Healthcare Cost Savings in the Year Following Successful Eradication of *Helicobacter pylori* With Current US Guideline-Recommended Treatment

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BACKGROUND

- *Helicobacter pylori* (HP) colonizes approximately 36% of the US population and is a major risk factor for peptic ulcer disease (PUD) and gastric cancer (GC).[1]
- HP eradication is associated with a reduced risk of PUD complications and reduced incidence of GC.[2,3]
- There is currently no direct evidence of the costs associated with HP eradication treatment failure.

OBJECTIVES

- To estimate healthcare cost savings in the year following successful lab-confirmed HP eradication with US guideline-recommended treatment compared to failed eradication.

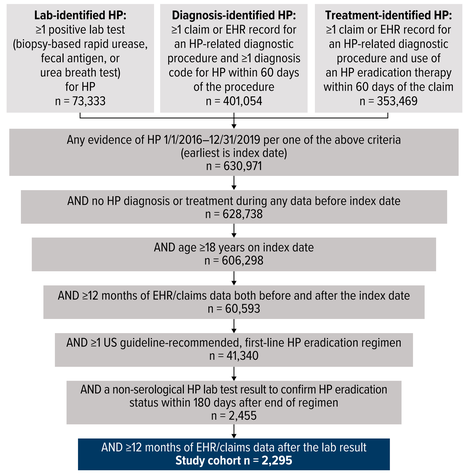
METHODS

Data source

- The Veradigm® electronic health record (EHR) database linked to medical and pharmacy claims from Komodo Health® (1/1/2015–07/31/2021).

Cohort selection

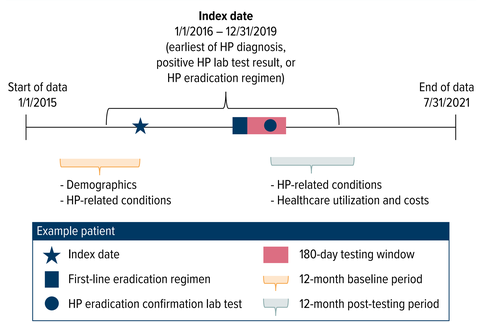
Figure 1. Cohort selection criteria



EHR, electronic health record; HP, *Helicobacter pylori*.

Study design

Figure 2. Study design



HP, *Helicobacter pylori*.

- The study cohort consisted of patients who had HP–non-invasive, non-serological test results (i.e. rapid urease, fecal antigen, or urea breath test) within 180 days following a first HP eradication regimen identified via pharmacy claims (**Figures 1 and 2**). Only those with positive or negative results were included; patients with equivocal tests or tests outside of the predefined time window were excluded.
- Patients with positive non-serology HP testing following eradication treatment were classified as "HP eradication failures", while patients with negative testing were classified as "HP eradication successes".
- Qualifying first-line HP eradication regimens were those recommended by current US evidence-based guidelines.[4]

Study measures

- We captured demographics, HP-related conditions, and HP-related healthcare costs.
- HP-related healthcare costs in the 12 months post HP non-serology lab test were captured and included: costs of outpatient claims with an HP diagnosis in any position, inpatient claims with HP as the admitting diagnosis on the claim, and pharmacy claims for gastrointestinal-related medications (e.g. antacids and sucralfate), including repeat courses of HP eradication treatment.

Statistical analysis

- We compared costs between patients classified as eradication treatment failures vs successes. We used a generalized linear model to assess eradication cost savings adjusted for HP eradication status and the covariates listed in **Table 1**. We also included in the models the interaction between each HP-related condition and eradication status.
  - HP-related conditions were measured in the 12-month post-eradication testing period.

RESULTS

- A total of 2,295 patients met the inclusion criteria and 80% had lab-confirmed successful HP eradication (i.e. negative non-serological testing) following guideline-recommended therapy.
- The percentage of patients with diagnosis codes for any HP-related condition decreased following successful eradication; smaller decreases were observed among patients with eradication failure (**Table 1**).
  - Dyspepsia frequency decreased by 8.0% following successful eradication compared with 2.2% following failed eradication.
  - The percentage of patients with a diagnosis code for gastritis decreased by 6.4 percentage points following successful eradication but increased by 13.9 percentage points following failed eradication.

Table 1. Patient characteristics

	Patients with lab-confirmed eradication success		Patients with lab-confirmed eradication failure	
	Baseline period	Post-eradication testing period	Baseline period	Post-eradication testing period
Patient characteristic	N = 1,835	N = 1,835	N = 460	N = 460
Age, mean (SD)	54.0 (14.9)		53.7 (14.4)	
Female, n (%)	1,219 (66.4)		339 (73.7)	
Geographic region of residence, n (%)				
Northeast	308 (16.8)		67 (14.6)	
Midwest	159 (8.7)		57 (12.4)	
South	714 (38.9)		179 (38.9)	
West	524 (28.6)		124 (27.0)	
Other/unknown	130 (7.1)		33 (7.2)	
Body mass index, mean (SD)	28.7 (6.4)		28.6 (6.5)	
HP-related conditions,[a] n (%)				
Peptic ulcer (gastric/duodenal)	71 (3.9)	45 (2.5)	13 (2.8)	11 (2.4)
Gastric polyp	28 (1.5)	21 (1.1)	5 (1.1)	4 (0.9)
Functional dyspepsia	167 (9.1)	101 (5.5)	64 (13.9)	51 (11.1)
Gastritis	607 (33.1)	490 (26.7)	158 (34.3)	222 (48.3)
Atrophic gastritis	29 (1.6)	37 (2.0)	12 (2.6)	18 (3.9)
Esophagitis	178 (9.7)	129 (7.0)	57 (12.4)	53 (11.5)
Dyspepsia	490 (26.7)	343 (18.7)	136 (29.6)	126 (27.4)
Gastroesophageal reflux disease	781 (42.6)	705 (38.4)	238 (51.7)	240 (52.2)
Idiopathic thrombocytopenic purpura	3 (0.2)	1 (0.1)	0 (0.0)	1 (0.2)

[a]Defined as having a diagnosis code for the condition of interest during the defined time period. We did not require evidence of diagnostic testing for the condition of interest.
HP, *Helicobacter pylori*; SD, standard deviation.

HP-related costs following eradication testing

- The mean (standard deviation) unadjusted HP-related cost in the 12-month post-eradication testing period was $233 ($696) for patients with successful eradication and $705 ($1,285) for patients with failed eradication.
- The marginal effect on HP-related costs was highest for a diagnosis code indicating PUD ($2,181; $P < 0.001$), gastric polyp ($1,585; $P < 0.001$), and functional dyspepsia ($714; $P < 0.001$) in the 12 months post eradication (**Table 2**).
- After controlling for other variables, eradication alone was not associated with a difference in HP-related costs; however:
  - HP eradication in patients with a diagnosis code indicating PUD was associated with cost savings of $1,770 ($P < 0.001$; **Table 2**).
  - HP eradication was also associated with significant savings for patients with a diagnosis code indicating atrophic gastritis (-$518; $P = 0.027$), functional dyspepsia (-$494; $P < 0.001$), or gastritis (-$352; $P < 0.001$).

Table 2. Marginal effects of reduction in HP-related costs associated with HP eradication

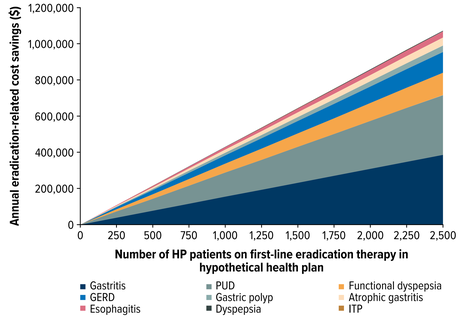
	Cost estimate[a]	95% confidence limits		*P*-value
		Lower	Upper	
Intercept	$244 .16	-$1.00	$489.33	0.051
Age	-$1.16	-$3.31	$0.99	0.291
Sex	-$1.97	-$69.97	$66.04	0.955
BMI	-$3.44	-$8.39	$1.51	0.173
Geographic region of residence				
Northeast	$189.42	$46.33	$332.50	0.010
Midwest	-$33.11	-$189.66	$123.44	0.678
South	-$42.55	-$171.68	$86.58	0.518
West	$6.35	-$126.48	$139.18	0.925
Clinical conditions 12 months post eradication testing				
PUD	$2,181.05	$1,715.09	$2,647.00	< 0.001
Gastric polyp	$1,585.34	$808.91	$2,361.76	< 0.001
Functional dyspepsia	$714.45	$476.77	$952.13	< 0.001
Gastritis	$625.83	$473.99	$777.67	< 0.001
Atrophic gastritis	$569.66	$189.66	$949.66	0.003
Esophagitis	$212.51	-$28.01	$453.03	0.083
Dyspepsia	$187.13	$17.67	$356.58	0.031
GERD	$149.62	-$2.25	$301.50	0.054
ITP	$105.13	-$1,391.31	$1,601.57	0.890
Eradicated HP after first-line treatment	-$37.59	-$165.04	$89.87	0.563
Cost saving after eradication (interaction term)				
PUD x eradicated	-$1,769.56	-$2,289.67	-$1,249.45	< 0.001
Gastric polyp x eradicated	-$524.26	-$1,369.71	$321.18	0.224
Functional dyspepsia x eradicated	-$494.10	-$780.25	-$207.96	< 0.001
Gastritis x eradicated	-$352.13	-$528.03	-$176.23	< 0.001
Atrophic gastritis x eradicated	-$517.77	-$977.81	-$57.74	0.027
Esophagitis x eradicated	-$84.02	-$365.85	$197.82	0.559
Dyspepsia x eradicated	-$5.34	-$200.58	$189.91	0.957
GERD x eradicated	-$90.79	-$262.09	$80.51	0.299
ITP x eradicated	-$202.33	-$2,320.29	$1,915.64	0.851

[a]Negative numbers represent cost savings.
BMI, body mass index; GERD, gastroesophageal reflux disease; HP, *Helicobacter pylori*; ITP, immune thrombocytopenic purpura; PUD, peptic ulcer disease.

Cost scenario example

- Health plans with 100 HP patients who are on first-line eradication therapy may have an estimated $42,000 in cost savings in the first year due to successful eradication and the associated decrease in HP-related conditions (**Figure 3**).
- Health plans with ≥2,500 HP patients who are on first-line eradication therapy have an estimated $1,070,000 in cost savings in the first year.
  - The estimations take into account the probability that treated patients may have an HP-related condition.

Figure 3. Hypothetical health plan cost savings



GERD, gastroesophageal reflux disease; HP, *Helicobacter pylori*; ITP, immune thrombocytopenic purpura; PUD, peptic ulcer disease.

CONCLUSIONS

- The presence of diagnosis codes for select HP-related conditions is associated with higher HP-related costs following first-line eradication therapy.
- Successful eradication was associated with significantly lower costs among patients with diagnosis codes for certain HP-related conditions in the first year.
- Additional research is warranted to determine the potential costs of HP eradication failure in the context of long-term complications such as gastric cancer.

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Disclosures

SS and **RY** are consultants for Phathom Pharmaceuticals. **KC**, **RS**, and **MB** are employees of Veradigm, which received funding from Phathom Pharmaceuticals to conduct this study. **CP** and **RJ** are employees of Phathom Pharmaceuticals.

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