirm eradication a monoclonal stool antigen test was used (in 2661 patient (68%).

The urea breath test is the main recommended non-invasive diagnostic test for the initial diagnosis of *H. pylori* infection, as well as the main non-invasive diagnostic method, and the ability to confirm eradication of *H. pylori* after treatment is the use of a monoclonal antigen test -an alternative for most variations. Only validated serological diagnostic tests for *H. pylori* can be used for initial diagnosis and are not recommended for assessing eradication success.

The availability and use of urea breath test and serological diagnostic test are expected to increase in the coming years; the main method has been the rapid urease test for the invasive diagnosis of *H. pylori* and meets current recommendations as a first-line diagnostic test.

It must be remembered that the only way to improve cure rates for *H. pylori* is to have reliable information on the current situation; Since the prevalence of *H. pylori* in Azerbaijan is not yet fully known, a much higher level of diagnosis may lead to better results in both studying the true prevalence and treating this infection.

Regarding prescribed *H. pylori* eradication regimens, the most commonly prescribed first-line therapy was standard triple therapy (PPI + C + A, which was prescribed to 2117 patients (54% of the total)); there is no specifically confirmed resistance data in our region to clarithromycin.

Triple therapy containing levofloxacin is one of the recommended treatment regimens for the second line of eradication therapy, although in our country in some cases it was used in the first line of eradication therapy and the referral of doctors to triple therapy PPI+A + L increased from 0 % in 2022 to 23% in 2023. The increase in the use of this fluoroquinolone increased in our country in the post-Covid period, and did not pass by gastroenterological patients; the prescription was in groups with respiratory patients or in patients who had previously been prescribed clarithromycin or other antibiotics from the *H. pylori* eradication therapy group for other indications. Along with levofloxacin, the use of tetracycline in first-line eradication regimens has also increased, so the prescription of the three-component combination PPI+A+Tc also increased from 0% in 2022 to 8% in 2023, despite the fact that the use of quadruple therapy, mainly with PPI+C+A+B, remained similar during the study period, accounting for about 15-16% of prescriptions each year.

Over the past two years (2022 and 2023), more than half of those prescribed (54% and 62%, respectively) used standard-dose PPIs, compared with 80% of low-dose PPI use in 2020; similarly, prescriptions for high-dose PPIs accounted for 20% of total treatments in 2020 and 5% in 2023.

Analyzing the data from 2020-2023 on the prescription of proton pump inhibitors, and specifically their dosages, it turns out that in our country the prescription of low doses of this group of drugs predominated (in 1891 patients, 48% of the total group of patients), standard doses were prescribed in 28% of cases (1102 patients), and only 23% (888 patients) were prescribed high doses of proton pump inhibitors, which also does not always correspond to international recommendations and with research data from other countries [2, 8-10].

Guidelines state that the recommended duration of treatment for *H. pylori* infection should be 10 to 14 days. In 2020–2023 in Azerbaijan, the most common duration of *H. pylori* eradication therapy

for first-line therapy was 14 days in 56% (2132 patients), 10 days in 27% (1041 patients). It should be noted that although a treatment duration of 7 days is no longer recommended by international guidelines, it was still found in prescriptions in 17% (650 patients) during 2020–2023 in Azerbaijan. This shift from 7 to 10–14 days of treatment duration was associated both with the adoption of the updated Maastricht/Florence consensus, where a duration of 7 days is no longer recommended, and with active measures in our country on the issues of professional training and retraining of family doctors, internists and gastroenterologists, in particular on the issues of eradication therapy for *H. pylori* infection.

Finally, the strengths and weaknesses of our study should be noted. There is a lack of data on the diagnosis and treatment of *H. pylori* not only in Azerbaijan but also in neighboring countries in the region, so our study contributes to the collection of additional data from the region and points to the most important information about the treatment of *H. pylori.* In addition, although our studies have clearly shown that the diagnosis (eg, no use of C13-UBT) and treatment (e.g., 7-day eradication duration) of H. pylori are only partially consistent with the Maastricht V and VI consensus report, the findings should encourage our clinician's better adherence to recommendations and, as a result, will contribute to improved diagnosis and treatment results for *H. pylori* infection. On the other hand, the main limitations of our study include the lack of adequate diagnostic methods in the country (such as C13-UBT devices); the widespread use of serology not only for the primary diagnosis of *H. pylori,* but also to identify the results of eradication therapy, is a direct failure with on the part of medical workers due to insufficient preventive work and motivation.

Conclusions. After evaluating *H. pylori* eradication regimens, it was concluded that the prescribed eradication regimens were in accordance with international recommendations, although the duration of treatment for *H. pylori* infection was only partially consistent with the Maastricht Recommendation.

Funding. The Hp-EuReg project was promoted and funded by the European Helicobacter and Microbiota Study Group (EHMSG) and received support from the Spanish Association of Gastroenterology (AEG) and the Centro de Investigación Biomédica en Red de Enfermedades Hepáticas y Digestivas (CIBERehd).

The Hp-EuReg was co-funded by the European Union programme HORIZON (grant agreement number 101095359) and supported by the UK Research and Innovation (grant agreement number 10058099). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the Health and Digitial Executive Agency (HaDEA). Neither the European Union nor the granting authority can be held responsible for them.

The Hp-EuReg was co-funded by the European Union programme EU4Health (grant agreement number 101101252).

The Hp-EuReg study was funded by Diasorin, Juvisé and Biocodex; however, clinical data were not accessible and the companies were not involved in any stage of the Hp-EuReg study (design, data collection, statistical analysis, or manuscript writing). We want to thank them for their support.

Competiting interests. Babayeva G.H. has served as speaker SANOFI, ABBOT, KRXA, BERLIN-CHEMIE, Wörwag Pharma, SoPharma, Stada. Mahmudov Umud R. has served as speaker KRXA, OLYMPUS. Mammadov E.E. has served as speaker BERLIN-CHEMIE. Guliyev F.V. has served as speaker KRXA, OLYMPUS. Machanov U.R. has served as speaker SANOFI, BERLIN-CHEMIE, GRINDEX. Gisbert J.P. has served as speaker, consultant and advisory member for or has received research funding from Mayoly, Allergan, Diasorin, Richen, Juvisé and Biocodex. Nyssen O. P. has received has received research funding from Mayoly, Allergan, Juvisé and Biocodex.

Data Availability Statement. All data relevant to the study are included in the article or uploaded as supplementary information. The data supporting the conclusions of this study are not publicly available, as their content may compromise the privacy of research participants. However, previous published data on the Hp-EuReg study, or de-identified raw data referring to current study, as well as further information on the methods used to explore the data could be shared upon request to OPN or JPG, with no particular time constraint. Individual participant data will not be shared.

REFERENCES – ƏDƏBİYYAT – ЛИТЕРАТУРА

1. Malfertheiner P, Megraud F, O'Morain CA, Gisbert JP, Kuipers EJ, Axon AT, et al. Management of Helicobacter pylori infection-the Maastricht V Florence Consensus Report // Gut 2017;66:6–30. doi:10.1136/gutjnl-2016-312288.
2. Malfertheiner P, Megraud F, Rokkas T, Gisbert JP, Liou J-M, Schulz Ch, Gasbarrini A, et al. Management of Helicobacter pylori infection: the Maastricht VI Florence consensus report // Gut 2022;0:1–39. doi:10.1136/gutjnl-2022-327745.
3. Miyaki A, Yamaguchi K, Ida A, Miyauchi T. An assessment of the efficacy of first-line Helicobacter pylori-eradication therapy based on clarithromycin susceptibility // Minerva Gastroenterologica e Dietologica 2016 September;62(3):234-9.
4. Ghotaslou R, Leylabadlo HE, Asl YM. Prevalence of antibiotic resistance in Helicobacter pylori: A recent literature review // World J Methodol. 2015; (5): 164-74.
5. Maev I.V., Andreev D.N. Molecular genetic predictors of resistance to Helicobacter pylori therapy // Therapeutic archive. 2017; 89 (8): 5-12.
6. Simanenkov V.I., Zakharova N.V., Zhebrun A.B., Svarval A.V., Savilova I.V., Ferman R.S. Resistance of Helicobacter pylori to antimicrobial drugs according to the results of bacteriological testing // Therapist. 2015; (4):10
7. McNicholl AG, O'Morain CA, Megraud F, et al. Protocol of the European Registry on the management of Helicobacter pylori infection (Hp-EuReg) // Helicobacter 2019; (24): 5: https://doi.org/10.1111/hel.12630
8. Lerardi E., Losurdo G., La Fortezza R.F., Principi M., Barone M., Di Leo A. Optimizing proton pump inhibitors in Helicobacter pylori treatment: Old and new tricks to improve effectiveness // World J Gastroenterol. 2019; 25(34): 5097–5104.
9. Gao W., Zhang X., Yin Y., Yu S., Wang L. Different dose of new generation proton pump inhibitors for the treatment of Helicobacter pylori infection: A meta-analysis // Int J Immunopathol Pharmacol. 2021; 35: doi: 10.1177/20587384211030397
10. Rojsanga W, Chanpiwat K, Bunchorntavakul C. 7-day High-dose Proton Pump Inhibitor Versus 10-day Standard Concomitant Therapy for Helicobacter pylori Eradication in Thai Patients: A Randomized Controlled Trial // J Med Assoc Thai 2019; 102 (12):12.

XÜLASƏ

AZƏRBAYCANDA BİRİNCİ XƏTT TERAPİYA TƏYİNATLARI: AVROPA HELICOBACTER PYLORI İDARƏETMƏ REYESTRİNİN (HP-EUREG) NƏTİCƏLƏRİ

[1]Babayeva G.H., [2]Mahmudov U.R., [1,3]Məmmədov E.E., [4]Guliyev F.V., [5]Verdiyev E.Kh., [6]Macanov Ü.R., [7]İbişev R.F., [8]Hüseynov H.M., [9]Zalov Z.S., [10]İsmayilova S.Y., [1,11]Həsənov R.A., [12]İbrahimli H.İ., [13]Kano-Katala A., [14]Parra P.P., [15]Moreyra L., [14]Nissen O.P., [16]Meqrod F., [17]O'Moreyn K., [14]Gizbert X.P.

[1]Ə.Əliyev adına Azərbaycan Dövlət Həkimləri Təkmilləşdirmə İnstitutu, Terapiya kafedrası, Bakı, Azərbaycan;
[2]Modern Hospital, qastroenterologiya və endoskopiya şöbəsi, Bakı, Azərbaycan;
[3]MediLand Hospital, qastroenterologiya və endoskopiya şöbəsi, Bakı, Azərbaycan;
[4]Milli Onkologiya Mərkəzi, invaziv diaqnostika və müalicə şöbəsi, Bakı, Azərbaycan;
[5]Mərkəzi Klinika, qastroenterologiya və endoskopiya şöbəsi, Bakı, Azərbaycan;
[6]Gəncə Beynəlxalq Xəstəxanası, qastroenterologiya və endoskopiya şöbəsi, Gəncə, Azərbaycan;
[7]Zəfəran Hospital, qastroenterologiya və endoskopiya şöbəsi, Bakı, Azərbaycan;
[8]Azərbaycan Tibb Universiteti, Onkologiya Klinikası, qastroenterologiya və endoskopiya şöbəsi, Bakı, Azərbaycan;
[9]Istanbul NS Klinika, qastroenterologiya və endoskopiya şöbəsi, Bakı, Azərbaycan;
[10]StarLab Medical Center, qastroenterologiya və endoskopiya şöbəsi, Bakı, Azərbaycan;
[11]German Hospital, qastroenterologiya və endoskopiya şöbəsi, Bakı, Azərbaycan;
[12]Ə.Əliyev adına Azərbaycan Dövlət Həkimləri Təkmilləşdirmə İnstitutu, Səhiyyənin təşkili kafedrası, Bakı, Azərbaycan;
[13]GOES tədqiqat qrupu, Manresa Altaya Xarks Assistent Universiteti, Manresa, İspaniya;
[14]La Princesa Universiteti Xəstəxanası, Princesa Sağlamlıq Tədqiqat İnstitutu (IIS-Princesa), Madrid Muxtar Universiteti (UAM), Qaraciyər və Həzm Xəstəlikləri üzrə Şəbəkə Biotibbi Araşdırma Mərkəzi (CIBERehd), Madrid, İspaniya;
[15]Barselona Mərkəzi Xəstəxanası, Qaraciyər və Həzm Xəstəlikləri üzrə Şəbəkə Biotibbi Araşdırmalar Mərkəzi (CIBERehd), IDIBAPS (Avgust Pi və Sanyer Biotibbi tədqiqatlar institutu), Barselona Universiteti, Barcelona, İspaniya;
[16]INSERM U1312, Bordo Universiteti, Bordo, Fransa;
[17]Dublin Triniti Kolleci, Dublin, İrlandiya

Giriş. Helicobacter pylori ilə əlaqəli mədə zədələnmələri, antibiotiklərin seçimi və terapiyanın müddəti baxımından eradikasiya məsələləri müasir səhiyyənin ən aktual mövzularından biri olaraq qalmaqda davam edir. **Metodlar.**

Məlumatlar Avropa Helicobacter pylori İdarəetmə Reyestrindən (Hp-EuReg) toplanmış və 2020-ci ilin yanvarından 2023-cü ilin may ayına qədər AEG-REDCap-də məlumatların daxil edilməsinin keyfiyyəti yoxlanılmışdır. Müalicə olunmayan bütün hallarda müalicə rejiminin seçimi və terapiyanın müddəti, həmçinin proton pompası inhibitorlarının dozası qiymətləndirilmişdir. **Nəticələr.** Tədqiqat 3898 xəstəni əhatə etdi (67% dispepsiya bildirilmişdir). Üçlü rejimlər ən çox təyin edilmişdir (82%), xəstələrin 54% -ində PPI-klaritromisin-amoksisillin rejimi istifadə edilmişdir. Müalicə müddəti 14 gün (56%), 10 gün (27%) və 7 gün (17%) təşkil etmişdir. **Yekun.** 2020-2023-cü illər üçün H. pylori eradikasiya rejimlərinin təyininatlarında Azərbaycanda Maastrixt tövsiyələrinə qismən əməl edilib.
Açar sözlər: Hp-EuReg, *Helicobacter pylori*, antisekretor terapiya, birinci xət müalicə, vismut, eradikasiya sürəti.

РЕЗЮМЕ

НАЗНАЧЕНИЯ ТЕРАПИИ ПЕРВОЙ ЛИНИИ В АЗЕРБАЙДЖАНЕ: РЕЗУЛЬТАТЫ ЕВРОПЕЙСКОГО РЕГИСТРА ПО МЕНЕДЖМЕНТУ *HELICOBACTER PYLORI* (HP-EUREG)

[1]Бабаева Г.Г., [2]Махмудов У.Р., [1,3]Мамедов Э.Э., [4]Гулиев Ф.В., [5]Вердиев Э.Х., [6]Мачанов У.Р., [7]Ибишев Р.Ф., [8]Гусейнов Г.М., [9]Залов З.С., [10]Исмаилова С.Ю., [1,11]Гасанов Р.А., [12]Ибрагимли Х.И., [13]Кано-Катала А., [14]Парра П.П., [15]Морейро Л., [14]Ниссен О.П., [16]Мегрод Ф., [17]О'Морейн К., [14]Гизберт Х.П.

[1]Азербайджанский Государственный Институт Усовершенствования Врачей имени А.Алиева, кафедра Терапии, Баку, Азербайджан;

[2]Modern Hospital, отделение гастроэнтерологии и эндоскопии, Баку, Азербайджан;

[3]MediLand Hospital, отделение гастроэнтерологии и эндоскопии, Баку, Азербайджан;

[4]Национальный Центр Онкологии, отделение инвазивной диагностики и лечения, Баку, Азербайджан;

[5]Центральная Клиника, отделение гастроэнтерологии и эндоскопии, Баку, Азербайджан;

[6]Международная Больница Гянджа, отделение гастроэнтерологии и эндоскопии, Гянджа, Азербайджан;

[7]Zafaran Hospital, отделение гастроэнтерологии и эндоскопии, Баку, Азербайджан;

[8]Азербайджанский Медицинский Университет, Клиника Онкологии, отделение гастроэнтерологии и эндоскопии, Баку, Азербайджан;

[9]Istanbul NS Klinika, отделение гастроэнтерологии и эндоскопии, Баку, Азербайджан;

[10]StarLab Medical Center, отделение гастроэнтерологии и эндоскопии, Баку, Азербайджан;

[11]German Hospital, отделение гастроэнтерологии и эндоскопии, Баку, Азербайджан;

[12]Азербайджанский Государственный Институт Усовершенствования Врачей имени А.Алиева, кафедра организации здравоохранения, Баку, Азербайджан;

[13]GOES исследовательская группа, Ассистентский университет Алтайя Харкса в Манрезе, Манреза, Испания;

[14]Университетская больница Ла-Принцесса, Научно-исследовательский институт здравоохранения Принцессы (IIS-Princesa), Автономный университет Мадрида (UAM), Сетевой центр биомедицинских исследований заболеваний печени и органов пищеварения (CIBERehd), Мадрид, Испания;

[15]Клиника Барселоны, Центр сетевых биомедицинских исследований заболеваний печени и органов пищеварения (CIBERehd), IDIBAPS (Институт биомедицинских исследований Августа Пи и Суньера), Университет Барселоны, Барселона, Испания;

[16]INSERM U1312, Университет Бордо, Бордо, Франция;

[17]Тринити-Колледж Дублин, Дублин, Ирландия.

Введение. Поражения желудка, ассоциированные с Helicobacter pylori, вопросы эрадикации с точки зрения выбора антибиотиков и продолжительности терапии, продолжают оставаться одной из наиболее актуальных тем в современном здравоохранении. **Методы.** Данные были собраны из Европейского реестра по менеджменту Helicobacter pylori (Hp-EuReg) и проверены на качество ввода информации, с января 2020 года по май 2023 года в AEG-REDCap. Во всех случаях, ранее не получавших лечения, оценивались выбор схем и продолжительности терапии, а также дозировка ингибиторов протонной помпы. **Результаты.** В исследование

были включены 3898 пациентов (67% сообщили о диспепсии). Чаще всего назначались тройные схемы (82%), схема ИПП-кларитромицин-амоксициллин применялась у 54% пациентов. Продолжительность лечения составила 14 дней (56%), 10 дней (27%) и 7 дней (17%). **Заключение.** Назначенные схемы эрадикации H. pylori в период 2020–2023 гг. в Азербайджане частично соответствовали Маастрихтским рекомендациям.
Ключевые слова: Hp-EuReg, Helicobacter pylori, антисекреторная терапия, лечение первой линии, висмут, скорость эрадикации.

Redaksiyaya daxil olub: 08.11.2023
Çapa tövsiyə olunub: 29.11.2023
Rəyçi: professor N.A.Fərəcova