Arab Republic of Egypt

Egyptian Pediatric Clinical Practice Guidelines Committee (EPG) Gastroenterology Group

Evidence-Based Clinical Practice Guideline for diagnosis and treatment of *H pylori* related diseases in children and adolescent

Adapted with permission from

1. The updated JSPGHAN guidelines for the management of Helicobacter pylori infection in childhood. Pediatrics International (2020) 62, 1315–1331

2. Joint ESPGHAN/NASPGHAN Guidelines for the Management of Helicobacter pylori in Children and Adolescents (Update 2016)

First Edition 2024

Disclaimer

Clinical Practice Guidelines (CPGs) are "systematically developed statements to assist health care professionals and patients in medical decision-making for specific clinical conditions" or they are "statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options". It is in no way a substitute for a medical professional's independent judgment. Most of the content herein is based on literature reviews. In areas of uncertainty, professional judgment was applied.

This CPG is a working document that reflects the state of the art in the field and is based upon the accessible best-updated published evidence. Because rapid changes in this area are expected, periodic revisions are inevitable. We encourage medical professionals to use this information in conjunction with, and not as a replacement for, their best clinical judgment. The presented recommendations may not be appropriate in all situations. Any decision by practitioners to apply these guidelines must be made considering local resources and individual patient circumstances.

The members of the Egyptian Pediatric Clinical Practice Guidelines Committee (EPG) Guideline Development/ Adaptation Groups (GDG/ GAG) and the external review groups receive no honoraria or expenses to attend the scientific review meetings, nor for the many hours spent reviewing the literature, appraising the guidelines, designing the implementation tools, and contributing to the writing of the report.

Intellectual Property Rights

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  Joint ESPGHAN/NASPGHAN Guidelines for the Management of Helicobacter pylori in Children and Adolescents (Update 2016) guidelines (the source original guidelines) for their cooperation in providing the permission for adapting our guidelines.
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- This work is not related to any pharmaceutical or industrial company. The members of the GDG/ GAG and their institutes and universities volunteered their participation and contribution

Abbreviations

Adolopment	Adoption-Adaptation-Development

AGREE II	Appraisal of Guidelines for Research and Evaluation Instrument
CPG/ CPGs	Clinical Practice Guideline (s)
DHS	Demographic and Health Survey
EPG	Egyptian Pediatrics Clinical Practice Guidelines Committee
EPG CPG	EPG Clinical Practice Guideline
ERG	External Review Group
GAG	Guideline Adaptation Group
GDG	Guideline Development Group
GPS	Good Practice Statement
GRADE	Grading of Recommendations Assessment, Development and Evaluation
PICO	population, intervention, comparison, and outcomes
PIPOH	Patient population, intervention, professionals, outcomes, and healthcare context
RIGHT	A Reporting Tool for Practice Guidelines in Health Care

Glossary

1. Acceptability

Is the extent to which the users are likely to adopt a recommendation, based on internal qualities such as clarity, comprehensiveness, and logical reasoning and on external factors such as the burden imposed on the process and system of care, patient and providers attitudes and beliefs, and patients' needs, expectations, and preferences.

2. Adaptation (of guidelines)

Is the systematic approach to considering the use and/or modification of (a) guidelines(s) produced in one cultural and organizational setting for application in different context? Adaptation can be used as an alternative to de novo guideline development or for customizing (an) existing guideline(s) to suit the local context.

3. Adoption (of a guideline)

Is the acceptance of a guideline as a whole after the assessment of its quality, currency, and content. When health care providers (or other users of recommendations) adopt a guideline, they feel committed to change their practices in accordance with the recommendations of the guideline.

4. Applicability
Is the extent to which the users are able to put a recommendation into practice, based on internal qualities such as a clearly defined eligible patient population that matches the population to which the intervention is targeted in the local setting and external factors such as the availability of the necessary knowledge, skills, provider time, staff, equipment, and other resources.
Applicability is sometimes taken as a synonym for feasibility:
Feasibility of the acquisition of necessary skills and knowledge
Feasibility of the necessary increase in provider time, staff, equipment, and so on.

5. Culture
Culture represents the norms and values of a specific group, community, or population.

6. Diffusion
Is a passive means of transferring knowledge; it is not directed towards a target audience (e.g. publication of articles in medical journals).

7. Dissemination
Is more active than diffusion in that it targets a specific audience and involve tailoring the information for that audience (e.g. of dissemination strategies include targeted mailings, presentations, and press conferences.

8. Evidence-based principles
Evidence-Based Medicine (EBM) has been defined as — the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of EBM means integrating individual clinical expertise with the best available external clinical evidence from systematic research.

9. Evidence tables
Are summaries of the most salient information from studies identified in the systematic review. The elements of evidence tables are dependent on the types of information in studies related to a particular topic but might include information such as the article reference, the study type (e.g. RCT or Cohort), the number of patients and their characteristics, and the intervention, comparison arms, outcome measures, and effect sizes.

10. Guideline or Clinical Practice Guideline (CPG)
Systematically developed statements about specific health problems, intended to assist practitioners and patients in making decisions about appropriate health care.

11. Guideline consistency
Agreement between the evidence and the recommendations, based on the:
Comprehensiveness of the study search and selection process,
Coherence between the results of the studies and their interpretation by the guideline authors
Transparency between interpretation and recommendations.

12. Guideline content
In the 'ADAPTE Manual and Resource Toolkit for Guideline Adaptation' document, guideline content refers to the recommendations in the source guidelines.

13. Guideline currency
A CPG may be considered up to date —when (no) new information on interventions, outcomes, and performance justifies updating (it).

14. Guideline quality
By quality of clinical practice guidelines, we mean the confidence that the potential biases of guideline development addressed adequately and that the recommendations are both internally and externally valid, and are feasible for practice. This process involves taking into account the benefits, harms and costs of the recommendations, as well as the practical issues attached to them. Therefore, the assessment (of quality) includes judgments about the methods used for developing the guidelines, the content of the final recommendations, and the factors linked to their uptake.

15. Guideline topic
In the ADAPTE Manual and Resource Toolkit for Guideline Adaptation' document, the topic refers to the theme of the guideline, as described in the guideline title, for a targeted population (disease and patients) and intervention. The purpose, the audience, and the setting intended for the guideline, although not necessarily explicitly stated in the title, are also part of the topic. A guideline on a given topic may contain more than one health question.

16. Health question or clinical question or key question
Is a precisely described health issue (e.g. clinical, professional practice or public health) relating to the topic of the guideline? Guideline may include one or more questions.

17. Implementation
Implementation includes methods to promote the uptake of research findings into routine healthcare in both clinical and policy contexts and hence to improve the quality and effectiveness of healthcare. It includes the study of influences on healthcare professional and organizational behavior.

18. Intra-class correlations
Intra-class correlations provide a measurement of the extent to which two or more raters agree when rating the same set of things. It is a reliability index and is typically a ratio of the variance of interest over the sum of the variance of interest plus error.

19. Recommendation
Any statement that promotes or advocates a particular course of action in clinical care.

20. Stakeholder
A stakeholder is an individual, group and/or organization with a stake in your decision to implement a guideline. Stakeholders include individuals or groups who will be directly or indirectly affected by the implementation of a guideline.

21. Source guideline
In the ADAPTE Manual and Resource Toolkit for Guideline Adaptation' document, source guideline refers to those guidelines selected to undergo assessments of quality, currency,

content, consistency, and acceptability/applicability and upon which an adapted guideline may be based.

Executive Summary

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Helicobacter pylori (H. pylori) is one of the most common bacterial infections worldwide. [1] It is a Gram-negative microaerophilic bacterium colonizes the gastric mucosa, [2] the infections are usually acquired during early childhood and generally passes asymptomatically in most patients, in which it will remain in the gastric cavity throughout life in the absence of eradication therapy. [3]

The prevalence of infection in pediatric age is high and varies from country to country. In Egypt, a population-based cross-sectional study performed among asymptomatic school children used urea breath test (UBT) to show that the overall H. pylori prevalence was 72.38%. Its main risk factor is residing in an overcrowded home and socially deprived area [4] In a rural area, relatives with low socioeconomic level generally showed the highest seroprevalence (82.5% and 78.1%, respectively). [5]

Another cross-sectional study showed that seroprevalence of H. pylori was significantly age-dependent: 60.6% of patients aged more than 5 years and 25.9% of patients aged less than 5 years. One of the main factors associated with seroprevalence was crowding in beds. The seroprevalence among children was 59.7% in the case of more than 3 persons sharing a bed and 26.9% in the case of fewer than 3 persons sharing a bed.

Moreover, the duration of breastfeeding also played a role in H. pylori acquisition. The seroprevalence was 64.7% among children who were breastfed for <1 year and only 42.4% among those breastfed for more than 1 year. [6] A cross-sectional study showed prevalence of about 70%, indicating that the burden of H. pylori infection is high in rural areas than in urban areas. [7]

Several diagnostic tests for detection of *H. pylori* have been widely used in clinical practice either invasive which require endoscopy to obtain biopsies of gastric tissues, or non-invasive methods with different levels of sensitivity and specificity.[8] However, each of these tests has certain disadvantages [9] The invasive methods include histological examination, culture, urease test and molecular methods, while the non-invasive methods include urea breath testing, serology and stool antigen testing. There is no single method that can meet, on its own, the criteria for acceptable sensitivity and specificity in identification of the bacterium. In the last few years, more interest has been paid for the non-invasive methods. [10] Molecular testing assays can be also a rapid and accurate methods for the diagnosis of H. pylori infection. [11]

Spontaneous eradication is described mainly in infants and young children but unfortunately the eradication decreases with age. Without a treatment scheme, eradication is highly improbable. [12]

Although *H. pylori* infection is mainly acquired in childhood, complications generally arise much later. *H. pylori* infection is implicated in the pathogenesis of gastritis, gastric and duodenal ulcers, gastric cancer, and gastric mucosa-associated lymphoid tissue (MALT) lymphoma [13- 16] In 2018, H. pylori was responsible for an estimated 810,000 new cases of non-cardia gastric adenocarcinoma worldwide, making it the leading cause of infection-attributable cancer ahead of high-risk human papillomavirus and hepatitis B and C viruses. [17]

It is now established that chronic *H. pylori* infection is the most important etiological factor for the occurrence of gastric cancer, [18-21] which is considered as the third leading cause of

cancer death globally. [22] Importantly, its eradication is recommended in the treatment and/or prevention of these conditions.

There is a strong association between *H. pylori* infection and diseases like; lymphoma, cardiovascular disease, dermatological disease, liver and gallbladder diseases, anemia, diabetes mellitus, autoimmune disease, atopy, asthma, neurological disease, bone disease, micronutrient deficiency , iron deficiency anemia, growth restriction, and idiopathic thrombocytopenic purpura (ITP) [1,2,23] *H. pylori* infection can lead to these diseases apart from the gastro-intestinal system by a series of hormonal, immunological, cytokine and chemokine mediators. Indications for treatment of this infection and optimal regimens have been proposed by a recent consensus guideline as well as optimal diagnostic tests. Eradication therapy should be considered in children under 5 years in whom the therapy is clinically indicated due to the disease or condition requiring a workup that results in the diagnosis of H. pylori infection including peptic ulcer diseases with stenotic lesion, perforation or recurrent hemorrhage, or MALT (mucosa-associated lymphoid tissue lymphoma). Eradication therapy should also be considered in children who have recurrent or refractory IDA to iron supplementation and in whom an active H. pylori infection has been determined.

All treatment guidelines agree that the best approach to the treatment of H. pylori infection is to succeed on the first attempt, thereby avoiding re-treatment and reducing cost, anxiety, and the further promotion of resistant strains. [24]

Treatment to eliminate H pylori infection is not expected to improve symptoms in children, except in cases of peptic ulcer disease (Gastric and duodenal ulcers) (PUD). Therefore, in children fulfilling the Rome criteria for functional abdominal pain, diagnostic testing (noninvasive or invasive) for H pylori infection should not be undertaken. (25-30) In the absence of alarm signs or symptoms (persistent right upper or right lower quadrant pain, dysphagia, odynophagia, persistent vomiting, gastrointestinal blood loss, involuntary weight loss, deceleration of linear growth, delayed puberty, unexplained fever, and a family history of inflammatory bowel disease, celiac disease, or PUD), recent updated recommendations from the committee for ROME IV did not identify compelling evidence to support upper endoscopy as part of the diagnostic work up. [31]

Treatments targeting *H. pylori* infection consist of combinations of a PPI and several antimicrobial agents. [32,33] There are limited well-designed studies in children and adolescents with respect to the optimal duration of anti H pylori therapy. Meta-analyses of optimal duration of H pylori eradication therapy in adults have been performed and show that increasing the duration of therapy enhances eradication rates .[34] With respect to triple therapy, a recent systematic review and network analysis of studies in adults showed that 14-day duration of treatment improves eradication rates compared to 10-day, and both are superior to 7-day treatment. [35]

The recommended goal for H pylori treatment is an eradication rate of at least 90% to avoid further investigations and antibiotic use. However, the latest clinical studies published have shown that the target of 90% eradication with first-line treatment may not be achieved by these regimens especially if treatment is not tailored to antimicrobial susceptibility tests and if compliance is not optimal (> 90%). [36]

This guideline was implemented for optimal diagnosis and treatment of H pylori related diseases in Egyptian children.

Guideline development process and methods

After revising inclusion and exclusion criteria and quality appraisal results, the GDG/ GAG recommended using the following source original clinical practice guideline (CPG):

1. The updated JSPGHAN guidelines for the management of Helicobacter pylori infection in childhood. Pediatrics International (2020) 62, 1315–1331

2. Joint ESPGHAN/NASPGHAN Guidelines for the Management of Helicobacter pylori in Children and Adolescents (Update 2016)

We conducted an adolopment for this guideline (Adoption, Adaptation, and Development)

- *Adoption for most of the guideline recommendations.*
- *Adaptation for 2 recommendations according to GRADE criteria to be suitable to our Economic implications (Evidence-to-Decision (EtD) table was done)*
- *Development of Good Practice Statements*

We can summarize the guidelines' recommendations for H. Pylori *related diseases in children and adolescent*
in the following:

We recommend that testing for H. pylori be performed in children with gastric or duodenal peptic ulcer disease (PUD). If H. pylori infection is identified then treatment should be administered and eradication confirmed. (Strong)

We recommend against diagnostic testing for H. pylori infection in children with functional abdominal pain disorders. (Strong)

We recommend against diagnostic testing for H. pylori infection as part of the initial investigation in children with iron deficiency anemia (IDA). (Strong)

We suggest that in children with refractory IDA in which other causes have been ruled out, testing for H. pylori during upper endoscopy may be considered. (Conditional)

We suggest that noninvasive diagnostic testing for H. pylori infection may be considered when investigating causes of chronic immune thrombocytopenic purpura (ITP). (Conditional)

We recommend against diagnostic testing for H. pylori infection when investigating causes of short stature. (Strong)

We recommend that one of the following tests be used to determine whether H. pylori treatment was successful: (1) The 13C-UBT. (2) A 2-step monoclonal stool H. pylori antigen test. (Strong)

To confirm eradication, we recommend that before testing for H. pylori, wait at least 2 weeks after stopping PPIs and 4 weeks after stopping antibiotics. (Strong)

We recommend against tests to detect anti-H. pylori antibodies as single diagnostic tests in clinical settings to diagnose active H. pylori infection. (Strong)

We recommend more than two H. pylori tests such as two non-invasive tests (breath test and stool test), or a biopsy-based and non-invasive test (breath test) for more accurate diagnosis of active infection. (Strong)

We recommend considering the performance of a rapid urease test directly on gastric biopsies to determine presence/absence of H. pylori as a diagnostic test for active infection. (Conditional)

We recommend histological examination of gastric biopsies as a biopsy-based diagnostic test for active H. pylori infection. (Conditional)

We recommend H. pylori culture because the culture method is the gold standard biopsy-based test for active infection and it can also be used for antimicrobial susceptibility testing for optimization of eradication therapy. (GPS)

Diagnostic accuracy: pre-eradication H&E staining sensitivity is 92%–98.8% and specificity is 89%–100%. (GPS)

We recommend that at least 6 gastric biopsies should be obtained for the diagnosis of H. pylori infection during upper endoscopy. (Strong)

Diagnostic accuracy: sensitivity of 68%–98% and specificity of 100%. (GPS)

Diagnostic accuracy: Pre-eradication sensitivity is 91.0%–98.5% and specificity is 90.9%–100%. Post-eradication sensitivity is 58.8%–86% and specificity is 97.8%–99.2%. (GPS)

We recommend H. pylori tests when the following endoscopic findings are observed: antrum-predominant nodularity, ulcerations or erosions in the stomach or duodenum, disappearance of regular arrangement of collecting venules (RAC) in the gastric body. (Strong)

We recommend eradication therapy for H. pylori-infected children with gastric and/or duodenal ulcers. (Strong)

Eradication therapy should be considered for children, 5 years of age or more, determined to be infected with H. pylori by a test for active infection, taking account possible re-infection. (Conditional)

We recommend consideration of eradication therapy for H. pylori-infected children who underwent diagnostic upper gastrointestinal endoscopy for abdominal symptoms. (Weak)

We recommend eradication therapy for H. pylori-infected children with gastric MALT lymphoma. (Strong)

We recommend eradication therapy for H. pylori-infected children with IDA when the iron deficiency is recurrent or refractory to iron supplement therapy. (Strong)

We recommend eradication therapy for H. pylori-infected children with chronic ITP as the first-line therapy. (Strong)

We do not recommend eradication therapies for H. pylori-infected children with chronic idiopathic urticaria. (Conditional)

We recommend against a “test-and-treat” strategy for H. pylori infection for asymptomatic children to protect against gastric cancer development. (Conditional)

If H. pylori is an incidental finding at endoscopy, treatment may be considered following careful discussion of the risks and benefits of H. pylori treatment with the patient/parents. When H. pylori is detected by biopsy-based methods in absence of PUD, treatment may be considered. (GPS)

We recommend consideration of eradication therapies for children who have a family history of gastric cancer in their first- or second-degree relatives and in whom active H. pylori infection has been found. (Weak)

We recommend against a “test-and-treat” strategy for asymptomatic children living in the household of an H. pylori-infected adult who received eradication therapy to prevent re-infection in that adult. (Weak)

A proton pump inhibitor-based triple regimen with amoxicillin and clarithromycin is recommended as first-line therapy if strains are susceptible or susceptibility is unknown. A proton pump inhibitor-based triple regimen with amoxicillin and metronidazole is recommended if strains are resistant to clarithromycin. (Strong)

Regarding the duration of eradication regimen in children, a 7-day course is basically recommended. However, if clinicians judge that there is a therapeutic need according to individual risk of eradication failure, then the regimen may be extended up to 14 days. (Strong)

Second-line therapies in children in whom first-line therapy failed: a proton pump inhibitor-based triple regimen with amoxicillin and metronidazole was shown to be successful in children who failed clarithromycin-containing triple therapy. In patients with second-line eradication failure, antimicrobial susceptibility should be obtained and salvage therapy tailored accordingly. (Strong)

Improvement of eradication rate by a combination of probiotics is not clear. However, probiotics have been shown to be effective for prevention of side effects including diarrhea. Side effects such as diarrhea, nausea, vomiting, dyspepsia or dysphagia significantly decreased when combined with probiotics. (Conditional)

We recommend that the outcome of anti-H. pylori therapy be assessed at least 4 weeks after completion of therapy. (Strong)

We recommend that one of the following tests be used to determine whether H. pylori treatment was successful: (1) The 13C-UBT. (2) A 2-step monoclonal stool H. pylori antigen test. (Strong)

We recommend H. pylori testing for active infection four weeks or more after completion of eradication therapy to avoid false negative results. (Strong)

We recommend that the 13C-urea breath test or stool antigen ELISA test using a monoclonal antibody be employed to confirm eradication. (Strong)

We recommend against H. pylori tests using endoscopic biopsy specimens (rapid urease test, histological examination, and culture method) to confirm eradication. (Conditional)

We recommend against serological tests to detect anti-H. pylori antibodies as a single test to confirm eradication. (Strong)

Guideline Registration

PREPARE (Practice guideline REgistration for transPAREncy), WHO Collaborating Center for Guideline Implementation and Knowledge Translation, EBM Center, University of Lanzhou, Lanzhou, China. **Registration Number:** ((submitted and in process)). Link: http://www.guidelines-registry.org/

Introduction

Helicobacter pylori (H. pylori) is one of the most common bacterial infections worldwide. [(1)] It is a Gram-negative microaerophilic bacterium colonizes the gastric mucosa, [(2)] the infections are usually acquired during early childhood and generally passes asymptomatically in most patients, in which it will remain in the gastric cavity throughout life in the absence of eradication therapy. [(3)]

The prevalence of infection in pediatric age is high and varies from country to country. In Egypt, a population-based cross-sectional study performed among asymptomatic school children used urea breath test (UBT) to show that the overall H. pylori prevalence was 72.38%. Its main risk factor is residing in an overcrowded home and socially deprived area [(4)] In a rural area, relatives with low socioeconomic level generally showed the highest seroprevalence (82.5% and 78.1%, respectively). [(5)]

Another cross-sectional study showed that seroprevalence of H. pylori was significantly age-dependent: 60.6% of patients aged more than 5 years and 25.9% of patients aged less than 5 years. One of the main factors associated with seroprevalence was crowding in beds. The seroprevalence among children was 59.7% in the case of more than 3 persons sharing a bed and 26.9% in the case of fewer than 3 persons sharing a bed.

Moreover, the duration of breastfeeding also played a role in H. pylori acquisition. The seroprevalence was 64.7% among children who were breastfed for <1 year and only 42.4% among those breastfed for more than 1 year. [6] A cross-sectional study showed prevalence of about 70%, indicating that the burden of H. pylori infection is high in rural areas than in urban areas. [7]

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It is now established that chronic *H. pylori* infection is the most important etiological factor for the occurrence of gastric cancer, [18-21] which is considered as the third leading cause of cancer death globally. [22] Importantly, its eradication is recommended in the treatment and/or prevention of these conditions.

There is a strong association between *H. pylori* infection and diseases like; lymphoma, cardiovascular disease, dermatological disease, liver and gallbladder diseases, anemia, diabetes mellitus, autoimmune disease, atopy, asthma, neurological disease, bone disease, micronutrient deficiency , iron deficiency anemia, growth restriction, and idiopathic thrombocytopenic purpura (ITP) [1,2,23] *H. pylori* infection can lead to these diseases apart from the gastro-intestinal system by a series of hormonal, immunological, cytokine and chemokine mediators.

Indications for treatment of this infection and optimal regimens have been proposed by a recent consensus guideline as well as optimal diagnostic tests. Eradication therapy should be considered in children under 5 years in whom the therapy is clinically indicated due to the disease or condition requiring a workup that results in the diagnosis of H. pylori infection including peptic ulcer diseases with stenotic lesion, perforation or recurrent hemorrhage, or MALT (mucosa-associated lymphoid tissue lymphoma). Eradication therapy should also be

considered in children who have recurrent or refractory IDA to iron supplementation and in whom an active H. pylori infection has been determined.

All treatment guidelines agree that the best approach to the treatment of H. pylori infection is to succeed on the first attempt, thereby avoiding re-treatment and reducing cost, anxiety, and the further promotion of resistant strains. [24]

Treatment to eliminate H pylori infection is not expected to improve symptoms in children, except in cases of peptic ulcer disease (Gastric and duodenal ulcers) (PUD). Therefore, in children fulfilling the Rome criteria for functional abdominal pain, diagnostic testing (noninvasive or invasive) for H pylori infection should not be undertaken. (25-30) In the absence of alarm signs or symptoms (persistent right upper or right lower quadrant pain, dysphagia, odynophagia, persistent vomiting, gastrointestinal blood loss, involuntary weight loss, deceleration of linear growth, delayed puberty, unexplained fever, and a family history of inflammatory bowel disease, celiac disease, or PUD), recent updated recommendations from the committee for ROME IV did not identify compelling evidence to support upper endoscopy as part of the diagnostic work up. [31]

Treatments targeting *H. pylori* infection consist of combinations of a PPI and several antimicrobial agents. [32,33] There are limited well-designed studies in children and adolescents with respect to the optimal duration of anti H pylori therapy. Meta-analyses of optimal duration of H pylori eradication therapy in adults have been performed and show that increasing the duration of therapy enhances eradication rates .[34] With respect to triple therapy, a recent systematic review and network analysis of studies in adults showed that 14-day duration of treatment improves eradication rates compared to 10-day, and both are superior to 7-day treatment. [35]

The recommended goal for H pylori treatment is an eradication rate of at least 90% to avoid further investigations and antibiotic use. However, the latest clinical studies published have shown that the target of 90% eradication with first-line treatment may not be achieved by these regimens especially if treatment is not tailored to antimicrobial susceptibility tests and if compliance is not optimal (> 90%). [36]

This guideline was implemented for optimal diagnosis and treatment of H pylori related diseases in Egyptian children.

Purpose and Scope

- **DISEASE/ CONDITION**

H pylori related diseases in children and adolescent

- **GUIDELINE OBJECTIVES**

    1. To identify diagnosis of *H pylori* related diseases including clinical and laboratory investigations
    2. To specify proper treatment of *H pylori* related diseases
    3. To correct common faults in diagnosis and treatment of *H pylori* related diseases

- **INTENDED USER (Target users)**

    1. Primary health care physician
    2. General practitioners
    3. Family physician
    4. Pediatrician
    5. Gastroenterologist

- **Health/Clinical Question (PIPOH)**

- **P (patients, target population):**

Gender: Both genders

Age group: children and adolescent from 5-18 years Disease/condition: H pylori related diseases (N.B. age below 5 years refer to gastroenterologist)

- **I (interventions and practices considered/ guideline category)**:

Clinical: history taking and examination

Laboratory investigations:

H pylori stool antigen

Urea breath test

Upper GIT endoscopy

Biopsy and histopathology

Biopsy and bacteriology

Biopsy and rapid urease test

Treatment

- **P (Professionals / intended or target users and clinical specialties):**

Primary health care physician

General practitioners

Family physician

Pediatrician

Gastroenterologist

- **O (major outcomes considered):**

Primary outcome: proper diagnosis of *H pylori* related diseases

Secondary outcome: proper treatment of *H pylori* related diseases

- **H (Healthcare settings):**

Types:

- **Primary, Secondary and Tertiary Healthcare Centers.**
- **Governmental Healthcare Sector:**

MOH, University, Military, Health Insurance Organization

•**Non-Governmental Healthcare Sector:**

- **Private and NGO Healthcare Centers.**

Methods

Methods of search:

A comprehensive search for guidelines was undertaken to identify the most relevant guidelines to consider for adaptation. Keywords used for search are: H pylori

Inclusion / exclusion criteria followed in the search and retrieval of guidelines to be adapted:

• Selecting only evidence-based guidelines (guideline must include a report on methodology of development including the systematic literature searches and explicit links between individual recommendations and their supporting evidence)
• Selecting national and/or international guidelines
• Specific range of dates for publication (using Guidelines published or updated in the last 10 years)
• Selecting peer-reviewed publications only
• Selecting guidelines written in English language
• Excluding guidelines written by a single author

All retrieved Guidelines were screened and appraised using AGREE II instrument (www.agreetrust.org) by at least two members. The panel decided a cut-off point or rank the guidelines (any guideline scoring above 60% in the AGREE II Domain 3 (rigor of development) was retained).

Two guidelines were considered eligible for the AGREE II appraisal instrument which were:

1. The updated JSPGHAN guidelines for the management of Helicobacter pylori infection in childhood. Pediatrics International (2020) 62, 1315–1331

2. Joint ESPGHAN/NASPGHAN Guidelines for the Management of Helicobacter pylori in Children and Adolescents (Update 2016)

After reviewing all the previous criteria and the AGREE II appraisal results the GDG/ GAG recommended using 2 guidelines:

1. The updated JSPGHAN guidelines for the management of Helicobacter pylori infection in childhood. Pediatrics International (2020) 62, 1315–1331

2. Joint ESPGHAN/NASPGHAN Guidelines for the Management of Helicobacter pylori in Children and Adolescents (Update 2016)

We did Adolopment for these guidelines: (Adoption, Adaptation, and Development)

- Adoption for most of the guideline recommendations.
- Adaptation for 2 recommendations according to GRADE criteria to be suitable to our Economic implications (Evidence to Decision (EtD) table was done). In this guideline no EtD table was done.
- Development of Good Practice Statement

Contributors to the guideline development process:

Guideline Development Group (GDG)/ Guideline Adaptation Group (GAG):

The GDG/ GAG included two subgroups; the clinicians/ healthcare providers subgroup and the guideline methodologists' subgroup.

Clinicians Subgroups

The clinicians' subgroup or clinical panel for this guideline included experts with a range of knowledge, technical skills and diverse perspectives in the field of Gastroenterology

The main functions of the clinical panel were adolopment of:

1. The updated JSPGHAN guidelines for the management of Helicobacter pylori infection in childhood. Pediatrics International (2020) 62, 1315–1331

2. Joint ESPGHAN/NASPGHAN Guidelines for the Management of Helicobacter pylori in Children and Adolescents (Update 2016) guideline, determining the scope of the guideline and guideline, reviewing the evidence, and formulating evidence-informed recommendations in case of changing strength of recommandations.

Guideline Methodologists Subgroup

There were guideline methodologists with expertise in guidelines development, adaptation, GRADE and translation of evidence into recommendations. Methodologists provided orientation and overview of evidence-informed guideline development processes using the GRADE approach, guideline adaptation using the Adapted ADAPTE, provided AGREE II assessment of the source guidelines in collaboration with the clinician's subgroup, generation of the EtD frameworks whenever applicable.

External Review Group:

The External Review Group for this guideline comprises 3 clinical national experts who have interest and expertise in as well as eminent international reviewers in the diagnosis and treatment of H pylori.

They were identified by Egyptian Pediatric Clinical Practice Guidelines Committee (EPG) as people who can provide valuable insights during the guideline development process.

The External Review Group was asked to comment on (peer review) the final guideline to identify any criticism on the content and to comment on clarity and applicability as well as issues relating to implementation, dissemination, ethics, regulations, or monitoring, but not to change the recommendations formulated by the GDG/ GAG. The members of the External Review Group were required to submit declarations of interest before the peer review process.

Guideline Development/ Adaptation Group meetings:

GDG/ GAG meetings were organized virtually (weekly/bimonthly). Due to the extensive scope of

the guideline, EPG was responsible for overseeing the adolopment process. the timetable and objectives of each meeting. GDG/ GAG meetings were also attended by members of the methodologists. Working rules for each contributor type were outlined by the chair at the start of each meeting, covering aspects such as vocal rights, voting, and evidence to decision and recommendation formulating processes.

Declarations of interests:

Prospective members of the GDG/ GAG were asked to fill in and sign the standard WHO declaration of interest and confidentiality undertaking forms. All guideline members and methodologists were also asked to fill in and sign the standard WHO declaration-of-interests. Members of the external review group will be asked to fill in and sign the standard WHO declaration-of-interests form before the peer review process.

Evidence for the guideline:

We used the GRADE system (Grading of Recommendations, Assessment, Development and Evaluation) for assigning the quality of evidence and strength of recommendations that includes the following definitions [13]. Informed by the evidence required for the GRADE

Evidence to Decision (EtD) framework(s) was(were) done while considering changing strength of recommendations according to availability of some resources in the recommendations (both ETD and changing strength of recommendation were not done in this guideline).
Description of the interpretation of the GRADE four levels of certainty of evidence:

Table 1. Classification of the Quality of Evidence

High	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	We are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	Our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very Low	We have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of the effect.

GRADE EtD's contextual factors, criteria and considerations that link to the strength of recommendations:
Criteria and Considerations:

1. Benefits and harms: When a new recommendation is developed, desirable effects (benefits) need to be weighed against undesirable effects (risks/harms), considering any previous recommendation or another alternative. The larger the gap or gradient in favor of the desirable effects over the undesirable effects, the more likely that a strong recommendation will be made.

2. Certainty of the evidence about the effects: The higher the certainty of the scientific evidence base, the more likely that a strong will be made.

3. Values and preferences: If there is no important uncertainty or variability in how much people value the main outcomes, it is likely that a strong recommendation will be made. Uncertainty or variability around these values that could likely lead to different decisions, is more likely to lead to a conditional recommendation.

4. Economic implications: Lower costs (monetary, infrastructure, equipment or human resources) or greater cost-effectiveness are more likely to support a strong recommendation.

5. Equity and human rights: If an intervention will reduce inequities, improve equity or contribute to the realization of human rights, the greater the likelihood of a strong recommendation.

6. Feasibility: The greater the feasibility of an intervention to all stakeholders, the greater the likelihood of a strong recommendation.

7. Acceptability: If a recommendation is widely supported by health workers and program managers and there is widespread acceptance for implementation within the health service, the likelihood of a strong recommendation is greater.

Table 2. Classification of the Strengths of Recommendations

Strong	The desirable effects of an intervention clearly outweigh the undesirable effects (or vice versa), so most patients should receive the recommended course of action.
Conditional	There is uncertainty about the trade-offs. The clinician and patient need to discuss the patient's values and preferences, and the decision should be individualized.

Developing good practice statements:

The GDG/ GAG also developed good practice statements for this guideline, which are actionable messages relevant to the guideline questions. The justification for each good practice statement was carefully considered by the GDG/ GAG with an emphasis that they are clearly needed. Good practice statements were developed, guided by the following GRADE criteria:

1- Message is really necessary with regard to actual healthcare practice
2- Have large net positive consequence (relevant outcomes and downstream consequences) (GRADE EtD domains)
3- Collecting and summarizing the evidence is a poor use of time and resources
4- Include awell-documented, clear rationale connecting indirect evidence
5- Are clear and actionable statements.

The GDG/ GAG collectively drafted and finalized good practice statements with relevant justifications and remarks to help with their interpretation, with close support and input from the consultant and guideline methodologists.

We have used the Reporting Items for Practice Guidelines in Healthcare (RIGHT) extension for adapted guidelines (RIGHT-Ad@pt Tool) as a reporting checklist for this guideline adaptation process as recommended by the EQUATOR network.

Recommendations

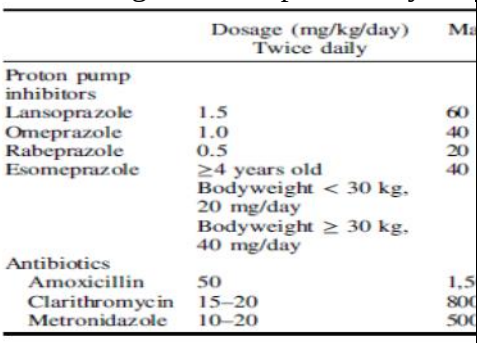
Health question	Source of guideline	Recommendation	Quality of evidence	Strength of recommendation
1-What are the GI symptoms?	JESPGHAN	H. pylori related diseases in children with gastric and/or duodenal ulcers.	High	Strong
1B	ESPGHAN/NASPGHAN	We recommend that testing for H pylori be performed in children with gastric or duodenal PUD. If H pylori infection is identified then treatment should be administered and eradication confirmed.	High	Strong
1C	ESPGHAN/NASPGHAN	We recommend against diagnostic testing for H pylori infection in children with functional abdominal pain disorders.	High	Strong
2A- Iron-deficiency anemia	ESPGHAN/NASPGHAN	We recommend against diagnostic testing for H pylori infection as part of the initial investigation in children with iron deficiency anemia (IDA).	Moderate	Strong
2B	ESPGHAN/NASPGHAN	We suggest that in children with refractory IDA in which other causes have been ruled out, testing for H pylori during upper endoscopy may be considered.	Low	Conditional
2C- Chronic ITP	ESPGHAN/NASPGHAN	We suggest that noninvasive diagnostic testing for H pylori infection may be considered when investigating causes of chronic immune thrombocytopenic purpura (ITP).	Low	Conditional

2E- Short stature	ESPGHAN/NASPGHAN	We recommend against diagnostic testing for H pylori infection when investigating causes of short stature.	Moderate	Strong
3A- What is the non-invasive test	ESPGHAN/NASPGHAN	We recommend that one of the following tests be used to determine whether H pylori treatment was successful: (1) The 13C-UBT. (2) A 2-step monoclonal stool H pylori antigen test.	High	Strong
3B- Precautions of stool antigen	ESPGHAN/NASPGHAN	To confirm eradication, we recommend that before testing for H pylori, wait at least 2 weeks after stopping PPIs and 4 weeks after stopping antibiotics.	Low	Strong
3C	JAPANES	We recommend against tests to detect anti-H. pylori antibodies as single diagnostic tests in clinical settings to diagnose active H. pylori infection.	High	Strong
4- What are the uses of non-invasive	JESPGHAN	We recommend more than two H. pylori tests such as two non-invasive tests, i.e. breath test and stool test, or a biopsy-based and non-invasive test (i.e. breath test) for more accurate diagnosis of active infection.	Low	Strong
5A- When to do upper endoscopy	JESPGHAN	We recommend considering the performance of a rapid urease test directly on gastric biopsies to determine presence / absence of H. pylori as a diagnostic test for active infection.	Low	Conditional
5B	JESPGHAN	We recommend histological examination of gastric biopsies as a biopsy-based diagnostic test for active H. pylori infection.	Moderate	Conditional
5C	JESPGHAN	We recommend H. pylori culture because the culture method is the	GPS	

		gold standard biopsy-based test for active infection and it can also be used for antimicrobial susceptibility testing for optimization of eradication therapy.		
6A- Upper endo with histopathology		Diagnostic accuracy: pre-eradication H&E staining sensitivity is 92%–98.8% and specificity is 89%–100%	GPS	
6B	ESPGHAN/NASPGHAN	We recommend that at least 6 gastric biopsies should be obtained for the diagnosis of H pylori infection during upper endoscopy.	Low	Strong
7- upper endoscopy with bacteriology	JESPGHAN	Diagnostic accuracy: sensitivity of 68%–98% and specificity of 100%	GPS	
8A- upper endoscopy with RUT	JESPGHAN	Diagnostic accuracy: Pre-eradication sensitivities is 91.0%–98.5% and specificity is 90.9%–100%. Post-eradication sensitivity is 58.8%–86% and specificity is 97.8%–99.2%.	GPS	
8B	JESPGHAN	We recommend H. pylori tests when the following endoscopic findings are observed at diagnostic upper endoscopy: antrum-predominant nodularity, ulcerations or erosions in the stomach or duodenum disappearance of regular arrangement of collecting venules (RAC) in the gastric body.	Low	Strong

9A- who should be treated PUD		We recommend eradication therapy for H. pylori- infected children with gastric and/or duodenal ulcers.	High	Strong
9B	JESPGHAN	Eradication therapy should be considered for children, 5 years of age or more, determined to be infected with H. pylori by a test for active infection, taking account possible re-infection.	Low	Conditional
9C	JESPGHAN	We recommend consideration of eradication therapy for H. pylori-infected children who underwent diagnostic upper gastrointestinal endoscopy for abdominal symptoms.	Very low	Weak
9D	JESPGHAN	We recommend eradication therapy for H. pylori-infected children with gastric MALT lymphoma.	Mode rate	Strong
9E	JESPGHAN	We recommend eradication therapy for H. pylori-infected children with IDA when the iron deficiency is recurrent or refractory to iron supplement therapy.	High	Strong
9F	JESPGHAN	We recommend eradication therapy for H. pylori-infected children with chronic ITP as the first line therapy.	Mode rate	Strong
9G	JESPGHAN	We do not recommend eradication therapies for H. pylori-infected children with chronic idiopathic urticaria.	Low	Conditional
9H	JESPGHAN	We recommend against a “test-and treat” strategy for H. pylori infection for asymptomatic children to protect gastric cancer development.	Low	Conditional

9K	ESPGHAN/NASPGHAN	If H pylori is an incidental finding at endoscopy treatment may be considered following careful discussion of the risks and benefits of H pylori treatment with the patient/parents. When H pylori is detected by biopsy-based methods in absence of PUD, treatment may be considered.		
Family history of gastric cancer	JESPGHAN	We recommend consideration of eradication therapies for children who have a family history of gastric cancer in their first- or second-degree relatives and in whom active H. pylori infection has been found.	Moderate	Weak
	JESPGHAN	We recommend against a “test-and treat” strategy for asymptomatic children living in the household of an H. pylori-infected adult who received eradication therapy to prevent re-infection in that adult.	Moderate	Weak
	ESPGHAN/NASPGHAN	We recommend that testing for H pylori be performed in children with gastric or duodenal PUD. If H pylori infection is identified then treatment should be administered and eradication confirmed.	High	Strong
10- how to treat	JESPGHAN	A proton pump inhibitor- based triple regimen with amoxicillin and clarithromycin as the first-line therapy if H. pylori strains are susceptible to clarithromycin or the antimicrobial susceptibility of the strains is unknown. a proton pump inhibitor- based triple regimen with amoxicillin and metronidazole as the first-line therapy, if H. pylori strains are shown to be resistant to clarithromycin.	Very low	Strong

Duration of eradication regimen	JESPGHAN	Regarding the duration of eradiation regimen in children, a 7-day course of treatment regimen is basically recommended. However, if clinicians judge that there is a therapeutic need according to individual risk of eradication failure, then the eradication regimen should be employed as a longer duration regimen for up to 14 days. 	Mode rate	Strong
Second-line therapies		Second-line therapies in H. pylori-infected children in whom the first-line therapy failed 1-a proton pump inhibitor- based triple regimen with amoxicillin and metronidazole was shown to be successful in children who failed in eradicating H. pylori with clarithromycin containing triple therapy. In patients with second-line eradication failure, antimicrobial susceptibility should be obtained for the infecting H. pylori strain and salvage therapy should be tailored accordingly.	Very low	Strong
Role of probiotic		Improvement of the eradication rate by a combination of probiotics is not clear. However, it has been shown to be effective for the prevention of side effects including diarrhea. Individual side-effect such as diarrhea, nausea, vomiting, dyspepsia or dysphagia, which occurred with the conventional eradication therapy, significantly	Low	Conditional

	Dosage (mg/kg/day) Twice daily	Ma
Proton pump inhibitors		
Lansoprazole	1.5	60
Omeprazole	1.0	40
Rabeprazole	0.5	20
Esomeprazole	≥4 years old Bodyweight < 30 kg, 20 mg/day Bodyweight ≥ 30 kg, 40 mg/day	40
Antibiotics		
Amoxicillin	50	1,5
Clarithromycin	15–20	80
Metronidazole	10–20	50

		decreased by combining with probiotics.		
11- When and how to test eradication	ESPGHAN/NASPGHAN	We recommend that the outcome of anti–H pylori therapy be assessed at least 4 weeks after completion of therapy.	Moderate	Strong
	ESPGHAN/NASPGHAN	We recommend that one of the following tests be used to determine whether H pylori treatment was successful: (1) The 13C-UBT. (2) A 2-step monoclonal stool H pylori antigen test.	High	Strong
	JESPGHAN	We recommend H. pylori testing for active infection four weeks or more after completion of eradication therapy to avoid false negative results.	Low	Strong
	JESPGHAN	We recommend that the 13C-urea breath test or stool antigen ELISA test using a monoclonal antibody be employed to confirm eradication.	High	Strong
	JESPGHAN	We recommend against H. pylori tests using endoscopic biopsy specimens (rapid urease test, histological examination, and the culture method) to confirm the eradication of the infection	Low	Conditional.
	JESPGHAN	We recommend against serological tests to detect anti-H. pylori antibodies as a single test to confirm eradication.	High	Strong

Evidence to recommendations: Considerations

The GDG/ GAG was guided by the results of the AGREE II appraisals of the eligible CPGs and thoroughly reviewed the recommendations of the original source WHO CPGs in

consideration of local contextual factors related to the national Egyptian health system like burden of the disease, equity, acceptability, feasibility, and other relevant factors. The GDG decided through an informal consensus process to adopt most recommendations however, there was a need to change the strength of 2 recommendations (B2 and B3) as they lack feasibility. Also, GDG/ GAG develops group of good practice statements to improve acceptability and feasibility.

Implementation Tools and Considerations

To improve healthcare provision, quality, safety, and patient outcome, evidence-based recommendations must not only be developed, but also disseminated and implemented at national and local levels and integrated into clinical practice.

Dissemination involves educating related healthcare providers to improve their awareness, knowledge and understanding of the guideline's recommendations. It is one part of implementation, which involved translation of evidence-based guidelines into real life practice with improvement of health outcomes for the patients.

Implementation requires an evidence-based strategy involving professional groups and stakeholders and should consider the local cultural and socioeconomic conditions. Cost-effectiveness of implementation programs should be assessed.

Specific steps need to be followed before clinical practice recommendations can be integrated into local clinical practice, particularly in low resource settings.

Steps of implementing Pylori diagnosis, treatment, and prevention strategies into the Egyptian health system:

1. Develop a multidisciplinary working group.
2. Assess the status of nutritional care delivery, care gaps and current needs.
3. Select the material to be implemented, agree on the main goals, identify the key recommendations for diagnosis, treatment and prevention and adapt them to the local context or environment.
4. Identify barriers to, and facilitators of implementation.
5. Select an implementation framework and its component strategies.
6. Develop a step-by-step implementation plan:
    - Select the target populations and evaluate the outcome.
    - Identify the local resources to support the implementation.
    - Set timelines.
    - Distribute the tasks to the members.
    - Evaluate the outcomes.
7. Continuously review the progress and results to determine if the strategy requires modification.

Guideline implementation strategies will focus on the following: -

1. **For Practitioners**
    - Educational meetings: conferences, lectures, workshops, grand rounds, seminars, and symposia.
    - Educational materials: printed or electronic information (software).
    - Web-based education: computer-based educational activities.
    - A trained person meets with providers in their practice setting to provide information with the intention of changing the provider's practice. The information may include feedback on the performance of the provider(s).

- Reminders: the provision of information verbally, on papers or on a computer screen to prompt a health professional to recall information or to perform or avoid a particular action related to patient care.
- Optimize professional-patient interactions, through mass media campaigns, reminders, and education materials.
- Practice tools: tools designed to facilitate behavioral/practice changes, e.g., flow charts.

2. **For Patients and care givers**
    - Patient education materials (Arabic booklet): Printed/electronic information aimed at the patient/consumer, family, caregivers, etc.
    - Reminders: the provision of information verbally, on papers or electronically to remind a patient/consumer to perform a particular health-related behaviors.
    - Mass media campaigns.
3. **For Nurses**
    - Educational meetings: lectures, workshops or traineeships, seminars, and symposia.
    - Educational materials: printed.
    - A trained person meets with nurses in their practice setting to provide information with the intention of changing the provider's practice.
    - Reminders: the provision of information verbally, on paper or on a computer screen to prompt them to recall information or to perform or avoid a particular action related to patient care.
    - Practice tools: tools designed to facilitate behavioral/practice changes.
4. **For Stakeholders**

    Plans have been made to contact with all the health sectors in Egypt including all sectors of the Ministry of Health and Population, National Nutrition Institute, University Hospitals, Ministry of Interior, Ministry of Defense, Non-Governmental Organizations, Private sector, and all Health Care Facilities.
    - Information and communication technology: Electronic decision support, order sets, care maps, electronic health records, office-based personal digital assistants, etc.
    - Any summary of clinical provision of health care over a specified period may include recommendations for clinical action. The information is obtained from medical records, databases, or observations by patients. Summary may be targeted at the individual practitioner or the organization.
    - Administrative policies and procedures.
    - Formularies: Drug safety programs, electronic medication administration records.
5. **Other activities to assist the implementation of the adapted guideline's recommendations include:**
    - **International initiative:** Dissemination of the presented adapted CPG internationally via sending the final adapted CPG to the Guidelines International Network (GIN) Adaptation Working Group and contacting the CPG developers.
    - **Gantt chart** has been designed to manage the dissemination and implementation stages for the adapted CPG over an accurate time frame (Appendix).

Guideline Implementation Tools

Educational materials based on this Adapted CPG for treatment of CAP in children have been made available in several forms.

Steps to implementing the guideline:

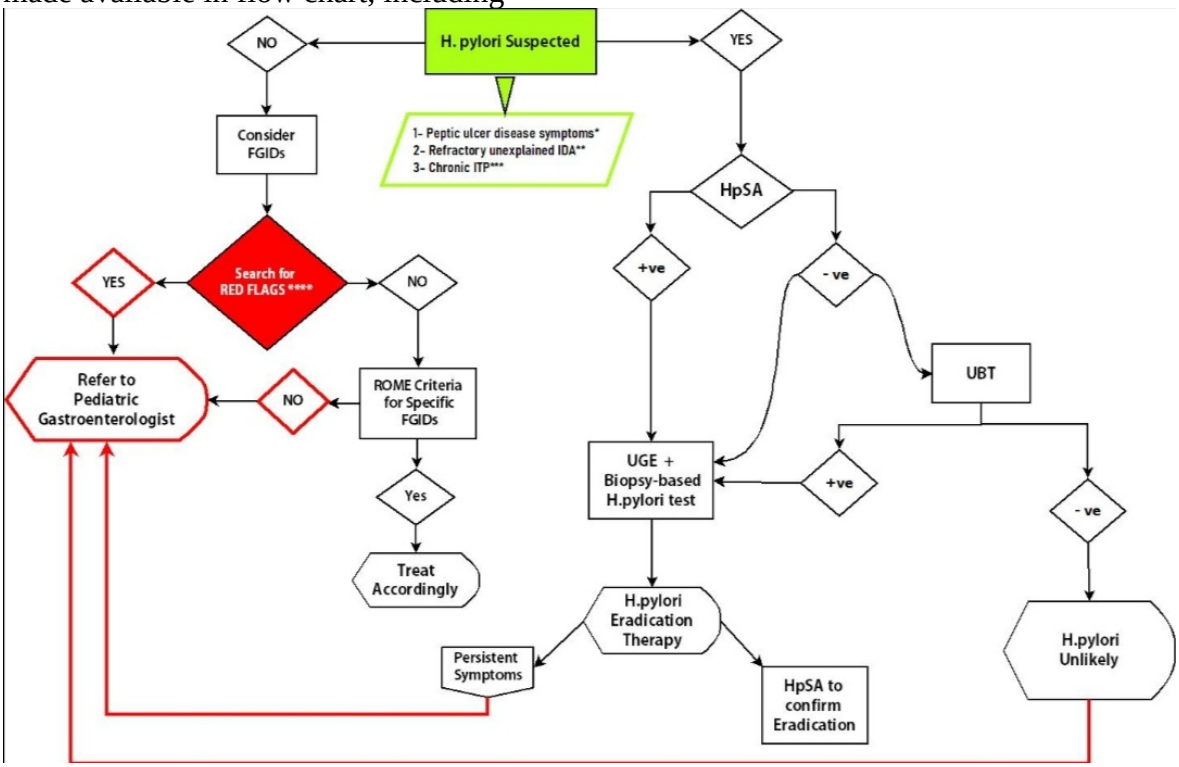
Table (9): CPG implementation strategies

Focus of Strategy	Strategies
Practitioners	• Educational meetings: Conferences, lectures, workshops or traineeships, grand rounds, seminars, and symposia.
	• Educational materials: Printed or electronic information.
	• Web-based education: Computer-based educational activities.
	• Educational outreach/academic detailing: A trained person meets with providers in their practice setting to provide information with the intention of changing the provider's practice. The information may include feedback on the performance of the provider(s).
	• Audit and feedback: Any summary of clinical provision of health care over a specified period; may include recommendations for clinical action. The information is obtained from medical records, databases or observations of patients. Summary may be targeted at the individual practitioner or the organization.
	• Reminders: The provision of information verbally, on paper or on a computer screen to prompt a health professional to recall information or to perform or avoid a particular action related to patient care.
	• Local opinion leaders: Providers nominated by their colleagues as "educationally influential." In general, such individuals are identified by their peer colleagues, are trained as change agents and operate within their communities to teach and enable change.
	• Patient-mediated interventions: Interventions directed at patients (e.g., mass media campaigns, reminders, education materials) to optimize professional–patient interactions.
	• Practice tools: Tools designed to facilitate behavioural/practice changes, e.g., flow charts.
Patients	• Patient education materials: Printed/electronic information aimed at the patient, consumer, family, caregivers, etc.
	• Mass media campaigns
	• Reminders: The provision of information verbally, on paper or electronically to remind a patient/consumer to perform a particular health-related behavior.
	• Decision-support tools: Aids designed to facilitate shared decisions by patients and their physicians
	• Changes to health care teams: Changing tasks or responsibilities of health professionals or compositions of health professional groups.

Organizations and regulatory bodies	• Information and communication technology: Electronic decision support, order sets, care maps, electronic health records, office-based personal digital assistants, etc.
	• Audit and feedback: Any summary of clinical provision of health care over a specified period; may include recommendations for clinical action. The information is obtained from medical records, databases or observations by patients. Summary may be targeted at the individual practitioner or the organization.
	• Administrative procedures/policies
	• Formularies: Drug safety programs, electronic medication administration records.
	• Financial incentives or penalties: The use of remuneration for the performance of certain functions or actions, e.g., screening procedures in primary care.
	• Mandated practices

Example of Dissemination and Implementation Proposed Resources

Educational materials based on this Adapted CPG for *H. pylori* related diseases are made available in flow chart, including



**PUD symptoms involve sudden, sharp abdominal pain, black or bloody stools, and bloody or coffee-like vomits. Other alarm features which warrant prompt gastroenterology referral include anemia, early satiety, unexplained weight loss, progressive dysphagia or odynophagia, and family history of GI cancer (*Chey and Wong, 2007)
***Refractoriness to oral iron is defined as failure to respond to treatment at a dose of at least 100 mg of elemental iron per day after 4 to 6 weeks of therapy (Hershko C and Camaschella C.2014)*
****Chronic ITP is defined by ITP persistence beyond 12 months, with spontaneous recovery occurring in less than 10% of adults (William B and Mitchell MD, 2019)*

*****Functional bowel disorders are heterogeneous group of disorder, the most prevalent of which is irritable bowel syndrome (IBS) and functional abdominal pain (FAP) syndrome. FAP characterized by frequent or continuous abdominal pain associated with a degree of loss of daily activity, in the absence in change in bowel habits (Farmer AD and Aziz Q.2014)*

Limitations and suggestions for further research needs

Future research recommendations for the management of Pylori in children in the Egyptian context could include:

- Teaching upper GIT endoscopy to be able to diagnose H.pylori.

These recommendations aim to address specific challenges and characteristics of the Egyptian context, potentially leading to more effective prevention and management strategies for Pylori in children.

Challenges

- teaching upper gastrointestinal endoscopy to medical practitioners and being able to use it for diagnosing H.pylori.

Strengthen the evidence base of the next update of this guideline by generating GRADE summary of finding tables, evidence profiles, and EtD frameworks.

Monitoring and evaluating the impact of the guideline.

The following are three performance measures or indicators for implementing this adapted CPG for H. Pylori. in children:

1. **Adherence to H. Pylori diagnosis and treatment Guidelines**
   - *Numerator:* Number of children with H. Pylori who received treatment as per guideline recommendations.
   - *Denominator:* Total number of children diagnosed with H. Pylori
   - *Data Source:* Hospital or clinic patient records.
2. **Duration of Hospital Stay**
   - *Numerator:* Total number of hospitals stay days for children with H. Pylori
   - *Denominator:* Total number of children admitted with H. Pylori
   - *Data Source:* Hospital admission and discharge records.
3. **Rate of Readmission**

- *Numerator:* Number of children readmitted with symptoms of H. Pylori within a certain period (e.g., 30 days) after discharge.
- *Denominator:* Total number of children initially admitted with H. Pylori
- *Data Source:* Hospital readmission records.

These key performance indicators are designed to measure the effectiveness and adherence to the guidelines, the efficiency of the treatment in terms of resource utilization (hospital stay), and the success of the treatment in preventing further complications (readmissions).

Updating of the guideline

The EPG Gastroenterology GAG has decided to conduct the next review of this adapted CPG for updates after five years. This should be carried out in 2029 after checking for updates in the source CPGs, consultation of expert opinion on the changes needed for updating according to the newest evidence and recommendations published in this area and the clinical audit and feedback from implementation efforts in the aforementioned local healthcare settings except if any breakthrough evidence- based recommendations are published before that date. The process will be guided by the Checklist for the Reporting of Updated Guidelines (CheckUp) Tool that is freely provided by the AGREE Enterprise and by the Reporting Items for Practice Guidelines in Healthcare (RIGHT) extension for adapted guidelines RIGHT-Ad@pt Checklist.

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Annexes

Annex Table 1.
Declaration of Conflict of Interests

The members of the guideline development/ adaptation group and the external review group have no academic, financial, or competing interests to declare and none of them were involved in the development of the original source guideline(s).
Any identified potential COI has been reported below.

Egyptian Pediatric Clinical Practice Guidelines Committee (EPG) *Guideline Development/ Adaptation Group (Clinicians subgroup)*		
Name	**Affiliation, Area of expertise / Country / Primary location [work]**	**Contribution**
Suzan Samir Gad (moderator)	**MD, Suez Canal University**	coordinate and supervise the guidelines development process, share in collecting published guidelines from databases, attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft,
Ahmed Foad	**MD, Alexandria University**	Supervise and share in collecting published guidelines from databases, attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft
Ahmed Hamdy	**MD, Ain Shams University**	Attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft
Amal Mahfouz	**MD, Alexandria University**	Collecting published guidelines from databases, attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft
Ayman Emil Eskandr	**MD, Cairo University**	Collecting published guidelines from databases,

		attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft
Gihan Bebars	**MD, Minia University**	Collecting published guidelines from databases, attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft
Hala Hussien Mansour	**MD, Cairo University**	Collecting published guidelines from databases, attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft
Hanan Fathy	**MD, Cairo University**	Collecting published guidelines from databases, attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft
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Mohamed Ezz	**MD, Mansoura University**	Collecting published guidelines from databases, attending online meetings of GDG, sharing in writing up the manuscript and revising its final draft
Naglaa Abu Faddan	**MD, Assuit University**	Collecting published guidelines from databases, attending online meetings of GDG, shares also in the guidelines appraisal, and she was the main organizer of the guidelines draft, and revising its final draft

Sara Tarek	MD, Cairo University	
Egyptian Pediatric Clinical Practice Guidelines Committee (EPG) ***Guideline Development/ Adaptation Group (Guideline Methodologists subgroup)***		
Name	**Affiliation, Area of expertise / Country / Primary location [work]**	**Contribution**
Prof. Ashraf Abdel Baky	Professor of Pediatrics Ain Shams University, Egypt Founder and Chair of EPG	Overseeing the adolopment process of the guidelines, training and education of new members, revision of the final draft, and organizing online meetings of GDG
Dr. Yasser Sami Amer	3. Pediatrics Department and Clinical Practice Guidelines and Quality Research Unit, Quality Management Department, King Saud University Medical City, Riyadh, Saudi Arabia; 4. Research Chair for Evidence-Based Health Care and Knowledge Translation, King Saud University, Riyadh, Saudi Arabia; 5. Chair, Adaptation Working Group, Guidelines International Network (GIN), Perth, Scotland 6. Department of Internal Medicine, Ribeirão	Overseeing the adolopment process of the guidelines, training and education of new members, participating in writing up the methodology of adaptation process, guideline appraisal, and revision of the final draft

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Dr. Nahla Gamaleldin	Lecturer of pediatrics, Faculty of Medicine, Modern University for Technology and Information (MTI), Egypt	Participating in multiple steps of the guideline adaptation process, Writing the methodology of adaptation process and revised the whole document.

External Reviewers Group (ERG)	
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Web annexes

The following annexes can be added as a package of standalone supplementary documents.

Keywords: The MeSH terms for "Guideline for the diagnosis and management of H. Pylori in **related diseases in children and adolescent**" on PubMed are: H. pylori. Children, adolescent, guidelines