# P04 Epidemiology and Transmission

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## SYMPTOMATIC MANIFESTATIONS OF *H. PYLORI*-ASSOCIATED DISEASE IN A NORTHERN CANADIAN COMMUNITY

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This analysis describes symptomatic manifestations of *H. pylori*-associated disease in an Aboriginal community in the Northwest Territories. In 2008, we invited participants in the Aklavik *H. pylori* Project to undergo endoscopy with gastric biopsy, without restricting symptom or *H. pylori* status, in temporary endoscopy units at the Aklavik Health Center. Gastroenterologists followed a standard protocol to note endoscopy findings and collect biopsies (2 antrum, 1 incisura, 2 corpus). One pathologist examined all biopsies, using hematoxylin-eosin & Giemsa stains, and scored *H. pylori* density, acute and chronic inflammation, gastric atrophy, and intestinal metaplasia on the updated Sydney System four-point scale (0–3). Each individual was assigned the highest score of examined biopsies for each variable. We interviewed participants to ascertain digestive symptoms using a validated questionnaire. Specific symptoms were grouped into none/any and categorized by the highest severity mentioned. Hundred and eight-nine participants (10–80 years, 57% female) had complete data. Across all diagnostic categories, 33–50% of participants were asymptomatic. In 22 participants with severe symptoms, 55% were *H. pylori* negative, and 41% had normal histopathology. Participants with endoscopically diagnosed lesions were more likely to have sought medical care for stomach problems, but those with more severe histopathology were, in general, less likely to have done so. Our report reveals a substantial prevalence of severe *H. pylori*-associated disease that would not normally come to the attention of health care providers.

**Table 1** Digestive symptom severity and history of medical attention by diagnostic category

| Diagnostic category | n | Symptom severity | | | Ever sought care for stomach problems % |
|---|---|---|---|---|---|
| | | None % | Mild-mod % | Severe % | |
| Endoscopy (few duodenal lesions: 7 duodenitis, 1 duodenal erosions, 0 duodenal ulcers) | | | | | |
| No gastritis | 164 | 37 | 52 | 10 | 37 |
| Gastritis | 25 | 44 | 36 | 20 | 44 |
| Gastric erosions | 12 | 33 | 50 | 17 | 58 |
| Gastric ulcer | 6 | 50 | 33 | 17 | 67 |
| Histopathology (normal = chronic inflammation = 0) | | | | | |
| Chronic inflammation = 0 | 61 | 44 | 39 | 16 | 57 |
| *H. pylori* negative/density = 0 | 64 | 42 | 39 | 19 | 56 |
| Density = 1 | 30 | 30 | 60 | 10 | 30 |
| 2 | 48 | 40 | 50 | 10 | 29 |
| 3 | 47 | 36 | 60 | 4 | 26 |
| Acute inflammation = 1 | 74 | 35 | 54 | 11 | 34 |
| 2–3 | 45 | 38 | 60 | 2 | 16 |
| Chronic inflammation = 1 | 13 | 23 | 54 | 23 | 38 |
| 2 | 59 | 37 | 51 | 12 | 34 |
| 3 | 56 | 36 | 61 | 4 | 20 |
| Atrophy = 1–3 | 27 | 37 | 52 | 11 | 26 |
| Metaplasia = 1–3 | 16 | 38 | 38 | 25 | 44 |

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## *H. PYLORI* COLONIZATION DENSITY AND GASTRIC HISTOPATHOLOGY IN A NORTHERN CANADIAN COMMUNITY

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The aim of this study was to estimate the association between *H. pylori* colonization density and gastric histopathological outcomes in a Northern Canadian Aboriginal community. Participants in the Aklavik *H. pylori* Project in the Northwest Territories were invited to undergo upper gastrointestinal endoscopy with gastric biopsy in 2008. Five biopsy specimens (2 antrum, 1 incisura, 2 corpus) were collected from each participant, processed with hematoxylin-eosin and Giemsa staining, and examined microscopically by one pathologist (SG), who scored *H. pylori* density, acute inflammation (neutrophilic activity), chronic inflammation, glandular atrophy, and intestinal metaplasia on a four-point scale (0–3) according to the updated Sydney System. Each individual was assigned the highest score of examined biopsies for each variable. Trend analysis was performed by inspecting the prevalence of histopathologic outcomes across increasing *H. pylori* density grades and conducting $\chi^2$ tests for trend. *H. pylori* density scores were available for 192 participants (age range = 10–80, 57% female, 91% Aboriginal), 127 of whom had *H. pylori* -positive histology. All participants with density >0 had chronic inflammation and nearly all (except 19% with density = 1) had acute inflammation (Table 1). A strong positive effect gradient was observed for atrophy but not metaplasia. These findings provide evidence of a dose-response effect of *H. pylori* density on gastric atrophy.

**Table 1** Prevalence of histopathologic diagnoses by *H. pylori* density*

| *H. pylori* density score | Acute inflammation | Chronic inflammation | Glandular atrophy | Intestinal metaplasia |
|---|---|---|---|---|
| 0 (none) n = 65 | 0% | 5% | 0% | 3% |
| 1 (mild) n = 32 | 81% | 100% | 6% | 16% |
| 2 (moderate) n = 48 | 100% | 100% | 19% | 10% |
| 3 (marked) n = 47 | 100% | 100% | 35% | 9% |
| $\chi^2$ for trend *p*-value | <0.001 | <0.001 | <0.001 | 0.18 |

*Table percentages represent the prevalence of each histopathological diagnosis within an *H. pylori* density score.

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## THE OCCUPATIONAL RISK OF *HELICOBACTER PYLORI* IN HEALTHCARE WORKERS

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**Background and Objectives:** *Helicobacter pylori* was discovered in 1984, but up to now its transmission is not clear. Direct person-to-person transmission is thought to be most likely and this could be relevant to occupational transmission particularly in healthcare workers (HCWs) .

**Methods:** We used serology to study the occupational risk for *H. pylori* in HCWs in 2 cross-sectional studies and one cohort study.

**Results:** In a cross-sectional study, 587 healthcare workers (HCWs) working in institutions for children with mental disabilities with a documented high prevalence of *H. pylori* infection were compared to non-exposed controls. Using multiple logistic regression to adjust for confounding variables, an OR of 2 (95% CI 1.4–2.7) was found in workers having contact with faeces of inhabitants. In another cross-sectional study in 198 nursing home workers, an OR of 0.9 (95% CI 0.5–1.9) was found in multiple logistic regression compared to non-exposed controls after adjusting for other risk factors.

In the cohort of HCWs and non-exposed controls, workers, seronegative at baseline were followed up for at least 10 years, resulting in 2254 person years (py) in the HCWs group and 1284 py in non-exposed controls. An incidence rate for *H. pylori* infection of 0.53/100 py (95% CI 0.28–0.93) was found in HCWs, compared to 0.39/100 py (95% CI 0.13–0.91) in non-exposed controls, resulting in a rate ratio of 1.36 (95% CI 0.43–4.21).



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**Conclusions:** Results of our studies show the difficulty in interpreting cross-sectional studies. Results of the cohort study show a slightly increased incidence in HCWs compared to non-exposed controls.

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## DEMOGRAPHIC CHARACTERIZATION OF HIGH RISK POPULATIONS MAY HELP IDENTIFY GASTRIC CANCER HIGH RISK SUBJECTS FOR FURTHER SCREENING PLANS AND CLINICAL FOLLOW-UPS

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We carried out a hospital based case-control study, including 382 cases with confirmed gastric cancer and 645 gastric cancer free controls. A self-designed questionnaire was filled by trained staff to collect personal, dietary and lifestyle habits. Logistic regression was employed to calculate odds ratios (ORs) and 95% confidence intervals (95% CI) using SPSS 18.0.

We observed that age, gender, smoking and education are the most important demographic factors in our population which affect the risk of gastric cancer. Furthermore, our study demonstrated that Kurdish people (a subgroup of Iranian ethnicity) are at a significantly increased risk of GC development (OR: 7.013, 95% CI (3.965–12.406), $p = .0001$). In this study, we also assessed the joint effect of age, gender and smoking status on the risk of GC development. According to the calculated adjusted OR for ethnicity and education, we found that male smokers over the age of 50 years are at more than six fold increased risk of GC development (OR: 6.281, 95% CI (2.108–18.714), $p = .001$) which is further enhanced in non-cardia subsite category (OR: 7.219, 95% CI (1.766–29.505), $p = .006$). Moreover, stratification based on GC histologic subtypes demonstrated an increased risk for these subjects in development of both intestinal (OR: 5.646, 95% CI (1.175–27.138), $p = .031$) and diffuse (OR: 5.504, 95% CI (1.021–29.666), $p = .047$) type GC. On the other hand, any kind of classical education (particularly above 8 years) reduced the risk of GC development by 70% (OR: 0.307, 95% CI: 0.149–0.633, $p = .001$) in general and noncardia subsite and both subtypes.

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## HOUSEHOLD FACTORS ASSOCIATED WITH *HELICOBACTER PYLORI* INFECTION IN AKLAVIK, NORTHWEST TERRITORIES, CANADA

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Concerns raised by residents of Aklavik, Northwest Territories (population = 590, ~90% Aboriginal) about health risks from *H. pylori* infection resulted in the community-driven Aklavik *H. pylori* Project, aimed at reducing health risks from *H. pylori* infection in Arctic Canada. This analysis describes associations of household characteristics with *H. pylori* prevalence among project participants recruited by open invitation disseminated throughout the community.

During 2008–2010, participants were tested for *H. pylori* by urea breath test or histology. To ascertain household characteristics, we interviewed representatives of participating households using a structured questionnaire. We used logistic regression with random effects for household clustering to estimate odds ratios (OR) and 95% confidence intervals (95% CI) for associations of household characteristics with individual *H. pylori* status, adjusting for age, sex and ethnicity. *H. pylori* prevalence among all project participants was 62% (221/355). We collected household data for 296 individuals (*H. pylori* prevalence = 60%) in 145 households.

The most notable effects of household factors were for income, education and household crowding indicators.

Our preliminary analysis of household-level risk factors for *H. pylori* infection in this Arctic Aboriginal hamlet shows low socioeconomic status and household crowding to be associated with increased odds of *H. pylori* infection.

**Table 1** Odds ratios for the association of household factors with individual *H. pylori* status, n = 296

| Variable | Unadjusted | Adjusted[a] |
|---|---|---|
| | OR (95% CI) | OR (95% CI) |
| Annual household income (in CAD) | | |
| <$25,000 | 1.0 | 1.0 |
| $25,000–$49,999 | 0.67 (0.26–1.7) | 0.74 (0.30–1.8) |
| $50,000–$74,999 | 0.41 (0.16–1.0) | 0.50 (0.21–1.2) |
| ≥$75,000 | 0.26 (0.12–0.56) | 0.33 (0.16–0.69) |
| Highest educational attainment by a household member | | |
| <Grade 12 | 1.0 | 1.0 |
| Grade 12 | 0.82 (0.40–1.7) | 0.86 (0.42–1.7) |
| >Grade 12 | 0.42 (0.19–0.91) | 0.60 (0.26–1.4) |
| Number of children in the house | | |
| 0 | 1.0 | 1.0 |
| 1 | 0.82 (0.41–1.6) | 0.76 (0.36–1.6) |
| 2 | 0.98 (0.42–2.3) | 0.98 (0.38–2.5) |
| 3–6 | 4.6 (1.4–15) | 4.2 (1.2–15) |
| Number of people per bedroom | | |
| ≤1 | 1.0 | 1.0 |
| 1.01–2 | 1.5 (0.84–2.8) | 1.4 (0.72–2.8) |
| 2.01–3 | 4.0 (0.85–19) | 3.1 (0.63–15) |

[a]Adjusted for age, sex, ethnicity, and random household effect.

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## THE DECLINE IN PREVALENCE OF *H. PYLORI* INFECTION IN CROATIA AFFECT SIGNIFICANTLY THE INCIDENCE OF ESOPHAGO-GASTRO-DUODENAL (EGD)ENDOSCOPIC FINDINGS

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**Aim:** We compare incidence of *H. pylori* infection and various endoscopic findings in two time periods of five years (Period-1 1994–1998; Period-2 2006–2010) in patients undergoing first endoscopy for dyspepsia, naive to any *H. pylori* treatment.

**Methods:** From 18147 of all patients in Period-1, 1647 were untreated and examined for the first time. The same number in Period-2 was 1224 from 18529 patients. For the evaluation of *H. pylori* infection, 1–2 biopsy specimens were obtained from the antrum and corpus.

**Results:** The proportion of naive patients in Period-1 was lower for 25.7%($p < .0001$), as well as number of both ulcers/scars: ventricular (VU) for 40.8% and duodenal (DU) for 50.8%, ($p < .0001$). Difference was not significant for stomach cancers and MALT lymphoma. Number of patients with normal gastroduodenal findings (NUD) and usually GERD symptoms showed clear increase of 65.1%, ($p < .0001$). Incidence of *H. pylori* infection declined significantly; altogether from 76.9% to 38.7% and in all groups; in VU from 80.1% to 37.1%, in DU from 85.0% to 43.2%, in NUD from 61.2% to 39.0%, even in C from 45.7% to 37.1% and in MALT from 100% to 80%.

**Conclusions:** The incidence of *H. pylori* infection among patients undergoing EGD for dyspepsia, naive to anti- *H. pylori* treatment, has decreased markedly in the 15-year follow-up in Croatia. This, and earlier proton pump inhibitor use, may contribute to significant decline in incidence of peptic ulcers and maybe the decline in the prevalence of gastric cancer in the future. As we expected from West World experiance, the incidence of NUD/GERD showed clear increase.

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## COMMUNITY-BASED, PARTICIPATORY RESEARCH ON *H. PYLORI*: MAKING MICROBIOLOGY RESULTS MEANINGFUL TO PARTICIPANTS

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The Canadian North *Helicobacter pylori* (CAN*Help*) Working Group conducts community-based, participatory research in Arctic Aboriginal communities to address community concerns about health risks from *H. pylori*. While *H. pylori* transmission has decreased in developed countries, evidence suggests that Arctic Aboriginal populations have a disproportionately high prevalence of the bacteria. Our collaborative initiative aims to describe the burden of disease, and seeks to identify effective public health strategies to reduce associated health risks. This research links Northwest Territories and Yukon community representatives, health care practitioners and health care decision makers, with faculty from various disciplines at the University of Alberta.

A component of our research involves culturing *H. pylori* from gastric biopsies obtained from participating community members. From these cultures, housekeeping genes have been sequenced to identify strain types and determine relatedness within households and communities. An important element of this work is the dissemination of research results in a manner that is meaningful to a variety of audiences. Because of differences in knowledge structures and world views between Aboriginal communities, health officials and researchers, the development of effective strategies for the dissemination of meaningful microbiology results is essential to successfully address our community-driven research goals. This process requires collaboration with community representatives to understand which results are of interest to community members and how they would be best presented. The process through which these decisions were made and the methods of dissemination chosen by community representatives will be described in a case study of the Aklavik *H. pylori* Project.

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## HELICOBACTER PYLORI IN CYPRUS

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We are presenting a pilot study concerning the epidemiology of *H. pylori* in Cyprus. This is the first time that such a study is proposed in our country, a small Mediterranean country of 700,000 population. We started a collection of gastric biopsies from patients with gastroenterological clinical symptoms. The aim is to evaluate the presence of *Helicobacter pylori* in the biopsy and in parallel, in stool samples of the same patient. Every patient has also a CLO test and independently of the answer, the biopsy is analyzed for the presence/absence of *H. pylori* DNA. Every positive sample is characterized further for the presence/absence of cagA, and molecular characterization of vacA alleles (signal and mid region). Also, for every positive biopsy, we try to standardize a methodology to identify the presence/absence of *Helicobacter pylori* in stool samples. From the above study, preliminary results indicate an approximately 50% of positive biopsies using a PCR test easy to handle in a molecular diagnostic laboratory and that it is also possible even on a diagnostic level (not only research) to detect *H. pylori* in stool samples.


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