1995. Implementation of *Helicobacter pylori* stool antigen testing in a large metropolitan centre: A prospective comparative diagnostic trial

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Abstract

Background: Clinical guidelines for *H. pylori* screening and post-treatment testing endorse the use of urea breath test (UBT), *H. pylori* stool antigen test (HpSAT), and biopsy-related tests. Due to protracted wait times at our patient service centers and non-compliance in children and elderly with complications for the UBT, we sought to compare UBT and HpSAT in the city of Calgary, Canada with a population close to 1.4 million people.
Methods: To achieve this, a prospective diagnostic trial was performed comparing UBT to HpSAT in patients presenting with dyspepsia. A total of N=150 patients agreed to undergo UBT (^{13}C-UBT kit, Helikit, Isodiagnostika Inc.) and consented to provide a stool specimen for simultaneous HpSAT testing (Diasorin LIAISON® XL *H. pylori* SA Monoclonal chemiluminescent immunoassay) in our centralized laboratory.
Results: Our data show that concordant results were obtained in 148/150 (98.7%) patients with a positivity rate of 18%. One of two discrepants (UBT positive/HpSAT negative) resolved after repeat testing. Using UBT as the gold standard, HpSAT had a sensitivity of 96.30% (95% CI; 81.03% to 99.91%) and specificity of 100% (95% CI; 97.05% to 100.00%). A positive predictive value of 100% and negative predictive value of 99.2% (95% CI; 94.73% to 99.88%) was obtained. For patients where drug information was available, 38/130 (29.2%) had received an antibiotic associated with *H.pylori* in the preceding 12 months, with UBT and HpSAT providing concordant results in 37/38 (97.4%) of these individuals. Of note, 6/130 (4.6%) patients had received a specific combination anti-*H.pylori* treatment, and all 6/6 (100%) had concordant negative results suggesting successful eradication. A post-implementation economic evaluation of labor and materials associated with testing demonstrates a cost-savings of approximately USD 5.47 per specimen in this locale.
Conclusion: Our study confirms that HpSAT is a viable alternative to UBT for *H. pylori* screening in our jurisdiction with equivalent test performance and cost-savings. Pre- and post-implementation analysis of test compliance rates, waiting times, and test turn around times will also be presented.

Background

H. pylori infection affects nearly half of the world's population. In developed countries, the prevalence is below 40%, whereas, in developing countries, the prevalence of infection is as high as 90% . *H. pylori* infection is also common in Canada, although decreasing because the incidence is low in children born in Canada. The prevalence increases with age, varies by region and ethnic sub-groups ranging from about 20% to 40% in some adult populations. In First Nations populations living in northern Canada, the prevalence is high, often greater than 50%.
According to the Maastricht IV/ Florence Consensus Report regarding the Management of *Helicobacter pylori* infection, the main non-invasive tests that can be used for the test-and-treat strategy are the UBT and monoclonal HpSAT.
According to 2018 Houston Consensus Conference guidelines, all patients receiving treatment for *H. pylori* receive post-treatment confirmation of eradication, such as UBT, HpSAT, or histology. According to the 2015 Canadian Agency for Drugs and Technologies in Health "Clinical and Cost-effectiveness guidelines", the EIA-based and ICA-based tests using monoclonal antibody were comparable with endoscopy and/or urea breath test to determine the results of *H. pylori* eradication therapy.

Methods

A prospective diagnostic trial was performed comparing UBT to HpSAT in patients presenting with dyspepsia. A total of N=150 patients agreed to undergo UBT (^{13}C-UBT kit, Helikit, Isodiagnostika Inc.) and consented to provide a stool specimen for simultaneous HpSAT testing (Diasorin LIAISON® XL *H. pylori* SA Monoclonal chemiluminescent immunoassay) in the Calgary Laboratory Services centralized laboratory.

H. pylori Stool Antigen Test (HpSAT)

- HpSAT is performed on unpreserved stool and is run on a high throughput antigen detection system.
- DiaSorin LIAISON® *H. pylori* SA, a chemiluminescent immunoassay (CLIA)
- 96-well format, monoclonal Ab.
- Results in approximately 24 hours.

UBT

- Helikit®, a 13C breath test is used for the detection of *H. pylori* bacterium
- Helikit® is a non-invasive, non-radioactive and convenient breath test kit for the diagnosis of *H. pylori*.
- Helikit® is safe to be used on children over the age of 6

Results

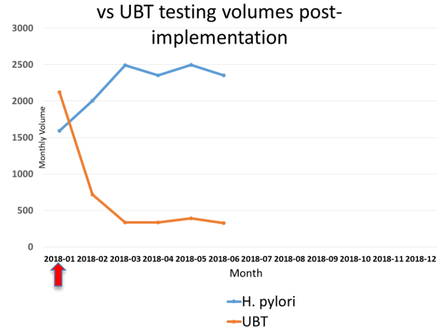
Table 1: *H. pylori* stool antigen test versus urea breath test as gold standard reference test (n=150)

Statistic	Value	95% CI
Sensitivity	96.30%*	81.03% to 99.91%
Specificity	100.00 %	97.05% to 100.00%
Disease prevalence	18.00%	12.21% to 25.10%
Positive Predictive Value	100.00%	N/A
Negative Predictive Value	99.19 %	94.73% to 99.88%

*One of two discrepants (UBT positive/HpSAT negative) resolved after repeat testing

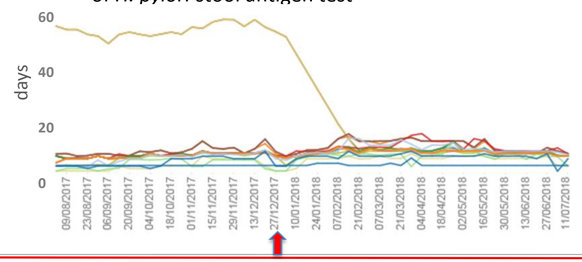
- ❑ 38/130 (29.2%) had received an antibiotic associated with *H.pylori* in the preceding 12 months, with UBT and HpSAT providing concordant results in 37/38 (97.4%) of these individuals
- ❑ 6/130 (4.6%) patients had received a specific combination anti-*H.pylori* treatment, and all 6/6 (100%) had concordant negative results suggesting successful eradication

Figure 1: *H. pylori* stool antigen *test* vs UBT testing volumes post-implementation



HpSAT implemented as primary screening test for dyspepsia

Figure 2: Wait time for *H. pylori* screening pre- and post-implementation of *H. pylori* stool antigen test



Results

Table 2: Monthly savings pre- and post-implementation of *H. pylori* stool antigen testing

Month	*H. pylori* Volumes	UBT Volumes	Savings (USD)
2018-01	1590	2123	-$13,600
2018-02	2003	717	-$592
2018-03	2490	334	$5,382
2018-04	2352	333	$3,732
2018-05	2495	391	$8,162
2018-06	2350	328	$11,409

- ❑ Test kit cost and associated labor cost included; cost of appointment for UBT not factored in

Conclusion

- *H. pylori* stool antigen testing (HpSAT) provides equivalent results to Urea Breath test (UBT) in this population
- Replacement of UBT by HpSAT was driven by a dyspepsia screening algorithm change resulting in improved waiting times and reduced costs in this jurisdiction
- HpSAT is not contra-indicated in the young and elderly with UBT compliance issues
- A small portion of patients (6/150) had received prior *H. pylori* treatment and the HpSAT demonstrated cure in line with the UBT result
- Further evaluation of HpSAT in post-treatment situations may be warranted

References

- Garza-González, Elvira. "A Review Of Helicobacter Pylori Diagnosis, Treatment, and Methods to Detect Eradication." World Journal of Gastroenterology, vol. 20, no. 6, 2014, p. 1438., doi:10.3748/wjg.v20.i6.1438.
- Toward Optimized Practice (TOP) Working Group for H. pylori. "Diagnosis and treatment of Helicobactor pylori: clinical practice guideline." Toward Optimized Practice. 2016 June Available from http://www.topalbertadoctors.org
- Malfertheiner P, Megraud F, O'Morain CA on behalf of the European Helicobacter and Microbiota Study Group and Consensus panel, et al "Management of Helicobacter pylori infection—the Maastricht V/Florence Consensus Report." Gut 2017;66:6-30.
- El-Serag, Hashem B., et al. "Houston Consensus Conference on Testing for Helicobacter Pylori Infection in the United States." Clinical Gastroenterology and Hepatology, vol. 16, no. 7, 2018, doi:10.1016/j.cgh.2018.03.013.
- Malfertheiner P, Megraud F, O'Morain CA, et al "Management of Helicobacter pylori infection—the Maastricht IV/ Florence Consensus Report." Gut 2012;61:646-664.
- Canadian Agency for Drugs and Technologies in Health "Stool Antigen Tests for Helicobacter pylori Infection: A Review of Clinical and Cost-Effectiveness and Guidelines" CADTH Rapid Response Report January 8, 2015

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