**Clinical Question**

<table>
<thead>
<tr>
<th>Suggested Strategies/Resources</th>
</tr>
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<tbody>
<tr>
<td><strong>Who should be tested for <em>H. pylori</em></strong>?</td>
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<tr>
<td>- Active peptic ulcer disease</td>
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<tr>
<td>- After resection of early gastric cancer</td>
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<tr>
<td>- Dyspepsia undergoing upper endoscopy or histology (asymptomatic patients already receiving is unclear)</td>
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<tr>
<td>- History of peptic ulcer disease, unless document cure of <em>H. pylori</em></td>
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<td>- Gastric MALT lymphoma</td>
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<td><em>Insufficient evidence to recommend routine testing in patients with the following:</em></td>
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**PPI Equivalent Doses for the Regimens Discussed Below:**

- Dexlansoprazole 30 to 60 mg = Esomeprazole 20 mg |
- Lansoprazole 30 mg = Omeprazole 20 mg |
- Lansoprazole 30 mg = Pantoprazole 40 mg |
- Rabeprazole 20 mg

**Abbreviations:**
- BID = twice daily |
- TID = three times daily |
- QD = once daily |
- QID = four times daily |
- PPI = proton pump inhibitor |
- MALT = mucosa associated lymphoid tissue |
- UBT = urea breath test |

How to use the recommended treatment regimen for *H. pylori*:

- **Initial PPI treatment** in patients with the following: |
  - *Insufficient evidence to recommend routine testing in patients with the following:* |
  - Family history of gastric cancer |
  - Gastroesophageal reflux disease without a history of peptic ulcer disease |
  - Hyperemesis gravidarum |
  - Carcinoid tumors of the alimentary tract (e.g., rectal, duodenal, cholangitis, weight loss) |
  - Uninvestigated dyspepsia without alarm features (e.g., blood, dysphagia, weight loss) |

- **PPI Eradication Doses for the Regimens Discussed Below:**

1. **BID Equivalent**: 1 dose of PPI/day. UBT = urea breath test.
### Clinical Question

**Which test are used with biopsy tissue obtained during endoscopy?**

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<tr>
<th>Test</th>
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<th>Disadvantages</th>
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<tr>
<td>Rapid Urease Test (RUT)</td>
<td>Advantages: Inexpensive, very good sensitivity, rapid results (usually within one to 24 hours)</td>
<td>Disadvantages: Reduced sensitivity, requires breath test for post-treatment results.</td>
</tr>
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<td><strong>Advice:</strong></td>
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### Suggested Strategies/Resources

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<td>Histology</td>
<td>Advantages: Excellent sensitivity and specificity</td>
<td>Disadvantages: Reduced sensitivity post-treatment results.</td>
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### Which test should be used for patients NOT undergoing endoscopy?

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**Polymerase Chain Reaction**

- **Advantages:** Excellent specificity and sensitivity, provides antimicrobial sensitivities.
- **Disadvantages:** Lack of standardization across locations, not widely available.
- **Recommendation:** Consider for endoscopy to assess antimicrobial sensitivities.

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**Urea Breath Test (UBT)**

- **Advantages:** Useful before and after treatment.
- **Disadvantages:** Inconsistent availability and reimbursement.
- **Recommendation:** If testing for eradication of H. pylori.

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**Fecal Antigen Test**

- **Advantages:** Useful before and after treatment.
- **Disadvantages:** Requires stool collection, less validated than UBT for post-treatment results, requires stool collection.
- **Recommendation:** If testing for eradication of H. pylori.

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**Antibody Testing**

- **Advantages:** Inexpensive, rapid results.
- **Disadvantages:** Less accurate post-treatment; avoid in patients with previous H. pylori treatment.
- **Recommendation:** Test repeatedly after treatment failure to assess antibiotic sensitivities.

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**Cultures**

- **Advantages:** Excellent sensitivity and specificity.
- **Disadvantages:** Requires specialized equipment, provides antimicrobial sensitivities.
- **Recommendation:** If no recent use of PPI (past one to two weeks) of bismuth (past four weeks).

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**Polymerase Chain Reaction**

- **Advantages:** Excellent sensitivity and specificity.
- **Disadvantages:** Reduced sensitivity post-treatment results.
- **Recommendation:** Test repeatedly after treatment failure to assess antibiotic sensitivities.
Clinical Question
Suggested Strategies/Resources

Which H. pylori regimens are recommended first-line?

- Bismuth quadruple therapy,* referred to as PBMT [PPI + Bismuth + Metronidazole + Tetracycline] in Canadian guidelines
- Concomitant quadruple therapy,** referred to as PAMC [PPI + Amoxicillin + Metronidazole + Clarithromycin] in Canadian guidelines

Which H. pylori regimen is also offered a 10-day option, with one of the following preferred options for most patients:

- Rabeprazole 20 mg BID or an equivalent dose of an alternate PPI
- Amoxicillin 1000 mg BID
- Metronidazole 500 mg BID
- Clarithromycin 500 mg BID

*Consider using Prevpac (U.S.) or Hp-PAC (Canada), which contains a PPI (lansoprazole), amoxicillin, and clarithromycin, concomitantly with metronidazole depending on cost.

**Consider using Prevac (U.S.) or Hp-PA (Canada), which contains a PPI (lansoprazole), amoxicillin, and clarithromycin, concomitantly with metronidazole depending on cost.

When should clarithromycin triple therapy be considered?

- Clarithromycin triple therapy can be considered in areas with documented clarithromycin-resistance rates of <15%.
- Unfortunately, these resistance rates are not always readily available and change over time.
- When resistance tests are not available, testing for proof of eradication can be considered, especially if symptoms persist.
- If resistance tests are not available, lasting for proof of eradication can be considered, especially if symptoms persist.

Clarithromycin triple therapy can be considered in areas with documented clarithromycin-resistance rates of <15%.
The following are the preferred clarithromycin triple therapy regimens:

- **Clarithromycin triple therapy (referred to as PAC [PPI + Amoxicillin + Clarithromycin] or PMC [PPI + Metronidazole + Clarithromycin] in Canadian guidelines) for 14 days with one of the following regimens can be considered in patients with no history of any macrolide use (especially use for >14 days in U.S.) or in areas with proven high local eradication rates of >85% (Canada):**
  - PPI: omeprazole 20 mg BID or an equivalent dose of an alternate PPI
  - Amoxicillin 1000 mg BID for seven days
  - Clarithromycin 500 mg BID for seven days
  - Metronidazole 20 mg BID or an equivalent dose of an alternate PPI

- **Sequential therapy (U.S. only):**
  - PPI: omeprazole 20 mg BID or an equivalent dose of an alternate PPI
  - Amoxicillin 1000 mg BID for five to seven days
  - Metronidazole 500 mg BID for five to seven days
  - Clarithromycin 500 mg BID for five to seven days

- **Hybrid therapy:**
  - PPI: omeprazole 20 mg BID or an equivalent dose of an alternate PPI
  - Amoxicillin 1000 mg BID for five to seven days
  - Metronidazole 20 mg BID or an equivalent dose of an alternate PPI
  - Clarithromycin 500 mg BID for five to seven days

What additional alternative regimens can be considered first-line?

- **Clarithromycin triple therapy continued:**
  - Levofloxacin 500 mg QD
  - Amoxycillin 1000 mg BID
  - Amoxycillin 20 mg BID or an equivalent dose of an alternate PPI
  - OR
  - Clarithromycin 500 mg BID
  - Amoxycillin 1000 mg BID
  - Amoxycillin 20 mg BID or an equivalent dose of an alternate PPI

High local eradication rates of >85% (Canada): considered in patients with no history of any macrolide use (especially use for >14 days in U.S.) or in areas with proven high local eradication rates of >85% (Canada). The following are the preferred clarithromycin triple therapy regimens:
### Clinical Question

**Alternatives to first-line regimens, continued**

- **Levofloxacin sequential therapy** (U.S. only):  
  - PPI: omeprazole 20 mg to 40 mg BID or an equivalent dose of an alternate PPI for five to seven days  
  - Amoxicillin 1000 mg BID for five to seven days  
  - Followed by five to seven days of:  
    - PPI: omeprazole 20 mg to 40 mg BID or an equivalent dose of an alternate PPI  
    - Amoxicillin 1000 mg BID  
    - Levofloxacin 500 mg QD  
    - Metronidazole 500 mg BID  
  - **LOAD therapy** ([*Levo*](U.S. only):  
    - Levofloxacin 250 mg QD  
    - PPI: omeprazole 40 mg once daily or an equivalent dose of an alternative PPI  
    - Nitazoxanide 500 mg BID  
    - Doxycycline 100 mg QD

### Clinical Question

**Which *H. pylori* regimens should be used after treatment failure (e.g., salvage therapy)?**

- Treatment failures can be due to either antibiotic failure due to resistance and/or lack of patient adherence.  
  - Consider the following AFTER treatment failure with one of the first-line (or alternative first-line) regimens:  
    - Resistance to clarithromycin, fluoroquinolones, and rifabutin correlates strongly with their previous use.  
    - Resistance to amoxicillin and tetracycline is rare, even with previous use.  
    - Avoid retreating with clarithromycin-containing regimens after a clarithromycin failure.  
    - Referral for allergy testing can be considered with a penicillin allergy history, as many regimens contain amoxicillin.  
    - For most patients, recommend treating with 14 days with bismuth quadruple therapy or levofloxacin triple therapy (referred to as PBMT or PAL, respectively in Canadian guidelines). See regimen descriptions above.
  - The following can be considered to possibly improve eradication:  
    - Adding bismuth to levofloxacin triple therapy (referred to as PAL in Canadian guidelines)  
    - Increasing the metronidazole and/or PPI dose, if retreating with bismuth quadruple therapy (referred to as PBMT in Canadian guidelines)  
    - Avoid levofloxacin triple therapy (referred to as PAL in Canadian guidelines) if associated with a prior failure or in patients with prior quinolone exposure.

*Continued...*
Clinical Question
Suggested Strategies/Resources

**Continued treatment failure, continued**

For patients not appropriate for or unable to take bismuth quadruple therapy or levofloxacin triple therapy (referred to as PBMT or PAL, respectively in Canadian guidelines), the following regimens can be considered:

1. **Concomitant quadruple therapy for ten to 14 days (U.S. only).**
   - See regimen description above.

2. **High-dose dual therapy** for ten to 14 days (U.S. only).
   - **PBMT or PAL.**
   - Preferred to as PBMT, especially in Canadian guidelines. (Refer to as PBMT or PAL, respectively in Canadian guidelines. The dual regimen can be considered along with additional treatment for those who fail.)

**Who should be tested to confirm eradication of \( \text{H. pylori} \)?**

- Patients with an \( \text{H. pylori} \)-associated ulcer, especially bleeding peptic ulcers.
- Patients with persistent dyspepsia after \( \text{H. pylori} \) treatment.
- Patients with \( \text{H. pylori} \)-associated MALT lymphoma.
- Patients with a history of resection associated with gastric cancer.

**Should probiotics be recommended to improve efficacy or tolerability?**

- **Avoid recommending probiotics to improve \( \text{H. pylori} \) eradication.**
  - Data are inconsistent, ingredient combinations vary, and more trials, including use with quadruple therapy, are needed.
  - Increases cost and complexity of treatment.
  - Don’t routinely recommend, but don’t discourage use to improve treatment tolerability (e.g., reduce diarrhea).

**When should eradication testing be performed?**

- For the most accurate results use the UBT or fecal antigen test at least four weeks after treatment.
- If also recommended to withhold PPI therapy for one to two weeks prior to eradication testing.
- Patients with \( \text{H. pylori} \)-associated gastric ulcer, especially bleeding peptic ulcers.

Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical decisions. Information and internet links in this article were current as of the date of publication.