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Disparities in Helicobacter pylori Infection Among Gastric Cancer Patients: Insights from the National Inpatient Sample (NIS)

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BACKGROUND

- Despite having a high disease burden in the United States and worldwide, there are currently no effective ways to screen for gastric cancer early on.
- In 2018, gastric cancer was the third leading cause of cancer-related death, with a mortality rate of 800,000 deaths per that year.[2]
- While the incidence of gastric cancer has shown to go down recently due to efforts of eradication of *Helicobacter pylori* (*H. pylori)* infection, the incidence seems to continually arise in many urban areas, prompting the search for a screening protocol.[3]
- One way to potentially screen for gastric cancer is through *H. pylori* antigen testing as gastric cancer is a consequence of *H. pylori* infection in over 90% cases.[4]
- While *H. pylori* infection seems highly indicative of developing gastric cancer down the line, external environmental factors, such as dietary components and essential micronutrients, can affect *H. pylori* activity as commensalistic or pathogenic.[1]
- There is currently no unified protocol across the United States regarding when to order *H. pylori* serology for patients, which could be a useful tool for screening for gastric cancer due to its long-term pathobiology.
- By reviewing the literature, methods for screening gastric cancer through *H. pylori* antigen testing can be identified, addressed at the national level, and highlighted as actionable areas for gastroenteric and oncological organizations to address.

OBJECTIVE

The objective of this study was to assess the prevalence and temporal trends of H. pylori among gastric cancer patients in the United States and to determine the effect of gender, race/ethnicity, and other sociodemographic factors on the trend of gastric cancer incidence, using the Nationwide Inpatient Sample (NIS).

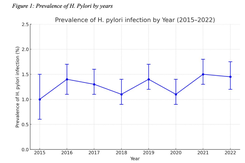
MATERIALS & METHODS

- We conducted a cross-sectional analysis of adult patients with gastric cancer in using the National Inpatient Sample (NIS) from 2015–2022. H. pylori infection was identified using ICD-10-CM codes.
- Covariates included demographics (age, sex, race/ethnicity, income quartile, primary payerpayer status), comorbidity burden (Charlson Comorbidity Index, (CCI), hospital-level factors (region, teaching status, bed size), alcohol use disorder (AUD), and COVID-19 era (pre-COVID: 2015–2019; COVID: 2020–2022). Descriptive statistics reported raw counts and weighted percentages.
- Survey-weighted logistic regression identified predictors of H. pylori infection and associations with outcomes: ELOS >5 days, in-hospital mortality, and non-home discharge.

Table 1: Racial Ethnic Disparities and Additional Predictors of H. pylori Infection in Patients with Gastric Adenocarcinoma

Racial/Ethnic Disparities — Adjusted Odds of H. pylori		
Hispanic	aOR 2.86	95% CI 2.35–3.49
Asian/Pacific Islander	aOR 2.74	95% CI 2.12–3.53
Black	aOR 2.49	95% CI 2.02–3.06
Other	aOR 1.70	95% CI 1.18–2.45
Additional Predictors of H. pylori Infection		
Alcohol Use Disorder	aOR 2.02	95% CI 1.50–2.72
"Other" Insurance	aOR 1.45	95% CI 1.11–1.90
Mild CCI	aOR 1.37	95% CI 1.08–1.74
Medicaid	aOR 1.25	95% CI 1.02–1.53
Older Age (per year)	aOR 0.99	95% CI 0.98–0.99

Figure 1: Prevalence of H. Pylori by years



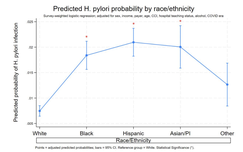


Figure 1 demonstrates the prevalence of H. pylori infection by year (2015-2022), while **Figure 2** demonstrates the race/ethnicity=based distribution of individuals that had both ICD-10 codes for gastric adenocarcinoma and for H. pylori. Hispanics were 2.77 times more likely to have H. pylori-related gastric cancer than non-Hispanics. The adjusted odds ratios for both racial/ethnic disparities and additional predictors of H. pylori infection are listed in **Table 1.**
Table 2 shows the association between H. pylori and hospital outcomes in patients with gastric adenocarcinoma.

Table 2: Association Between H. pylori and Hospital Outcomes in Population with Gastric Cancer (N=288,775)

Outcomes	aOR (95% CI)	p
LOS >5 days	1.87 (1.61–2.16)	**<0.001**
In-hospital mortality	0.30 (0.19–0.48)	**<0.001**
Non-home discharge (alive)	0.55 (0.44–0.67)	**<0.001**

Note: Models adjusted for age, sex, race, income quartile
aOR = Adjusted Odds Ratio; 95% CI = 95% Confidence Interval.
Statistical significance was defined as $p < 0.05$. Exact p-values are shown.
Significant p-values are shown in **bold**.

RESULTS

- Among 60,214 unweighted hospitalizations (weighted N=301,070), *H. pylori* prevalence was 1.3% with no significant temporal trend (p=0.17).
- In adjusted models, Black (aOR 2.49, 95% CI 2.02–3.06), Hispanic (aOR 2.86, 95% CI 2.35–3.49), Asian/PI (aOR 2.74, 95% CI 2.12–3.53), and other (aOR 1.70, 95% CI 1.18–2.45) race had higher odds of *H. pylori* than White race.
- Additional predictors of infection included Medicaid (aOR 1.25, 95% CI 1.02–1.53), "Other" insurance (aOR 1.45, 95% CI 1.11–1.90), mild CCI (aOR 1.37, 95% CI 1.08–1.74), and AUD (aOR 2.02, 95% CI 1.50–2.72). Older age was associated with lower odds (aOR 0.99 per year, 95% CI 0.98–0.99).
- *H. pylori* infection was linked to increased ELOS (aOR 1.87, 95% CI 1.61–2.16) but decreased in-hospital mortality (aOR 0.30, 95% CI 0.19–0.48) and non-home discharge (aOR 0.55, 95% CI 0.44–0.67).

CONCLUSIONS

- The incidence of H. Pylori-related gastric adenocarcinoma is rising in the United States.
- Among patients hospitalized with gastric cancer, *H. pylori* infection disproportionately affected older patients in racial minorities, those with public or non-traditional insurance, mild comorbidity, and AUD.
- Despite association with prolonged hospitalization, infection was paradoxically linked to reduced in-hospital mortality and non-home discharge, highlighting disparities in infection burden and suggesting a complex relationship between *H. pylori* and outcomes that warrants further study.
- A limitation of this study is that it is a cross-sectional study of ICD10 code diagnoses. Furthermore, H. pylori diagnoses were determined by ICD10 code, but a stronger indicator would be H. pylori serology results as that would be definitive criteria for not having H. pylori-related gastric adenocarcinoma.

FUTURE STEPS

- There is no standardized national screening protocol in place to identify high-risk patients for occult *H. Pylori* infection nor a consensus on the best methods of detection in these populations.
- This study lacks specificity for the racial differences between H. pylori-related gastric adenocarcinoma among migrant populations, which could be a contributing factor to the rise in gastric adenocarcinoma in the United States, which could be another area to study further.
- Further studies can identify a screening program using *H. pylori* serology, addressing actionable areas for gastroenteric and oncological organizations to address effectively.

BIBLIOGRAPHY

1. Amieva M, Peek RM Jr. Pathobiology of Helicobacter pylori-Induced Gastric Cancer. *Gastroenterology*. 2016;150(1):64-78. https://doi.org/10.1053/j.gastro.2015.09.004
2. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries [published correction appears in CA Cancer J Clin. 2020 Jul;70(4):313]. *CA Cancer J Clin*. 2018;68(6):394-424. https://doi.org/10.3322/caac.21492
3. Lee YC, Chiang TH, Chou CK, et al. Association Between Helicobacter pylori Eradication and Gastric Cancer Incidence: A Systematic Review and Meta-analysis. *Gastroenterology*. 2016;150(5):1113-1124.e5. https://doi.org/10.1053/j.gastro.2016.01.028
4. Petryszyn P, Chapelle N, Matysiak-Budnik T. Gastric Cancer: Where Are We Heading?. *Dig Dis*. 2020;38(4):280-285. https://doi.org/10.1159/000506509