

Screening, Diagnosis and Treatment of Patients Infected with *Helicobacter Pylori* by General Practitioners in Picardie: Results of a Cross-Sectional Observational Study

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Keywords:

Helicobacter pylori; General medicine; Gastroenterology; Observation study; Gastric ulcer; Antibiotherapy

Abbreviations:

GERD : Gastroesophageal Reflux Disease ; GHPSO: Groupe Hospitalier Public Du Sud De l'Oise; HAS: Haute Autorité De santé; H.pylori: *Helicobacter Pylori*; NSAID: Non-Steroidal Anti-Inflammatory Drug; PPI: Proton Pump Inhibitors; PUD: Peptic Ulcer Disease; q: Question; RR: Relative Risk; UGE: Upper Gastrointestinal Endoscopy; WHO: World Health Organisation

1. Abstract

1.1. Introduction: One of the roles of the general practitioner is to spot, treat and verify the eradication of the *H. pylori* infection. The aim of this study was to carry out an inventory of the management of the *H. pylori* infection by the general practitioners from Picardie.

1.2. Physicians and Methods: The method which was chosen was a transversal observational study relying on a preestablished questionnaire with multiple choices and single answer questions. The questionnaire was sent to general practitioners working in Picardie-France by e-mail and was later analysed through the help of a R software. The tests which purposes were to compare the proportions of the responses to the questionnaire were carried out at the alpha significance level of 0.05 by Chi-square test or by Fisher's exact test when the number of responses was inferior or equal to 5.

1.3. Results: 89 physicians responded to the questionnaire. 75% of the doctors said they felt comfortable in managing the infection, a likelihood which increased the more when the respondents were experienced physicians. The first reasons for a screening to be done were pyrosis/gastroesophageal reflux disease and the gastric ulcer-like clinic. Both the gastroenterologist and the general practitio-

er were in charge of the prescription of an antibiotic therapy. 51% of the doctors prescribed quadritherapy with bismuth, 28% prescribed tritherapy (AMOXICILLIN + CLARITHROMYCIN+IPP). 94% of the physicians checked that the infection had been eradicated, mostly after 4 weeks after the treatments were stopped and by a testing with marked urea.

1.4. Conclusion: The coordination between the general practitioner and the gastroenterologist is essential in the management of the *H. pylori* infection. The recommendations were well followed, and the fact the physicians were experienced or not could influence the choice of an antibiotic therapy.

2. Introduction

The *Helicobacter pylori* is a Gram-negative spiral bacillus, its prevalence is estimated at around 20 and 25% in France [1]. It varies according to the population studied, which corresponds to 80% in Africa [2] and 50% worldwide [3]. The reservoir of the *Helicobacter pylori* is the human stomach and there are two modes of transmission: the first one is the oral transmission through a direct contact with the infected saliva, through regurgitation or within minutes of vomiting [4]. The second mode of transmission is the fecal-oral

transmission in developing countries through diarrhoea which reduces the transit time.

This bacterium is identified in the genesis of several digestive pathologies: dyspepsia, gastritis, peptic ulcers and gastric cancers, which explains why it is recognised by the WHO as the only carcinogenic bacterial species. Its role is also recognised in some extradigestive pathologies such as the iron deficiency anaemia, the vitamin B12 deficiency and the thrombocytopenic purpura.

The general practitioner plays an important part in screening for gastric cancer, identifying patients at risk and prescribing further investigations for the *H. pylori*. The indications for the testing of this bacterium are to be found in Table 1 [5].

The diagnosis is obtained either by a culture of the bacteria [6] via a UGE, or by an indirect identification of the bacteria via a breath test.

The treatment is probabilistic (without resistance testing) and is based on 14 days of concurrent therapy (PPI+AMOXICILLIN+CLARITHROMYCIN+METRONIDAZOLE) or 10 days of therapy with bismuth (PPI+bismuth salt+TETRACYCLIN+METRONIDAZOLE) [7].

A verification of the eradication of the bacterium is mandatory and must be done at least 4 weeks after stopping the treatment (4 weeks after stopping the antibiotics and 2 weeks after stopping PPIs) by a labelled urea breath test. The sensitivity of this test is estimated at 96% and its specificity at 94% [8].

The purpose of this study is to carry out an inventory of the knowledge of the management of the *H. pylori* by the general practitioner practising in Picardie, its impact in the screening, the treatment and the verification of the eradication of the infection.

3. Materials and Methods

3.1. Population

This is a population-based observational epidemiological study about general practitioners in Picardie. The sampling is non-probabilistic. The doctors who took part in the study are the university lecturers at the University of Picardie Jules Vernes (121 doctors) as well as the doctors who have a TSA assistance (a tele-secretarial platform installed in the Oise region) as their secretariat (68 doctors), i.e. a total of 189 doctors. There are no exclusion criteria.

3.2. Data Collection

The questionnaire was created on the basis of the Maastricht V guidelines to assess the practice of general practitioners in the management of the *H.pylori*. The questionnaire consisted of 13 questions which were either single response or multiple-choice questions. The questions were mostly of the Yes/No answer type, however some

questions included an “Other answers” box and allowed doctors to write a more detailed answers, these were open-ended questions.

The questionnaire was sent to the GPs in the shape of a Google Forms via their email addresses.

The questionnaire was sent out on 9 July 2020 and responses were collected until 27 September 2020. The responses were collected regardless of the email addresses of the respondents, so the answers are anonymous.

3.3. Data Analysis

All the data was collected by means of the Excel tool, and the statistical analyses were carried out using a R software. The tests of comparisons of the proportion responses to the questionnaire responses were performed at the 0.05 alpha significance level using the Chi-2 test or Fisher’s exact test when the number of responses was inferior than or equal to 5. Since this study is a non-interventional one about professional practices, this study is outside the scope of the Jardé law and was not referred to to the committee for the protection of individuals.

3.4. Questionnaire

The questionnaire is available in Appendix 1 and consisted of multiple choice and single open-ended questions. Some questions were about how long the doctors had been exercising their profession, the reasons for screening for the *H.pylori* infection, the examination used for screening, the antibiotic therapy undertaken and its duration, as well as the procedures for verifying the eradication of the infection that were chosen.

4. Results

From 9 July 2020 to 27 September 2020, 189 doctors participated in the survey, 89 responded to the questionnaire, which corresponds to a participation rate of 47.1% (Figure 1).

4.1. How long have the doctors exercised in the medical profession

Figure 2 shows the classification of the doctors according to how long they have started their service in the profession. Among the 89 doctors, 21 (23.6%) had been in the medical profession for less than 5 years, 11 (12.4%) had been in the medical profession for 5 to 9 years, 14 (15.7%) had been in the medical profession for 10 to 19 years, 22 (24.7%) had been in the medical profession for 20 to 29 years (the most represented group), and 21 (23.6%) had been in the medical profession for 30 years or more. For the rest of the study, we will separate the doctors into two groups (Table 2) in order to carry out a comparative analysis: One group corresponding to less than 20 years of practice (i.e. 46 doctors (51.7%)) and the other group corresponding to 20 years or more of practice (i.e. 43 doctors (48.3%)).

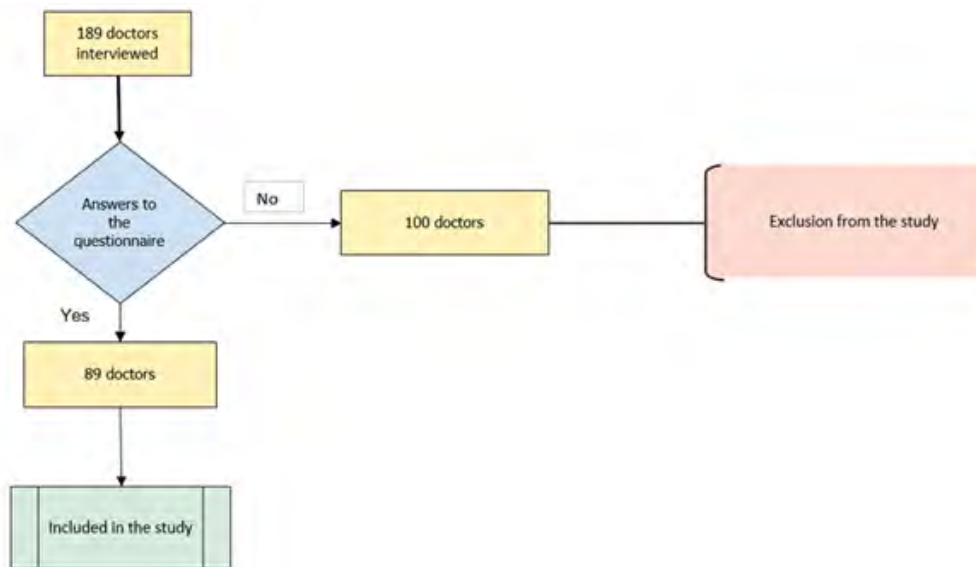


Figure 1: Inclusion criteria

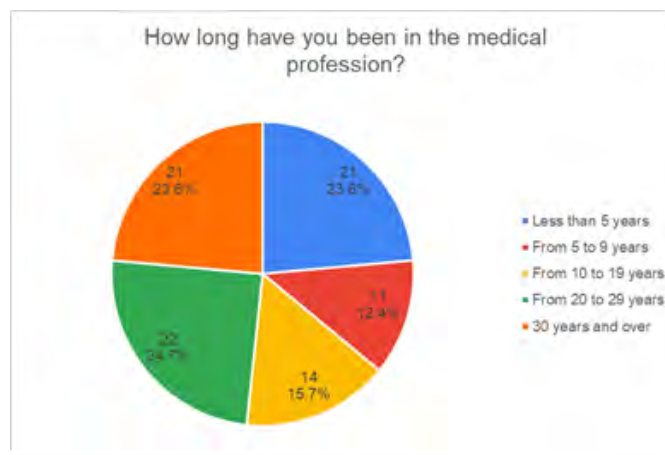


Figure 2: Representation of the doctors according to the number of years of experience in the profession

Table 1: Indications for the *H. pylori* testing

Indications for the <i>H. pylori</i> testing
- peptic ulcer
- MALT lymphoma
- primary prevention of PUD before NSAIDs
- chronic dyspepsia
- long-term PPI treatment of at least 6 months
- family history of first-degree gastric cancer
- mutation of DNA repair genes (Lynch syndrome)
Pre-neoplastic gastric mucosal lesion
- history of localized gastric cancer resection
- iron deficiency anaemia with no known cause
- vitamin B12 deficiency without a known cause
- adult idiopathic thrombocytopenic purpura
- prevention of gastric cancer in bariatric surgery

Table 2: Representation of the doctors by years of experience in the profession

How long have you been in the medical profession?	89
Less than 20 years	46 (51,7%)
20 years and over	43 (48,3%)

4.2. How do the respondents feel regarding the management of the pathology ?

67 respondents, in other words 75.3% of the physicians reported feeling comfortable managing the H.pylori infection, in comparison to 22 which stands for 24.7% of the physicians who reported feeling uncomfortable managing the infection.

4.3. Indication for screening for the H.pylori infection

83 doctors (93.3%) (Figure 3) replied that they screened for the infection in the presence of pyrosis or GERD resistant to treatment ; 76 doctors (85.4%) chose to do this screening when facing with clinical signs that could be attributed to gastric ulcers, which were the most frequent reasons given by these doctors, followed by biological abnormalities (iron deficiency anaemia with an unknown cause, a vitamin B12 deficiency or other biological abnormalities) for 37 doctors (41.6%), then a family history of gastric cancer for 31 doctors (34.8%).

At last, 22 doctors (24.7%) mentioned another reason: a check-up before starting a long-term treatment with NSAIDs for 7 doctors (7.9%) and a check-up before starting a long-term treatment with an antiaggregant or anticoagulant for 2 doctors (2.2%). The other reasons that were mentioned in the free text response were: a dry cough, predominantly nocturnal for 6 doctors (6.9%), 3 doctors (3.4%) replied that they chose to have this screening done at the request of the gastroenterologist, 3 doctors (3.4%) replied that they decided to have the screening done an H.pylori infection (“post H.pylori infection”, “history of H.pylori infection”, “check-up after a treatment or if the symptoms reappear”) 1 physician (1.1%) responded that they screened for “ family history of BPH “.

4.4. Carrying out the additional examinations

Among the 89 doctors surveyed, almost all of them, that is to say 88 or 98.9%, said that they carried out additional tests when they suspected a H.pylori infection, only one doctor (1.1%) said that he did not carry out additional tests and started a treatment without evidences.

4.5. Type of additional examinations which were performed

The majority of the physicians interviewed through the survey requested a UGE, 53 (59.6%) (Figure 4) of them did so. 24 physicians (27%) reported performing a labeled urea test for the H.pylori infection. 11 physicians (12.4%) reported performing a serology for anti-Helicobacter IgG antibodies. 1 physician (1.1%) reported seeking advice from the gastroenterologist. No doctor chose to test for Helicobacter pylori antigens in the stool.

4.6. Place of the UGE in the management of the H.pylori infection

Among the 89 practitioners surveyed, 74 (83.1%) said that the UGE is part of the management of the H.pylori infection, 10 (11.2%) said that UGE is not part of the management of H.pylori infection and 5 (5.6%) answered they did not know.

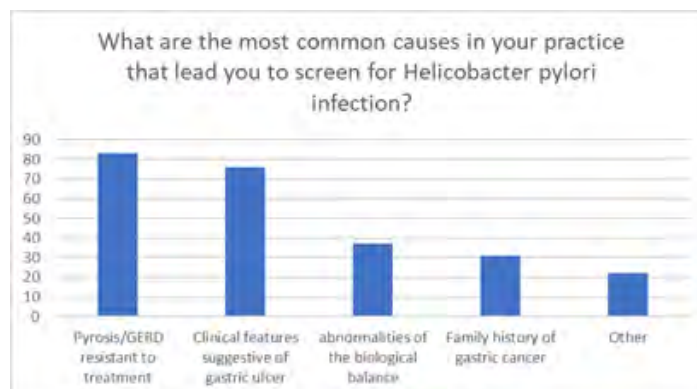


Figure 3: Reasons for the doctors to screen for the Helicobacter pylori infection

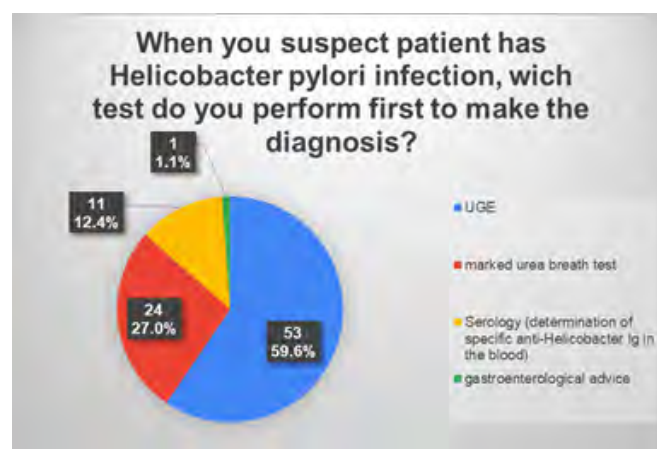


Figure 4: Testing for suspected the H.pylori infection

4.7. Which doctor prescribes the treatment?

Whenever the Helicobacter pylori infection is diagnosed, do you or the gastroenterologist prescribe the treatment?

To this question (Figure 5) the majority of the doctors responded to a sharing of the antibiotic management between themselves and the gastroenterologist (combination of “Sometimes you” and “Sometimes the gastroenterologist” answers), if we add the responses “Sometimes you” on the one hand and “Sometimes the gastroenterologist” on the other hand isolated from the category “Sometimes you, sometimes the gastroenterologist”, we obtain the following results (Figure 6):

Among the 89 doctors, 68 (76.4%) answered at least once “Sometimes you” or “Sometimes the gastroenterologist”, which shows that the two specialists share the responsibility for prescribing an antibiotic therapy. 17 doctors (19.1%) replied that they were always the

ones prescribing the antibiotics, 3 doctors (3.4%) replied that the gastroenterologist was always the one prescribing the antibiotics. 1 doctor (1.1%) answered with the combination “Sometimes you” and “Always the gastroenterologist” to the question of who prescribed the antibiotic therapy.



Figure 5: Doctor prescribing the antibiotic therapy

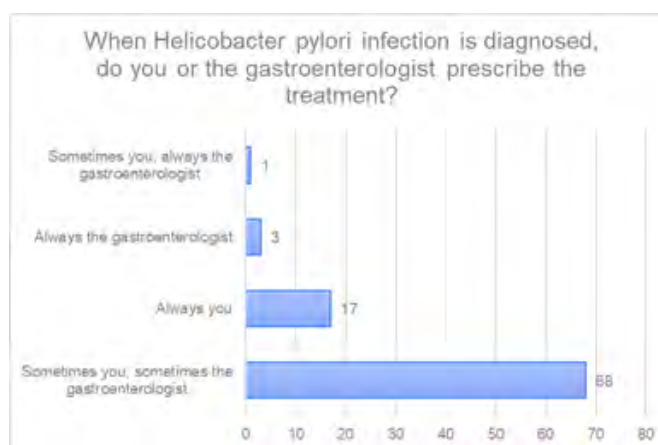


Figure 6: Distribution of the antibiotic prescription between the GP and the gastroenterologist

4.8. Choice of antibiotic therapy

Among the 89 doctors who responded to the survey, the majority of them which corresponds to 45 of them (50.6%) replied that they resorted to a quadruple therapy with bismuth (Figure 7); 25 doctors (28.1%) preferred to resort to AMOXICILLIN+CLARITHROMYCIN+IPP ; 14 doctors (15.7%) resorted to the “concomitant” quadritherapy of AMOXICILLIN+METRONIDAZOLE+CLARITHROMYCIN+IPP; 1 doctor (1.1%) replied that he resorted to a dual therapy of AMOXICILLIN+IPP; 3 doctors (3.4%) replied with a free text answer mentioning that they were looking at the current recommendations: “I check the current validated protocol” mentioned twice and “I look for the current recommendations to follow on Antibiotic (it changes on a regular basis) and I follow the recommended procedure of that time”, these 3 answers were grouped together in the item “checking the recommendations”. To finish, 1 doctor (1.1%) replied with a free text answer that he managed the treatment according to the antibiogram.

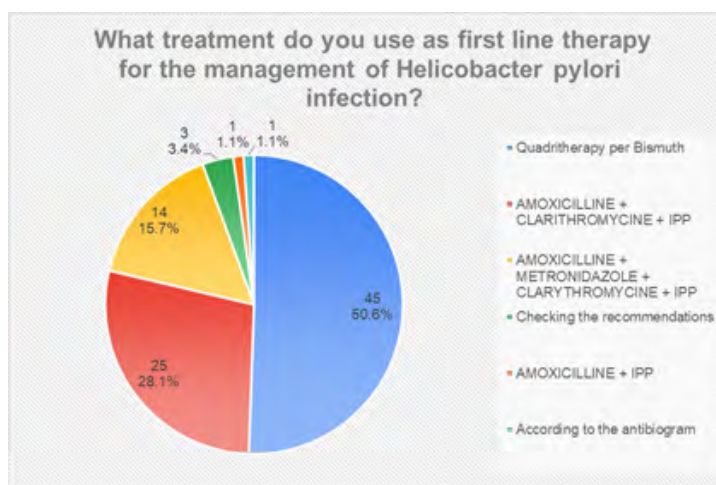


Figure 7: Choice of the antibiotic therapy

4.9. Prescription time for the antibiotics

In our study, the number of days of antibiotic therapy should be separated according to the antibiotic therapy prescribed:

The 45 doctors who prescribed a bismuth quadruple therapy (Pyl-*era*+IPP) prescribed it for an average of 11.5 days with a standard deviation of 5.4 days. The mode (most quoted answer) was 10 days for 33 out of these 45 doctors, i.e. 73%, so the majority answered 10 days (Figure 8). The other answers were: 2 days for 2 doctors, 7 days for 1 doctor, 14 days for 5 doctors, 21 days for 1 doctor, 28 days for 2 doctors and 30 days for 2 doctors.

The 25 doctors who prescribed a triple therapy with AMOXICIL-LIN+CLARITHROMYCIN+IPP prescribed it on average for 11.6 days with a standard deviation of 6.6 days. The mode was 10 days for 15 of these 25 doctors, i.e. 60% of them. The other answers were: 7 days for 3 doctors, 8 days for 1 doctor, 14 days for 5 doctors and 42

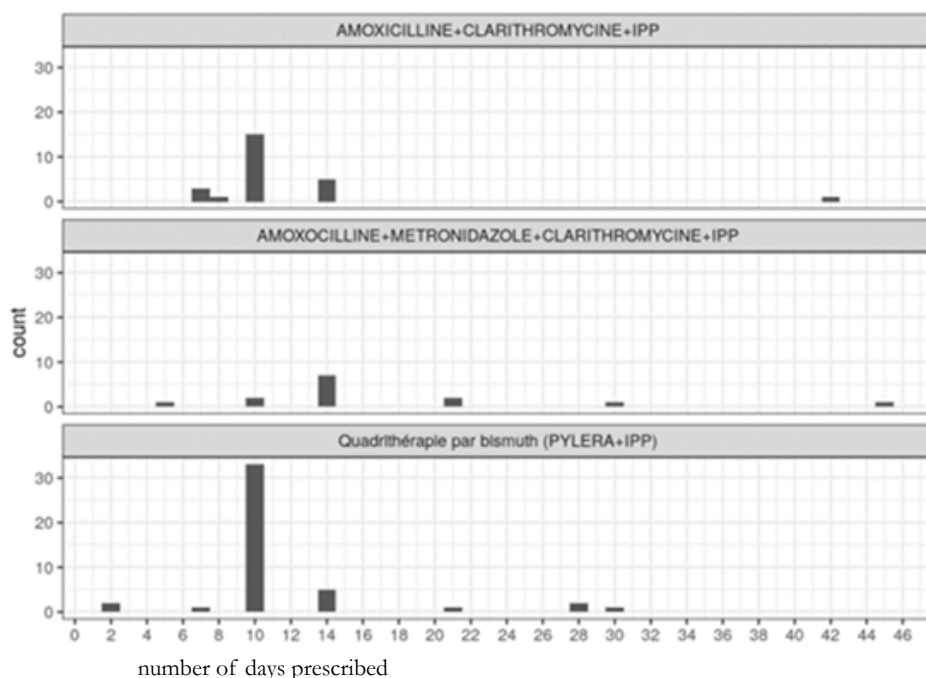
days for 1 doctor.

The 14 doctors who prescribed a “concomitant” quadritherapy with AMOXICILLIN+METRONIDAZOLE+CLARITHROMY-CIN+IPP prescribed it for an average of 17.1 days with a standard deviation of 9.96 days. The mode was 14 days for 7 of these 14 doctors, i.e. 50%, so the majority answered 14 days. The other responses were: 5 days for 1 doctor, 10 days for 2 doctors, 21 days for 2 doctors, 30 days for 1 doctor and 45 days for 1 doctor.

The doctor who prescribed an antibiotic therapy with AMOXICIL-LIN+IPP prescribed it for 14 days.

4.10. Verification of the eradication of the *H.pylori* infection

Among the 89 physicians who responded to the survey, 84 (94.4%) in other words the majority of them reported checking for the *H.pylori* eradication (Figure 9) while only 5 physicians which corresponds to 5.6% of them reported not checking for the *H.pylori* eradication.



Which treatment do you use as first line ?	Number	Average	SD	Min	Max	Mode
AMOXICILLINE + CLARITHROMYCINE + IPP	25	11,64	6,67	7	42	10
AMOXICILLINE + METRONIDAZOLE + CLARITHROMYCINE + IPP	14	17,14	9,96	5	45	14
Quadrithérapie per Bismuth	45	11,51	5,4	2	30	10

Figure 8: Prescription duration according to the antibiotic therapy

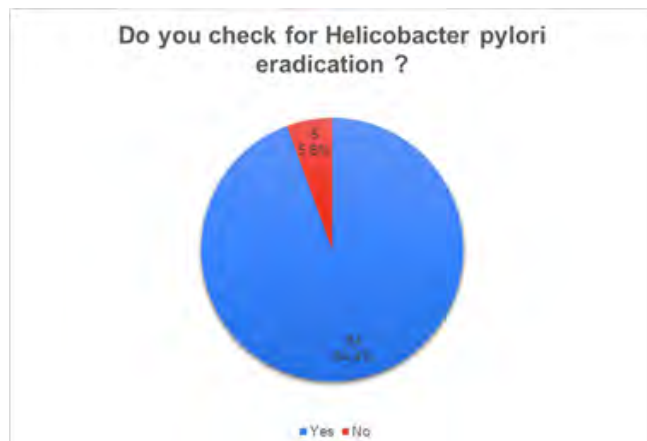


Figure 9: Verification of eradication of the H.pylori eradication

4.11. How long the doctors take to verify the eradication of the H.pylori

All the doctors who answered “Yes” to the previous question provided an answer to this question and all those who answered “No” did not give an answer to this question.

Among the 84 doctors who reported checking for the H.pylori eradication, the main responses were: 5 doctors checked for its eradication after 2 weeks off treatment, the majority of the doctors (31 doctors) checked for its eradication after 4 weeks off treatment, 9 doctors checked for its eradication after 8 weeks off treatment, 6 doctors checked for its eradication after 28 weeks off treatment, 10 doctors checked for its eradication after 30 weeks off treatment.

4.12. What were the means used to verify the eradication of the H.pylori infection

1 doctor who answered he did not check for the eradication of the H.pylori infection answered this question, his answer was excluded from the analysis, moreover, 2 doctors who answered they had checked for the eradication of the H.pylori did not answer this question, so the result is based on 84-2 which means 82 answers.

Among the 82 physicians who responded to this question, 78 (95.1%) verified the H.pylori eradication by a labeled urea test (Figure 10), 2 physicians (2.4%) responded by using both the labeled urea test and the UGE to verify the eradication of the infection. 1 physician (1.2%) used the serology and 1 physician (1.2%) used the UGE to verify eradication of the infection.

4.13. How to react in the case of a resistance to a first antibiotic therapy

Among the 89 doctors questioned, after a failure of a first intake of antibiotics, the doctors were divided according to the behaviour they had to adopt (Figure 11): 46 doctors (51.7%) replied that they would refer the patient to a gastroenterologist and 43 doctors (48.3%) replied that they would change the antibiotic therapy.

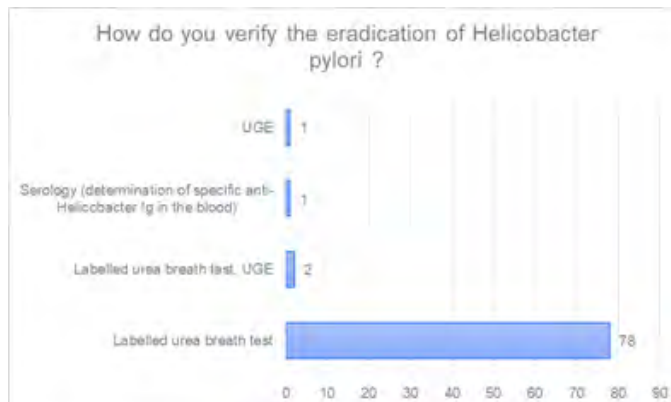


Figure 10: Means used to verify the eradication of the H.pylori infection

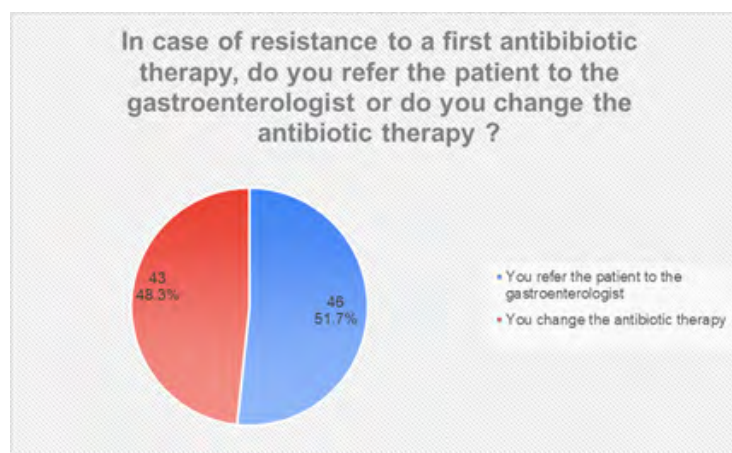


Figure 11: Behaviour in case of a resistance to a first antibiotic therapy

4.14. Influence of the time the doctors spent exercising in the medical profession

The first question separated the doctors into two categories: less than 20 years of experience and more than 20 years of experience in the medical profession in order to calculate the relative risks associated with responding to a proposal between the two categories:

The relative risk (RR) of being comfortable managing the H.pylori is $86/65.2=1.32$ (Table 3). This means that there is a 32% chance of being more comfortable in the management of the H.pylori if one has 20 years or more experience in the profession, which is significant with a p-value of 4.2%.

$RR=34.8/14=2.49$. Similarly, one is 2.49 times more likely to feel uncomfortable if one has less than 20 years experience in the profession with a p-value of 4.2%.

As for the tests ordered between the different age groups, the highest relative risk is $RR=15.2/9.3=1.63$. There is a 1.63 times greater chance of requesting a serology in the first instance if one has less than 20 years experience in the profession (Table 4). This result is not significant, p-value=71.1%.

The responses are also close between the different age groups, the highest relative risk is $RR=15.2/6.98=2.18$. There is a 2.18 times greater chance of saying that the UGE is not part of the management of the H.pylori if one has less than 20 years experience in the medical profession (Table 5).

The specialist prescribing antibiotics did not change according to the professional experience (Table 6), the 2 groups provided similar responses with a p-value = 1.

Concerning the antibiotic therapy prescribed according to the seniority in the medical profession (Table 7), we can note a difference, the RR of prescribing AMOXICILLIN+METRONIDAZOLE+CLARITHROMYCIN+IPP in the first place corresponds to $23.9/6.98=3.42$. There is a 3.42-fold increase in the chance of prescribing a "concurrent" quadruple therapy when there is less than 20 years experience in the profession. This result does not show a

significant p-value = 5.3%, but it can still be stated with a risk of error of 5.3% which is low.

$RR=32.6/23.9=1.36$. There is a 36% higher chance of prescribing AMOXICILLIN+CLARITHROMYCIN+IPP as first-line treatment when one has 20 years or more experience in the profession, with a p-value of 5.3%.

$RR=58.1/43.5=1.34$. There is a 34% higher chance of prescribing bismuth quadruple therapy when one has 20 years or more experience in the profession, with a p-value of 5.3%.

Finally, in case of a resistance to a first antibiotic therapy, the responses are close between the different age groups (Table 8), the highest relative risk corresponds to $RR=56.5/46.5=1.22$. There is a 22% higher chance of referring the patient to the gastroenterologist after a first antibiotic failure when one has less than 20 years of experience in the profession. This result is not significant, p-value=46.4%.

Table 3: Perceived comfort according to the seniority in the profession

Are you comfortable with the management of Helicobacter pylori infection?	Less than 20 years	20 years and over	P. overall
No	16 (34,8%)	6 (14,0%)	0,042
Yes	30 (65,2%)	37 (65,2%)	

Table 4: Type of examination prescribed according to the seniority in the profession

With a suspected Helicobacter pylori infection, which test do you perform first to make the diagnosis?	Less than 20 years	20 years and over	P. overall
gastroenterological advice	0(0,0%)	1 (2,3%)	0,711
UGE	27 (58,6%)	26 (60,5%)	
Serology (determination of specific anti-Helicobacter Ig in the blood)	7 (15,2%)	4 (9,3%)	
marked urea breath test	12 (26,1%)	17 (27,9%)	

Table 5: Place of the UGE in the management of the infection according to seniority in the profession.

In your opinion, is UGE part of the management of Helicobacter pylori?	Less than 20 years	20 years and over	P. overall
Don't know	2 (4,4%)	3 (7,0%)	0,52
NO	7 (15,2%)	3 (7,0%)	
Yes	37 (80,4%)	37 (86,0%)	

Table 6: Specialist prescribing the antibiotic therapy according to the seniority in the profession.

When Helico bacter pylori infection is diagnosed, do you or the gastroenterologist prescribe the treatment?	Less than 20 years	20 years and over	P. overall
Sometimes you, always the gastroenterologist	1 (2,2%)	0 (0,0%)	1
Sometimes you, Sometimes the gastroenterologist	34 (73,9%)	34 (79,1%)	
Always the gastroenterologist	2 (4,4%)	1 (2,3%)	
Always you	9 (19,6%)	8 (18,6%)	

Table 7: Antibiotic therapy prescribed according to the seniority in the profession.

What treatment do you use as first line therapy for the management of Helicobacter pylori infection?	Less than 20 years	20 years and over	P. overall
AMOXICILLINE + CLARITHROMYCINE + IPP	11 (23,9%)	14 (32,6%)	0,053
AMOXICILLINE + IPP	0 (0,0%)	1 (2,3,%)	
AMOXICILLINE + METRONIDAZOLE + CLARITHROMYCINE + IPP	11 (23,9%)	3 (7,0%)	
According to the antibiogram	1 (2,2%)	0 (0,0%)	
Checking the recommendations	3 (6,5%)	0 (0,0%)	
Quadritherapy per Bismuth	20 (43,5%)	25 (58,1%)	

Table 8: Attitude to adopt in case of a resistance to a first antibiotic therapy according to the seniority in the profession.

In case of resistance to a first antibiobiotic therapy, do you refer the patient to the gastroenterologist or do you change the antibiotic therapy	Less than 20 years	20 years and over	P. overall
You change the antibiotic therapy	20 (43,5%)	23 (53,5%)	0,464
You refer the patient to the gastroenterologist	26 (56,5%)	20 (46,5%)	

5. Discussion

Gastric cancer is a common disease in France with 6600 incident cases in 2017 [9]. The 5-year survival rate varies from 16 to 20% and the number of stable cases is increasing [10]. However, this cancer can be avoided because the eradication of the *H.pylori* could reduce the incidence of this cancer by more than 30% [11]. Therefore, the general practitioner plays a very important part in eradicating the bacteria.

In this study about 89 general practitioners practising in Picardie, different age groups among the doctors are represented, the groups are approximately equal in number for those less than 20 years of practice in the medical profession and those with more years of practice. The majority (75.3%) of the doctors felt comfortable with the management of the *H.pylori* infection, and this feeling of ease in the management of the infection increased according to how long the doctors were practising their profession..

The most common reason for requesting a UGE screening was a GERD/pyrosis, the second most common reason was whether the clinic suggested an ulcer, one doctor replied that he requested a screening because of “a family history of BPH” but did not specify the meaning of “BPH”, it could be the *Helicobacter pylori*.

Almost all (98.9%) of the physicians who participated in the survey perform additional tests to detect the *H. pylori* infection and the majority (59.6%) do so as a first choice of defence as it is recommended by the UGE. The *H.pylori* infection and the majority (59.6%) do so in the first place as it is recommended by the UGE, however this attitude is not unanimous: 27% will start with a labeled urea test and 12.4% with serology, these tests may be easier to access, faster and less invasive, moreover the labeled urea test is very reliable to detect the *H.pylori* infection even when it is chronic unlike the serology. Furthermore, according to the new recommendations, a labeled urea breath test can be used for patients under 45 years of age with a first-degree history of gastric cancer without genetic mutation. Finally, faecal antigens can be used as a means of screening for children if the histological examination is the only one available [12].

Among the 36 physicians who responded that they did not perform a UGE as a first line procedure, 8 responded that a UGE was not part of the management of the *H.pylori* infection and 2 did not know. If we subtract these 10 doctors from the 36 doctors who said they did not perform a UGE as a first-line procedure, we can assume that 26 (=36-8-2) will perform it at some other point in the management of the infection, assuming that those who said they did not know will not perform it.

In addition, regarding the place of the UGE in the management of the *H.pylori* infection, among the 53 doctors who answered that the UGE was the first line examination to be performed, 2 answered that the UGE was not part of the management of the *H.pylori* infection and 3 answered that they did not know. *pylori* infection and 3 answered that they did not know, these answers are contradictory, it is probably the result of an error of interpretation of the questions, if we convert these 5 answers into “yes, UGE is part of the management of *H.pylori*”, we obtain the following results:

After this adjustment, of the 89 doctors, 79 (88.8%) (Figure 12) thought that the UGE is part of the management of the *H.pylori* infection. 8 (9%) thought it was not part of the management of the infection and 2 (2.2%) did not know.

For 76.4% of the doctors questioned, the prescription of an antibiotic therapy is shared between them and the gastroenterologist. This shows the need for a correspondence between the two specialists.

The majority of the doctors (50.6%) prescribed a bismuth quadruple therapy with a duration of 10 days in the first place as it is recommended. As a second option, the doctors suggested a triple therapy with AMOXICILLINE+CLARITHROMYCINE+IPP for 10 days, which corresponds to an old recommendation: Maastricht III (2007) (13) The 10-day duration may also correspond to this recommendation or to the Maastricht IV (2012) recommendation (6) which advocated a sequential treatment: 5 days AMOXICILLIN+IPP then 5 days PPI+METRONIDAZOLE+CLARITHROMYCIN. There was also a non-significant tendency to prescribe AMOXICILLIN+CLARITHROMYCIN+IPP if one had 20 years or more experience in the profession with an RR (compared to those with 20 years of experience in the profession) of 1.36 and a p-value of 5.3%. Quadruple therapy with AMOXICILLIN+CLARITHROMYCIN+METRONIDAZOLE+IPP was chosen by 15.7% of the doctors, although it was also the first-line treatment, with bismuth being widely cited first. In addition, we can observe a non-significant tendency to prescribe this quadritherapy if one has less than 20 years of experience in the profession with an RR (compared to those with 20 years or more experience in the profession) of 3.42 and a p-value of 5.3%.

Almost all the physicians (94.4%) verified eradication of the *H.pylori* eradication and did so by a labeled urea test, as it is suggested in the recommendations, however the time to verify the eradication of the infection after the treatment as been stopped was an issue when processing the responses, The responses were requested within the weeks of the treatment cessation before verification of the eradication of the bacteria was verified and 25 responses were greater

than 10 weeks, which does not seem very consistent, so if we decide to modify all the responses greater than 10 weeks by considering that the doctors had responded in number of days, we obtain the following modifications: 15 was modified into 2 weeks, 28 and 30 were modified into 4 weeks, 40 was modified into 6 weeks, 60 into 6 weeks, 90 into 13 weeks and 120 into 17 weeks. One doctor answered “1 month” and it was modified into 4 weeks, 1 doctor answered “2 months” and it was modified into 8 weeks. One doctor answered “At least 28 days after stopping the TBA and 14 days after stopping the PPI”, his answer was modified into 4 weeks, and finally one doctor answered 4 to 8 weeks, his answer was modified into 4 weeks. After these modifications, the following results were obtained (Figure 13):

Among the 84 physicians who reported checking for the H.pylori eradication, an average eradication of the bacteria was achieved within 4.87 weeks. The majority, 52 physicians (61.9%) verified its eradication 4 weeks after the treatment was stopped. 13 doctors (15.5%) checked its eradication 8 weeks after the treatment was stopped. 8 doctors (9.5%) checked its eradication 2 weeks after the treatment was stopped. 2 doctors (2.4%) verified its eradication 3 weeks after the treatment was stopped.

We can criticise the fact that we modified the answers above 10 by considering that the doctors had answered back then in numbers of days (similarly to the question about the number of days of treatment by antibiotic therapy) and not in number of weeks, it resulted nevertheless in 26 among the 84 answers, among these 26 answers, we can note 3 answers “15”, all the other answers being superior or equal to 28. However, the choice of leaving 10 in week and to modify the higher values by considering that they were expressed in number of days is personal. Converting “10” to 1.5 weeks seems inconsistent as it implies a period of time to verify the eradication of the H.pylori. Besides, similarly leaving “15” in number of weeks seems to be an excessive period of time to verify the eradication of the infection.

Finally, in case of a failure with a first antibiotic treatment, the doctors’ opinions were divided, with 51.7% saying that they referred the patient to a gastroenterologist and 48.3% of them changing the antibiotic treatment.

Our study is a prospective one, the method of collecting questionnaires using Google Forms allows the answers to be anonymous and avoids the loss of some questionnaires, the medium being digital. It is a self-administered questionnaire addressed to the doctors, so there is no influence from a third party. The questionnaire is short (13 questions), which helps reducing the doctor’ fatigue completing it.

This study shows a selection bias, only the people in charge of the training at university and the doctors attached to the company TSA assistance answer the questions, it can therefore be said that the study is monocentric and the results cannot be extrapolated to the entire France. The collection period is short (3 months) and the participation rate is 47%, however, after a reminder addressed to the doctors, the participation rate only increased slightly, which led to the study being closed.

A study on the practice of general practitioners in Guadeloupe on the management of patients infected by the H.pylori was carried out in 2017 [14]. It is based on the work of 117 general practitioners in Guadeloupe. The reasons for looking for the H.pylori infection were similar: a former or current peptic ulcer for 70% of the doctors, a non-ulcer epigastralgia for 70% of the doctors, an anaemia due to a martial deficiency or a B12 deficiency with no cause found for 30% of the doctors. However, some answers were quoted more in comparison to our study: a family history of gastric cancer for 50% of the doctors, a long-term NSAID use for 22% of the doctors, a long-term aspirin intake for 10% of the doctors. Finally, some answers which are quoted in Guadeloupe were not quoted in our study: taking PPI for more than 6 months for 35% of the doctors (but this answer can be compared to the answer “pyrosis or GERD resistant to the treatments” in our questionnaire), a history of H.pylori concerning a relative for 30% of the doctors.

In Guadeloupe, the first-line test for the H.pylori was the marked urea test for 60% of the doctors and the UGE for 55% of the doctors. This could be explained by the lack of access to the UGE in Guadeloupe or because the question was associated with a multiple choice answer whereas in our questionnaire it was a single choice answer one.

The most prescribed first-line treatment was a sequential therapy for 55% of the doctors, which is close to the Maastricht IV recommendation (6). While the triple therapy was prescribed by 18% of the doctors, the bismuth quadruple therapy was prescribed by 10% of the doctors and the non-bismuth quadruple therapy was prescribed by 5% of the doctors. In comparison to our study, the one from Guadeloupe shows a change in the antibiotic therapy by the doctors, which could be explained by the difference in location of the two studies or by a change in the treatment recommended by the doctors following the Maastricht V recommendations of 2015, the study from Guadeloupe dates from 2017, back then the doctors benefited from less time to update their practice in comparison to our study, moreover, the changes in the recommendations were numerous: 6 Maastricht conferences in 20 years!

In Guadeloupe, 73% of the doctors declared they checked for the H.pylori eradication, 24% did so sometimes and 3% never checked. In the Picardie study, the choice “sometimes” was not offered but 94.4% of the doctors declared to check the H.pylori eradication (which may correspond to the $73+24=97\%$ of the Guadeloupean doctors who always or sometimes checked the H.pylori eradication) and 5.6% of the doctors declared not to check the H.pylori eradication.

In each of the studies 95% of the physicians used the labeled urea test to verify the H.pylori eradication.

In Guadeloupe, 45% of the doctors replied that the marked urea test was carried out after 4 weeks of stopping the PPIs and 4 weeks of stopping the antibiotics (the most common response), which corresponds to the urea test carried out 4 weeks after the treatment was stopped for 61.9% of the doctors in Picardie.

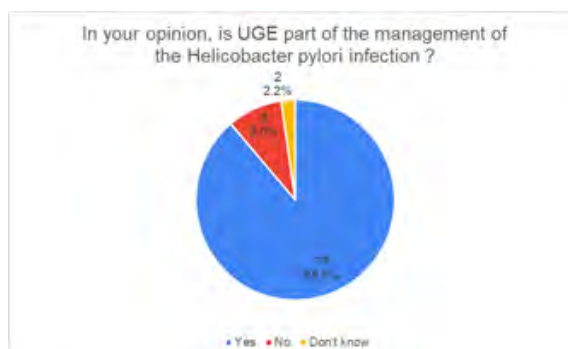


Figure 12: Place of the UGE in the management of the H.pylori infection

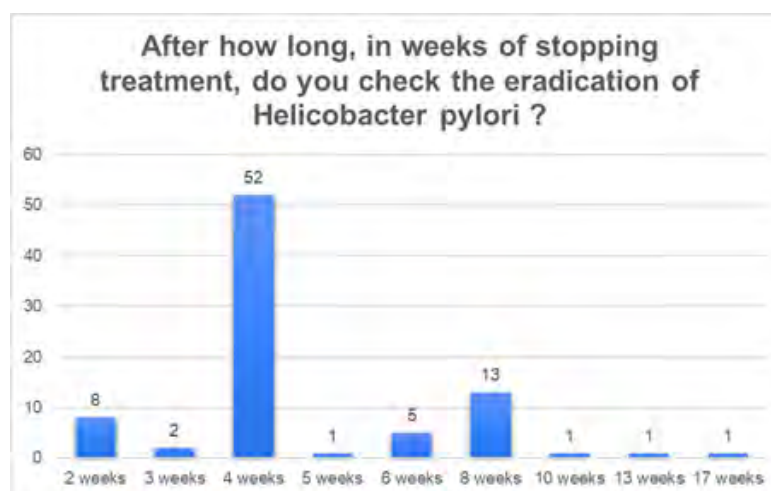


Figure 13: Period of time chosen to verify the eradication of the H.pylori infection

6. Conclusion

This work shows the essential role of the general practitioner in the management of the H.pylori infection, the main indications to follow. The mode of screening and the modality of verification of the H.pylori eradication are well known by the general practitioners.

We could also assess that the communication between the general practitioner and the gastroenterologist is fundamental in the management of the H.pylori, as it is the gastroenterologist who will perform the UGE. The coordination of these two specialists is even more important in the prescription of an antibiotic therapy which is shared between these two doctors. Furthermore, it is to be noted that the general practitioner will not hesitate to call on the gastroenterologist again should the first antibiotic therapy fail.

Finally, we have observed that the choice of a first-line antibiotic therapy is not unanimous: in the first place, the quadruple therapy with bismuth is mentioned, but it is a treatment that is not recommended which is quoted in the second place (AMOXICILLINE+CLARITHROMYCINE+IPP) and the second first-line treatment (AMOXICILLINE+CLARITHROMYCINE+METRONIDAZOLE+IPP) only comes in third position. This choice may be the result of the many changes in the recommendations, the performance of the antibiotic susceptibility testing or other factors. In addition,

the number of years of experience of the doctors in the medical profession could influence this choice: Doctors feel more comfortable if they have 20 years or more experience in the profession and we have observed a non-significant tendency to prescribe AMOXICILLIN+CLARITHROMYCIN+IPP (p-value=5.3%), conversely, those with less than 20 years of experience in the profession have showed a non-significant tendency to prescribe AMOXICILLIN+CLARITHROMYCIN+METRONIDAZOLE+IPP (p-value=5.3%). In all the cases, it is necessary for the general practitioner to be well informed and to share all the relevant information with the gastroenterologist to make the choice of an antibiotic therapy.

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