

Original Article

Do Low-Risk Patients With Dyspepsia Need a Gastroscopy? Use of Gastroscopy for Otherwise Healthy Patients With Dyspepsia

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ABSTRACT

Background: Choosing Wisely Canada (CWC) recommends not to perform gastroscopy for dyspepsia in otherwise healthy adults less than 55 years of age (2014). The aim of this study was to evaluate the use of gastroscopy in a young, healthy population with uncomplicated dyspepsia.

Methods: A retrospective review of gastroscopies completed during 3-month periods in 2015, 2016, and 2017 identified all patients undergoing gastroscopy for the primary indication of dyspepsia. Low-risk patients for dyspepsia were defined as adults, aged 18 to 54 years without alarm symptoms, comorbidities and/or abnormal imaging findings or laboratory values. Gastroscopy and pathology reports were reviewed to identify clinically actionable findings. Clinical outcomes were followed to December 31, 2018 including gastroenterology referrals, emergency room visitation and hospitalization.

Results: Among 1358 patients having a gastroscopy for dyspepsia, 480 (35%) were low-risk patients. Sixteen patients 3.3% (16/480) had a clinically actionable result found on gastroscopy or biopsy. No malignant lesions were detected. Low-risk patients were followed up for an average of 2.75 years, 8% (39/480) visited the emergency department (ED), 1% (3/480) of patients were admitted to hospital and 12% (59/480) of patients were re-referred for a dyspepsia-related concern.

Interpretation: A high rate of low yield, high cost, invasive endoscopic investigations were performed in this population of otherwise healthy patients under age 55 years. These data suggest limited uptake of current recommendations against the routine use of gastroscopy to investigate dyspepsia.

Keywords: *Choosing Wisely; Dyspepsia; Gastroscopy*

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Introduction

Dyspepsia is a syndrome characterized by upper gastrointestinal symptoms often including epigastric pain and/or burning, postprandial fullness, bloating, nausea and/or early satiety (1). Dyspepsia is prevalent in North America, with reports of 20% to 40% of the population experiencing symptoms of varying severity during their life (2). Less than half of these individuals seek medical care, yet dyspepsia accounts for 2% to 5% of all patients presenting to primary care (3). These symptoms can negatively affect an individual's quality of life (1). However, this syndrome rarely portends sinister etiologies in individuals younger than 60 years of age who are otherwise healthy (4). Interestingly, even in individuals over 60, presentation with alarm symptoms correlates poorly with worrisome etiologies (5). More than 70% of individuals with dyspepsia experience symptoms that are functional in nature, with no organic or clinically actionable cause (6).

Endoscopic examination for this condition is discouraged, given the low rate of detection of organic disease in this population. These recommendations have been formalized through national campaigns, such as Choosing Wisely Canada, further supported by guidelines from the American College of Gastroenterology and the Canadian Association of Gastroenterology (4,7). Despite these recommendations, the invasive test is commonly performed, reports demonstrate gastroscopy performed in up to 92% of patients with dyspepsia (8). Because of the high cost of gastroscopy and the low rate of malignancy in patients with dyspepsia, the cost of detecting a single cancer with endoscopy for dyspepsia has been estimated at \$82,900 (9). In addition, less appropriate use of this costly examination delays use (opportunity costs) for more urgent/appropriate indications; thus reduced use will improve access for these more important indications.

Data regarding the use and outcome of gastroscopy for individuals under the age of 55 who are otherwise healthy presenting with dyspepsia in Canada are scarce. The aim of this project was to evaluate the frequency and outcome of gastroscopy used to investigate dyspepsia in otherwise healthy adults less than 55 years old.

METHODS

Setting and Design

This study was approved by the University of Calgary Research Ethics Board. A retrospective cohort of all patients who underwent gastroscopy for symptoms of dyspepsia at one of four acute care sites in Calgary, a large urban center in Alberta with a population of 1.27 million was evaluated (10). A single electronic database, EndoPRO (Pentax), is used for endoscopic reporting for all urban endoscopy sites in Calgary. Data were extracted from this database to create a list of all endoscopies performed within the study period.

This study was performed in collaboration with the University of Calgary Physician Learning Program (PLP), with expertise in data-driven practice improvement for physicians, including audit and feedback.

Study Population

All patients who underwent gastroscopy within the Calgary Zone between April 1st and June 30th in each of 2015, 2016 and 2017 were screened for inclusion in our evaluation (Supplementary Appendix 1). Endoscopy reports stored on EndoPRO were used for initial screening. Patients with dyspepsia were defined as low risk based on the following criteria: (1) younger than 55 years at the time of the procedure, given then-extant CWC recommendations; (2) indication for gastroscopy included any of the following: abdominal pain, epigastric pain, dyspepsia, nausea or bloating; (3) no record of any alarm symptoms or finding, including vomiting, dysphagia, anemia, weight loss and/or iron deficiency; and (4) no report of a clinically relevant indication for gastroscopy such as abnormal imaging, positive celiac disease serology, inflammatory bowel disease, treatment resistant *Helicobacter pylori* or personal or family history of gastric cancer.

Within the Calgary Zone, a primary care-focused clinical care pathway exists to support the management of patients with dyspepsia in primary care (Supplementary Appendix 2). Patients were considered appropriate for gastroscopy if they did not improve despite recommended management outlined by the evidence-based pathway. Patients were excluded from analysis if they had their consult and procedure on the same day, if they were an inpatient at time of the procedure, or if they were less than 18 years of age at time of gastroscopy.

Gastroscopy findings and associated pathology reports were initially evaluated by a single gastroenterologist (K.L.N.) to determine if the findings were clinically actionable. Subsequently, three additional gastroenterologists (K.W.B., T.M. and J.W.) independently confirmed the definitions of any clinically actionable finding at the time of gastroscopy. Clinically actionable findings were defined as a diagnosis that would influence the medical management of the patient including those with immediate consequences such as malignancy and those with potential for long-term management implications, such as eosinophilic esophagitis. Findings were not considered clinically actionable if they could have been diagnosed noninvasively such as *H. pylori* or did not require active treatment.

Medication history was determined using the Pharmaceutical Information Network (PIN) database. Date and frequency of antibiotics, proton pump inhibitors, domperidone and H₂-receptor antagonists preceding the gastroscopy were recorded. Laboratory data were used to collect each patient's pre-gastroscopy values for the 12 months preceding the exam

date including hemoglobin, ferritin, urea breath test, celiac serology, alanine aminotransferase, alkaline phosphatase, gamma-glutamyl transferase, bilirubin, lipase and lactose tolerance test where available. Provincial reimbursement physician claims database was used to identify if patients had received an abdominal ultrasound or upper gastrointestinal series prior to their gastroscopy. Data linkages were performed by data analysts at the Physician Learning Program.

All low-risk patients undergoing gastroscopy for dyspepsia were followed from the date of gastroscopy until December 31, 2018. During the follow-up period, all hospital admissions, emergency department (ED) visits and physician encounters for concerns related to dyspepsia were obtained from electronic medical records and provincial reimbursement physician claims database to assess healthcare utilization for this population.

Cost of performing low-risk endoscopy was calculated for the study population and extrapolated for the population of Alberta yearly. The cost of low-risk scopes in the study population was assumed to be the yearly cost of low-risk scopes in Calgary. Using the 2016 population of Calgary and Alberta, the cost per year of low-risk scopes in Alberta was calculated (11).

Data Analysis

Descriptive statistics were reported as either proportions for categorical variables or median with interquartile range (IQR) for continuous variables.

RESULTS

During the study period, 12,184 patients underwent gastroscopy, with 1358 (11.1%) of these performed to investigate dyspepsia in patients aged 18 to 54 years. Of these, 65% (878/1358) were appropriate for gastroscopy due to evidence of alarm symptoms, co-morbidities or other appropriate indication. The remainder, 35% (480/1358) of gastroscopies were defined as being performed in patients at low risk (Figure 1).

In the 12 months preceding gastroscopy, 33% (156/480) of patients had celiac serology completed, all of which were negative. Urea breath tests (UBT) were completed in 31% (148/480) of patients, 84% (124/148) of these tests were positive. Complete abdominal ultrasound or single organ abdominal ultrasound was completed in 48% (229/480) patients, and upper gastrointestinal series was completed in 13% (61/480) of patients. In the 12 months prior to gastroscopy, 317 (66%) unique patients filled prescriptions for at least one of the following medications: proton pump inhibitor, H₂-receptor antagonist, domperidone or triple/quadruple therapy against *H. pylori*. Twenty patients (4%) underwent no investigations and filled no prescriptions in the 12 months prior to their endoscopy (Table 1).

Biopsies were taken in 88% (420/480) of patients who underwent low-risk gastroscopy. The majority of patients had

normal findings 425/480 (89%), with 14% (59/425) identified as normal on gastroscopy alone. Importantly, not one malignant lesion was detected in this population (Table 2). Findings on gastroscopy or biopsy were present in 11% (55/480) of patients (Table 2). *Helicobacter pylori* was found in 8% (36/480) of patients, of which 36% (13/36) had a UBT within the 12 months prior and 85% (11/13) of these UBTs were positive. There were two false-negative UBTs, which were considered clinically actionable. *Helicobacter pylori* was a new histologic finding in 5% (25/480) of patients. Two individuals had celiac disease identified pathologically, and they had not undergone noninvasive celiac serology prior to their gastroscopy.

Healthcare utilization was collected for patients over an average of 2.75 years following endoscopy (Table 3). Within this follow-up period, 39 patients (8%) visited the emergency department at least one time for dyspepsia and 3 patients (1%) were admitted to hospital for dyspepsia-related reasons. Fifty-nine patients (12%) had a subsequent outpatient physician encounter for dyspepsia. No malignancies were detected in any patient over this time period.

The cost of low yield scopes was calculated using the average cost of a gastroscopy in Alberta (\$882.04 ± \$362.17). There were 480 gastroscopies performed that were low yield, meaning the total cost of the low yield scopes was \$ 423,379.20 (±\$173,841.60) (12). The cost of low yield scopes per year in Calgary was estimated to be \$564,505.60 (± \$231,788.80). Using the 2016 population of Calgary, 1,239,000 and the 2016 population of Alberta 4,067,000, the estimated total cost of low yield scopes in Alberta yearly is \$1,852,981.66 (± \$760,843.46).

Discussion

Gastroscopy is costly, invasive and findings are low yield in individuals who are less than 55 years old and are otherwise healthy, yet high rates of these procedures are still performed. In 2014, Choosing Wisely Canada recommended avoiding gastroscopy in this low-risk population. These recommendations were based on clinical practice guidelines published in Canada and the USA in 2005 (3,4). Choosing Wisely Canada updated the recommendations in 2019, now recommending to avoid gastroscopy in individuals less than 65 years old who are otherwise healthy (13). Despite this, our study used the 2014 guidelines to guide our age cut off as it was the recommendation during the study period. The substantial number of gastroscopies were performed for investigating dyspepsia in this urban center, highlights a significant knowledge to action gap, and improved understanding of use and outcome may contribute to practice change. The proportion of clinically actionable findings was low, suggesting the majority of these procedures added little value. It has been debated if performing gastroscopy provides reassurance and reduces anxiety, with some research supporting a reduction in anxiety and some supporting a paradoxical increase

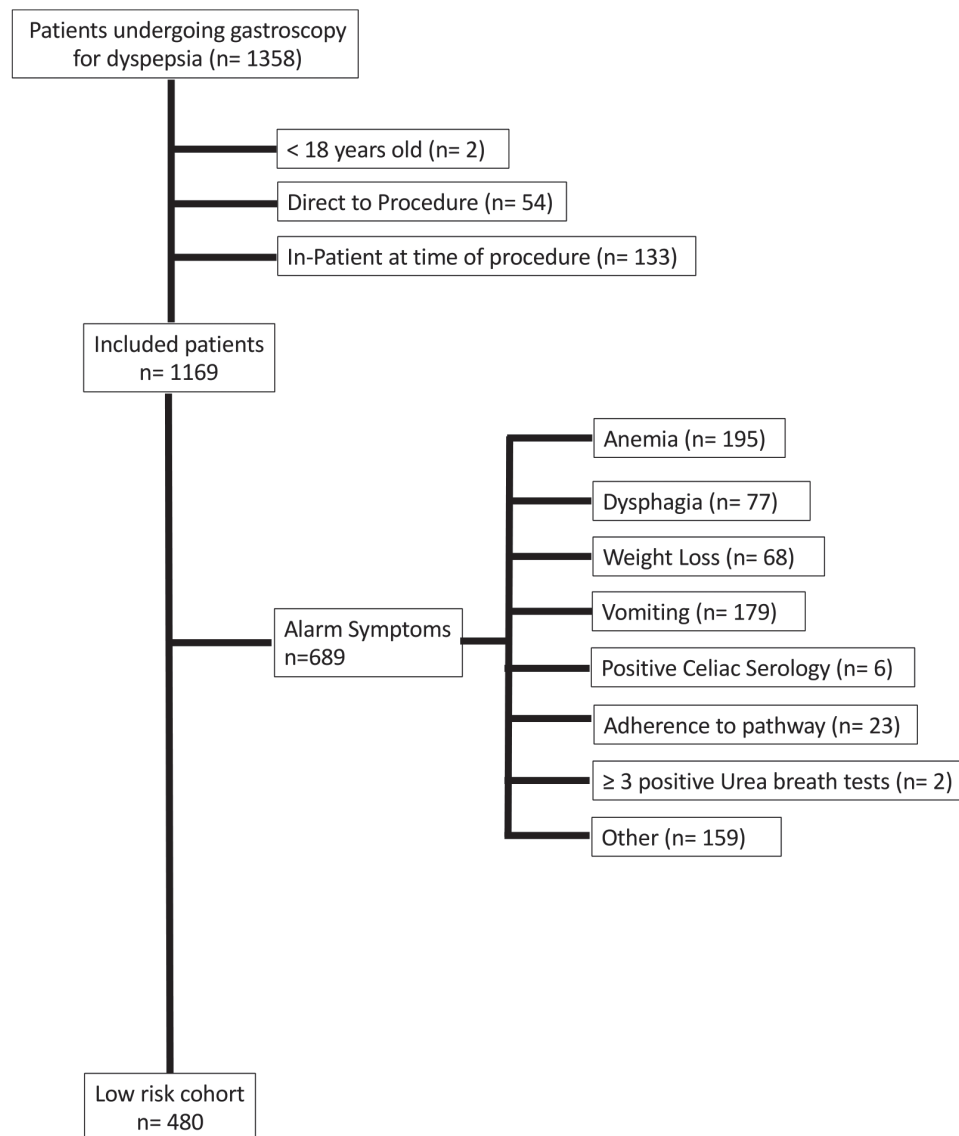


Figure 1. Flow diagram for patient inclusion and exclusion.

in anxiety (14–16). Alternative avenues in the management of these otherwise healthy patients is important: this population of symptomatic patients would likely be better served by education and lifestyle intervention, reflecting best evidence guidelines and in some a trial of acid suppressive therapy if that was not already given before (4). Interestingly, only approximately two thirds of patients (63% 302/480) had trialed a PPI prior to their procedure. This demonstrates the limited use of a low risk, high impact medication to potentially manage symptoms prior to an invasive investigation. Similarly, only 31% of patients had investigation for *H. pylori* infection, while a ‘test and treat’ strategy is recognized as a first line strategy (4). Again, this highlights the importance of safe and effective management approaches implemented in the Medical Home.

Ideally, multidisciplinary care teams co-located in patient’s primary care medical home could be used to improve quality

of life and symptom burden in patients negative for *H. pylori* and/ or nonresponders to PPI therapy. Managing dyspepsia in the medical home could lead to avoiding referral to specialty gastroenterologists who may have lengthy wait times and limited access (17). Such services may include nutrition support, stress management/behavior change consultants, even psychiatric and specialized nursing care (Supplementary Appendix 2). Ideally, implementation of such services would decrease other costly health system usage. There is a paucity of data on healthcare utilization pre- and post-gastroscopy in patients with dyspepsia (18–20). However, it has been shown that patients with upper gastrointestinal symptoms access healthcare more frequently than the general population (20). In our patients, despite receiving speciality care and endoscopic evaluation, 17% (82/480) of patients were referred back to gastroenterology or sought care in the emergency department for a related concern.

Table 1. Demographics and pre-endoscopy investigation and treatment of low-risk patients

Number of patients	N = 480 (%)
2015	191 (39.8)
2016	158 (32.9)
2017	131 (27.3)
Median Age (IQR)	41.7 (33.4–48.8)
Male (%)	177 (36.9)
Baseline Investigations (%):*	433 (90.0)
Complete Blood Count	418 (87.0)
Ferritin	269 (56.9)
ALT	345 (71.8)
ALP	268 (55.8)
GGT	220 (45.8)
Bilirubin	218 (45.4)
Lipase	172 (35.8)
Celiac Serology	156 (32.5)
Urea Breath Test	149 (31.0)
Medication History (%):	317 (66.0)
PPI	304 (63.3)
H2 Receptor Antagonist	18 (3.7)
Domperidone	30 (6.2)
Triple/Quadruple Therapy	24 (5.0)
Imaging History (%):	242 (50.4)
Ultrasound	229 (47.7)
Upper GI Series	61 (12.7)

*All baseline investigations with the exception of urea breath test were normal or negative to fit within the low-risk population.

Table 2. Gastroscopy and pathology findings

Endoscopic finding	N = 480 (%)
No findings	425 (88.5)
<i>Helicobacter pylori</i> *	34 (7.1)
False-negative Urea Breath Test [†]	2 (0.4)
Barrett's without dysplasia	6 (1.3)
Barrett's with low-grade dysplasia [†]	1 (0.2)
Ulcer*, [†]	4 (0.8)
Grade C esophagitis [†]	3 (0.6)
Eosinophilic esophagitis [†]	3 (0.6)
Celiac disease [†]	2 (0.4)
Esophageal candidiasis [†]	1 (0.2)

*One patient had findings of both an ulcer and *Helicobacter pylori*, all other numbers represent unique patients.

[†]Clinically actionable

It is important to identify factors that increase the likelihood of increased healthcare utilization, in hopes of developing better supports to reduce unnecessary ED presentations. Of those patients who accessed additional healthcare, only two were

Table 3. Post-endoscopy healthcare utilization

Health outcome	N = 480 (%)
Emergency Department Visits	39 (8.1)
Abdominal/Epigastric Pain NYD	24 (61.5)
Irritable Bowel Syndrome	4 (10.3)
Gastroesophageal Reflux Disease	4 (10.3)
Esophagitis/Gastritis	3 (7.7)
Peptic Ulcer Disease	1 (2.6)
Dyspepsia	1 (2.6)
Cyclic vomiting	1 (2.6)
Parasitic infection	1 (2.6)
Hospitalizations	3 (0.6)
Abdominal Pain NYD	1 (33.3)
Cyclic vomiting	1 (33.3)
Dyspepsia	1 (33.3)
Dyspepsia-related physician visits	59 (12.3)

found to have a new diagnosis that would alter their management (parasitic infection and peptic ulcer disease).

Despite the low diagnostic yield of gastroscopy for young otherwise healthy patients with dyspepsia demonstrated in our study and others (6,21), there often is a demand from patients and/or physicians to refer the patient for a gastroscopy. Health-related anxiety and fear of serious illness, such as malignancy, is prevalent among patients with dyspepsia (14). This anxiety has been shown to contribute to an increase healthcare utilization for patients (22). Additionally, patients experience a resultant decrease in health-related anxiety and an increase in patient satisfaction subsequent to gastroscopy (14,23,24). However, this effect is unlikely to be sustained long-term, with no overall improvement on quality of life (16).

Given the high health system utilization in this population, patient fear and anxiety create a significant driver of the request for gastroscopy for these patients. In addition to patient fears, physician fears are an additional driver, as they do not want to miss an underlying upper gastrointestinal cancer or other worrisome, treatable etiology (25,26). This barrier may be mitigated by data demonstrating low risk of an upper GI malignancy. The incidence of gastric cancer is decreasing worldwide, with an incidence of 5.6 per 100,000 in North America (27). No malignancies were found in this study and important screening blood work identifying iron deficiency or anemia may increase the yield of these investigations. Gastroscopy is an expensive, time intensive, and resource limited procedure, frequently performed for indications outside of recommended guidelines (25). Dyspepsia in young otherwise healthy adults is a common, and is not the list of appropriate indications for endoscopy (28,29). However, as we have documented here, they continue to be a frequently performed, low yield procedure. There are financial incentives to perform EGD regardless of

indication and future consideration of remuneration limits for these may be a disincentive, improving access for more appropriate indications. Timely completion of gastroscopy is important for the diagnosis and management of some GI conditions but adds limited or no benefit in others. Functional dyspepsia is one such condition that has limited demonstrable benefit from gastroscopy. When gastroscopy and biopsy are performed, the results are low yield, meaning no additional information will be obtained that alters management (30–32). Approaches such as the *H. pylori* ‘test and treat’ have been compared to early endoscopic investigation with no significant difference in outcome, but at lower cost (24,33–35). Lifestyle modification, noninvasive testing strategies *H. pylori*, and empiric treatment, especially with a PPI, have all shown benefit for patients with symptoms of dyspepsia (4). Limiting the use of dyspepsia to those with alarm signs and symptoms or persistent symptoms despite therapy will improve the availability of gastroscopy for individuals whose diagnosis and management requires it.

Limitations

There are a number of limitations of this study that are important to highlight. First, its retrospective nature, limiting certain identification of the target population based on records in the chart. Second, although all acute care sites in Calgary were used, the results may not be representative of all Canadian populations. Third, a control population is lacking for comparative analyses; however, the purpose of the study was to report the frequency of clinically actionable diagnoses at time of gastroscopy and subsequent follow-up in patients with low-risk symptoms of dyspepsia. Fourth, we do not have data on how many patients seen with dyspepsia by gastroenterologists in the outpatient setting proceed onto endoscopy. Fifth, loss of follow-up may have occurred among patients migrating out of province or who died prior to end of study period. Finally, interpretation of data was based on multiple sources (electronic medical reporting, pathology databases, administrative data); though, misclassification errors may have occurred if clinically relevant data were not available in these data sources.

Conclusions

Gastroscopy performed for otherwise healthy individuals younger than 55 years old with dyspepsia is low yield. The recent Choosing Wisely Canada campaign also advises not to resort to gastroscopy in the absence of alarm symptoms or specific indications. Gastroscopy is an expensive health resource the use of which can be improved through better resource stewardship, improved appropriateness of indications while maintaining the provision of high quality care. These data suggest the uptake of current recommendations to manage dyspepsia in this

population by primary care and by gastroenterologists is low. Future knowledge translation activities should address low yield gastroscopy in patients with dyspepsia including better understanding the concerns that exist for patients when a gastroscopy is not performed and the subsequent barriers that exist for family practitioners and gastroenterologists when following guidelines. Resources for family physicians and gastroenterologists to facilitate patient education and the lack of utility and appropriateness of gastroscopy are important, with resources to support better understanding of the syndrome and multidisciplinary management.

SUPPLEMENTARY DATA

Supplementary data are available at *Journal of the Canadian Association of Gastroenterology* online.

Guarantor of the article: K.L.N. had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Author Contributions

J.B.H. contributed to study concept and design, data collection, analysis and interpretation, manuscript drafting and editing for important intellectual content. K.W.B. contributed to study concept and design, data interpretation, manuscript editing for important intellectual content. S.K.D. contributed to data interpretation, manuscript editing for important intellectual content. B.M. contributed to data collection, manuscript editing for important intellectual content. J.W. contributed to data interpretation, manuscript editing for important intellectual content. T.M. contributed to data interpretation, manuscript editing for important intellectual content. S.J.V.Z. contributed to data interpretation, manuscript editing for important intellectual content. G.G.K. contributed to data analysis, interpretation, and manuscript editing for important intellectual content. M.S. contributed to data interpretation, manuscript editing for important intellectual content. K.L.N. contributed to study concept and design, data collection, analysis and interpretation, manuscript drafting and editing for important intellectual content. All authors have seen and approved the manuscript.

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Conflict of Interest

The authors declare they have no actual or potential competing financial interests.

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