Routledge
Taylor & Francis Group

Archives of Environmental & Occupational Health

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/vaeh20

World Trade Center Health Program best practices for the diagnosis and treatment of gastroesophageal reflux disease

Ruth A. Lin, Geoffrey M. Calvert & Iris G. Udasin

To cite this article: Ruth A. Lin, Geoffrey M. Calvert & Iris G. Udasin (2023) World Trade Center Health Program best practices for the diagnosis and treatment of gastroesophageal reflux disease, Archives of Environmental & Occupational Health, 78:4, 236-240, DOI: 10.1080/19338244.2023.2171958

To link to this article: https://doi.org/10.1080/19338244.2023.2171958

ARCHIVES OF ENVIRONMENTAL & OCCUPATIONAL HEALTH
2023, VOL. 78, NO. 4, 236–240
https://doi.org/10.1080/19338244.2023.2171958

Taylor & Francis
Taylor & Francis Group

BRIEF REPORT

World Trade Center Health Program best practices for the diagnosis and treatment of gastroesophageal reflux disease

Ruth A. Lin[a], Geoffrey M. Calvert[b], and Iris G. Udasin[a]

[a]World Trade Center Health Program Clinical Center of Excellence, Environmental and Occupational Health Sciences Institute, Rutgers University Biomedical Sciences, Piscataway, New Jersey, USA; [b]World Trade Center Health Program, National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), Cincinnati, Ohio, USA

ABSTRACT

Gastroesophageal reflux disease (GERD) is one of the most common health conditions reported among persons exposed to the dust, debris and chemicals after the September 11, 2001 attacks in the United States. In the 9/11-exposed population, GERD is often found to be co-morbid with other conditions, such as asthma, post-traumatic stress disorder, and obesity. High-quality clinical practice guidelines for GERD are available from the American College of Gastroenterology. GERD diagnostic services and medically necessary treatment are covered by the WTC Health Program for persons who meet eligibility criteria.

ARTICLE HISTORY
Received 19 October 2022
Accepted 18 January 2023

KEYWORDS
9/11; Gastroesophageal Reflux Disease; PPI; proton pump inhibitor; September 11; World Trade Center; WTC

Background

Gastroesophageal reflux disease (GERD) is one of the most common health conditions reported among the World Trade Center Health Program (WTCHP) cohorts.[1–4] It is the 2nd most common condition certified for treatment coverage by the WTCHP (among enrolled members who meet eligibility criteria, certified conditions are those medical conditions for which medically necessary treatment expenses are paid by the WTCHP). Among those who developed new-onset GERD after the 9/11 attacks, after approximately 15 years post-9/11, 73% continued to report GERD-related symptoms.[5] The main risk factors for GERD in responders are early arrival to the WTC site and exposure to the dust cloud and particulates. The pathophysiology has not been definitively determined but is thought to be due to inflammation of the digestive mucosa arising from 9/11 irritant exposures.[2,3,6–8] Psychologic stress associated with the terrorist attack is another potential cause.[1] Many investigators have reported on the prevalence or co-morbidity of GERD with asthma or lower respiratory disease[1,2,8,9] and post-traumatic stress disorder (PTSD).[1,2,10] Overweight and obesity, both of which are highly prevalent in WTCHP cohorts, are risk factors for GERD symptoms, erosive esophagitis, and esophageal adenocarcinoma.[11] As expected, GERD prevalence was higher in overweight and obese responders.[12]

GERD is characterized by symptoms of heartburn (i.e., a substernal burning sensation starting in the epigastrium and moving upwards toward the neck), food regurgitation, chest pain, and dysphagia. Atypical or extra esophageal reflux symptoms include chronic dry cough, pharyngitis with or without dysphagia, hoarseness, and bronchospasm.[13] A single unifying clinical definition of GERD is difficult, and instead requires a blend of definitions. A consensus document of The American College of Gastroenterology defines GERD as reflux of gastric contents into the esophagus resulting in symptoms and/or complication.[13] GERD is objectively defined by the characteristic mucosal injury seen on reflux monitoring study (pH or impedance-pH) and/or abnormal esophageal acid exposure demonstrated on a reflux monitoring study.[13] Importantly, the reflux disorders observed in WTC-exposed persons are heterogeneous, and sometimes cannot be objectively documented (e.g., when the disorder is consistent with hypersensitive esophagus syndrome or functional heartburn, or other disorders[9]) Note that the presence of GERD appears to adversely affect the quality of life. Among Japanese workers who received a routine checkup at a clinic in Osaka,

CONTACT Iris G. Udasin iu22@eohsi.rutgers.edu World Trade Center Health Program Clinical Center of Excellence, Environmental and Occupational Health Sciences Institute, Rutgers University Biomedical Sciences, Piscataway, New Jersey, USA.

Japan, patients with GERD were found to have a poorer quality of life compared to clinic patients who did not have GERD, functional dyspepsia nor irritable bowel syndrome.[14]

This article is one in a series of papers to promote the practice of high quality, evidence-based medicine when evaluating, diagnosing and treating persons who were directly exposed to the September 11, 2001 terrorist attacks and their aftermath.[15] This paper focuses on GERD diagnosis and treatment, and the potential side effects of treatment. It summarizes the high-quality clinical practice guidelines provided by the American College of Gastroenterology (ACG).

Diagnosis of GERD

The following is a summary of recommendations for the diagnosis of GERD:[13]

1. For patients with classic GERD symptoms of heartburn and no alarm symptoms, an 8-week trial of empiric proton pump inhibitors (PPIs) taken once daily before a meal.
2. It is recommended to discontinue the PPIs after an 8-week trial.
3. Diagnostic endoscopy is indicated for patients with classic GERD symptoms who do not respond to PPIs or whose symptoms return when PPIs are discontinued. To improve diagnostic yield, it is recommended that diagnostic endoscopy be performed after PPIs have been stopped for 2–4 weeks.
4. Objective testing by endoscopy or pH monitoring is recommended in patients with chest pain without heartburn in whom cardiac causes are ruled out.
5. Barium swallow is not recommended as a diagnostic test for GERD.
6. Endoscopy is recommended as a first line test in the evaluation of patients with dysphagia or other alarm symptoms (e.g., gastrointestinal bleeding, weight loss, dysphagia, vomiting, and/or anemia) and for patients with multiple risk factors for Barrett's esophagus (e.g., presence of erosive esophagitis, central obesity, family history of Barrett's esophagus, and history of smoking).
7. In patients for whom the diagnosis of GERD is suspected but not clear, and endoscopy shows no objective evidence of GERD, reflux monitoring off therapy is recommended.
8. Reflux monitoring off therapy is not recommended solely as a diagnostic test for GERD in patients known to have endoscopic evidence of Los Angeles (LA) grade C or D reflux (in LA grade C distal esophageal erosion(s) occur over mucosal folds but include less than 75% of the esophageal circumference; in LA grade D erosion(s) occur in more than 75% of the esophageal circumference) or in patients with long segment (4 or more cm) Barrett's esophagus.

A summary of the quality and strength of recommendations is provided in Reference 13

Treatment of GERD

Diet and lifestyle changes should be considered first in the management of GERD. This includes weight loss, elevating the head of the bed, tobacco, and alcohol cessation, avoidance of late-night meals and snacks, staying upright after meals and avoidance of known food triggers including foods with high fat content, caffeine-containing beverages and medications, gas-containing beverages, chocolate, alcoholic beverages, spicy foods, and acidic foods such as citrus and tomatoes. Note that data supporting these recommendations are limited. A summary of the scientific basis of lifestyle modification is provided in the paper by[13]

Pharmacologic treatment of GERD includes medications directed at neutralization or reduction of gastric acid. Agents in this class include antacids which are used for on-demand symptom relief, PPIs, and Histamine 2 reducing agents (H2RA). Studies have consistently demonstrated that PPIs are more effective for heartburn and regurgitation symptom relief and healing compared with H2RAs.[13]

PPIs suppress acid production by irreversibly blocking the H^+K^+-ATPase proton pump in gastric parietal cells. As a result, PPIs raise the pH of the gastric reflux into the esophagus. H2RAs compete for histamine receptors in the gastric parietal cells and block acid production. Decreased acidity limits the damage of the gastric reflux in the esophagus. Summaries of the mechanism of action and scientific basis of these medications are available.[16,17]

For patients whose GERD symptoms resolve with PPI therapy, and who do not have erosive esophagitis or Barrett's esophagus, an attempt should be made to discontinue PPIs or to switch to on-demand therapy in which PPIs are taken only when symptoms occur and discontinued upon symptom relief. For patients who require maintenance PPI therapy, the PPIs should be administered in the lowest dose that

effectively controls GERD symptoms and maintains reflux esophagitis healing.[13]

The following is recommended for treatment of refractory GERD (GERD symptoms or evidence of GERD that remains despite treatment):[13]

1. Exclude other disorders that can cause dyspepsia, and may be confused with reflux disorders, such as gastritis, peptic ulcer disease, cholecystitis, etc.
2. Optimization of PPI therapy (e.g., verifying compliance with daily PPI usage, changing the dosing schedule of the medication, considering doubling the dose of PPI therapy for a minimum of eight weeks, adding a H2RA or some other type of antacid, or switching to a different PPI).
3. Esophageal pH monitoring (with or without impedance testing) performed off PPIs if the diagnosis of GERD has not been confirmed by endoscopy or previous pH monitoring.
4. Esophageal impedance monitoring performed on PPIs is recommended for patients with established diagnosis of GERD whose symptoms have not responded adequately to twice daily PPI therapy.
5. For patients who have regurgitation as the primary source of their PPI refractory symptoms and who have GERD documented by objective testing, consider antireflux surgery. Fundoplication (typically done laparoscopically), considered the "gold standard" antireflux procedure, is the procedure when the top of the stomach (fundus) is folded and sewn around the lower esophageal sphincter (LES) to increase pressure around the LES and reduce the chance of stomach acid entering the esophagus. Other antireflux procedures include sphincter sewing (using additional stitches to tighten the lower esophageal sphincter) and magnetic sphincter augmentation (MSA). Early limited data suggest MSA is as effective as fundoplication for GERD symptom control. Another endoscopic therapy is radiofrequency application to the wall of the lower esophagus around the lower esophageal sphincter. It is thought to thicken the esophageal wall, decrease relaxation of the lower esophageal sphincter and improve gastric emptying but the exact mechanism is not known. A summary of different surgical and endoscopic treatments of GERD is available from [13] Importantly, in severely obese individuals, fundoplication is less successful, and bariatric surgery usually takes precedence in the surgical considerations for the treatment of a refractory case of GERD.

PPI adverse effects

While PPI are considered the most effective treatment of GERD, several studies have cited an association between PPI use and adverse health effects including intestinal infections, osteoporotic fractures, chronic kidney disease, cardiovascular events in patients on clopidogrel (an antiplatelet medication), deficiencies of certain minerals, and dementia. However, high-quality epidemiologic studies have determined that PPIs are not associated with a significantly increased risk for any of these conditions, except for intestinal infections (enteric pathogens are able to survive passage through the stomach due to diminished gastric acid.) Nice summaries of the adverse effects of PPI use are provided in (12, 17).

Switching to a different PPI can be considered for patients who experience minor PPI side effects including headaches, abdominal pain, nausea, vomiting, abdominal pain, diarrhea and flatulence. For patients with GERD taking clopidogrel and who also have LA grade C or D esophagitis, the established benefits of PPI outweigh the risks. For patients with renal failure taking PPI, close monitoring or consultation with a nephrologist is indicated.

Program coverage

GERD diagnostic services and treatment are covered by the WTC Health Program. For diagnostic coverage, the patient must be enrolled in the WTC Health Program. Treatment coverage also requires that the enrolled member's GERD be certified. To receive certification, a WTC Health Program-affiliated Clinical Center of Excellence (CCE) or the Nationwide Provider Network (NPN) must submit a WTC-3 form (https://wws.cdc.gov/wtc/pdfs/Appendix-WTC3.pdf). Among other things, on the WTC-3 form, the CCE/NPN physician must attest that 9/11 exposures were substantially likely to have been a significant factor in aggravating, contributing to, or causing the enrolled WTC member's GERD. To receive GERD certification, the member must also satisfy 9/11 exposure[19] and maximum time interval requirements.[7]

Conclusion

GERD is the 2nd most common condition certified for treatment by the WTC Health Program. Multiple therapies are available, such as PPI, H2RA, and other types of antacids, as well as surgical and endoscopic interventions. The increased prevalence of GERD with asthma, other lower respiratory diseases, and PTSD as

well as with being overweight or obese places importance of effective therapy for co-morbid respiratory and mental health conditions, as well as, for reaching and maintaining ideal body weight.

Funding statement

This work was funded in part by the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention of the U.S. Department of Health and Human Services (CDC/HHS) (CDC/NIOSH: 200-2017-93431) (Dr. Lin and Udasin). Dr. Calvert is an employee of the US federal government and contributed to this paper as part of his official job duties.

Disclaimer statement

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC). Mention of any company or product does not constitute endorsement by NIOSH/CDC. In addition, citations to websites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

Acknowledgments

The authors thank the WTC rescue, response, recovery and cleanup workers and survivors who participate in the WTC Health Program, and the healthcare professionals dedicated to their care. The authors also thank Kathy Black, PhD, MPH for her kind assistance with the paper.

Disclosure statement

The authors report there are no competing interests to declare.

Institutional Review Board Review

This activity did not involve human subjects and therefore did not require IRB review.

ORCID

Geoffrey M. Calvert http://orcid.org/0000-0003-3968-8458

References

1. Li J, Brackbill RM, Jordan HT, Cone JE, Farfel MR, Stellman SD. Effect of asthma and PTSD on persistence and onset of gastroesophageal reflux symptoms among adults exposed to the September 11, 2001, terrorist attacks. *Am J Ind Med*. 2016;59(9):805–814. doi:10.1002/ajim.22644.
2. Li J, Brackbill RM, Stellman SD, et al. Gastroesophageal reflux symptoms and comorbid asthma and posttraumatic stress disorder following the 9/11 terrorist attacks on World Trade Center in New York City. *Am J Gastroenterol*. 2011;106(11):1933–1941. doi:10.1038/aig.2011.300.
3. Prezant DJ, Weiden M, Banauch GI, et al. Cough and bronchial responsiveness in firefighters at the World Trade Center Site. *N Engl J Med*. 2002;347(11):806–815. doi:10.1056/NEJMoa021300.
4. de la Hoz RE, Shohet MR, Chasan R, et al. Occupational toxicant inhalation injury: The World Trade Center (WTC) experience. *Int Arch Occup Environ Health*. 2008;81(4):479–485. doi:10.1007/s00420-007-0240-x. PMID: 17786467
5. Jordan HT, Osahan S, Li J, et al. Persistent mental and physical health impact of exposure to the September 11, 2001 World Trade Center terrorist attacks. *Environ Health*. 2019;18(1):12. doi:10.1186/s12940-019-0449-7.
6. Banauch GI, Hall C, Weiden M, et al. Pulmonary function after exposure to the World Trade Center collapse in the New York City Fire Department. *Am J Respir Crit Care Med*. 2006;174(3):312–319. doi:10.1164/rccm.200511-1736OC.
7. NIOSH. 2017. *Time Intervals for New-Onset Aerodigestive Disorders*. Washington DC: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, https://www.cdc.gov/wtc/pdfs/policies/WTCHP_PP_Time_Intervals_New_Onset_AeroDig_Disorders_30_August_2017-508.pdf.
8. Wisnivesky JP, Teitelbaum SL, Todd AC, et al. Persistence of multiple illnesses in World Trade Center rescue and Recovery Workers: A cohort study. *Lancet*. 2011;378(9794):888–897.3 doi:10.1016/S0140-6736(11)61180-X.
9. de la Hoz RE, Christie J, Teamer J, et al. Reflux symptoms and disorders and pulmonary disease in former World Trade Center rescue and recovery workers and volunteers. *J Occup Environ Med*. 2008;50(12):1351–1354. doi:10.1097/JOM.0b013e3181845f9b.
10. Litcher-Kelly L, Lam Y, Broihier JA, et al. Longitudinal study of the impact of psychological distress symptoms on new-onset upper gastrointestinal symptoms in World Trade Center responders.

Psychosomatic Medicine Journal of Behavioral Medicine. 2014;76(9):686–693. doi:10.1097/PSY.0000000000000116.

11. Hampel H, Abraham NS, El Serag HB. Meta-analysis: obesity and the risk for gastroesophageal reflux disease and its complications. *Ann Intern Med*. 2005; 143(3):199–211. PMID 16061918, doi:10.7326/0003-4819-143-3-200508020-00006.
12. Icitovic N, Onyebeke LC, Wallenstein S, et al. The association between body mass index and gastroesophageal reflux disease in the World Trade Center Health Program General Responder Cohort. *Am J Ind Med*. 2016;59(9):761–766. doi:10.1002/ajim.22637.
13. Katz PO, Dunbar KB, Schnoll-Sussman FH, Greer KB, Yadlapati R, Spechler SJ. ACG clinical guideline for the diagnosis and management of gastroesophageal reflux disease. *Am J Gastroenterol*. 2022;117(1): 27–56. doi:10.14309/ajg.0000000000001538.
14. Kaji M, Fujiwara Y, Shiba M, et al. Prevalence of overlaps between GERD, FD and IBS and impact on health-related quality of life. *J Gastroenterol Hepatol*. 2010; 25(6):1151–1156. doi:10.1111/j.1440-1746.2010.06249.x.
15. Calvert GM, Anderson K, Cochran J, et al. The World Trade Center Health Program: an introduction to best practices. *Arch Environ Occup Health*. 2022;:1–7. doi:10.1080/19338244.2022.2156975.
16. Gyawali CP, Fass R. Management of gastroesophageal reflux disease. *Gastroenterology*. 2018;154(2):302–318. doi:10.1053/j.gastro.2017.07.049.
17. Yadlapati R, Gyawali CP, Pandolfino JE, et al. AGA clinical practice update on the personalized approach to the evaluation and management of gerd: Expert review. *Clinical Gastroenterology and Hepatology*. 2022;20(5):984–994.e1. doi:10.1016/j.cgh.2022.01.025.
18. Maret-Ouda J, Markar SR, Lagergren J. Gastroesophageal reflux disease. *JAMA*. 2020;324(24):2536–2547. doi:10.1001/jama.2020.21360.
19. NIOSH. 2015. *Policy and Procedures for Certification of Physician Determinations for Aerodigestive and Cancer Health Conditions*. Washington, DC: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, https://www.cdc.gov/wtc/pdfs/policies/WTCHPPPCertPhysDetFINAL20Feb2015-508.pdf.