

GUT INSTINCTS: MY PERSPECTIVE

Magical Thinking

Charles R. Boardman, DNP, MS¹ and Amnon Sonnenberg, MD, MSc¹

Clinical and Translational Gastroenterology (2014) 5, e63; doi:10.1038/ctg.2014.15; published online 13 November 2014

INTRODUCTION

The majority of diagnostic work-ups by gastroenterologists, including gastrointestinal (GI) endoscopy, are initiated by open-access referrals or diagnostic consults from general practitioners and other medical subspecialties. In its response to outside referrals and consults, gastroenterology often functions similarly to radiology, surgical pathology, or the clinical laboratory in providing auxiliary diagnostic and therapeutic services to other physicians who still remain primarily in charge for the patient's health care. In an appreciable number of cases, consults to gastroenterology seem imbued with magical thinking or strange concepts about GI pathophysiology, and a dilemma arises for the gastroenterologist on how to respond to such requests.

In his book "The Golden Bough", James Frazer described magical thinking as prescientific attribution of causal relations between entities not connected by any demonstrable natural law.¹ Frazer divided magical thinking into two major categories: the *law of contagion* and the *law of similarity*. By the law of contagion, entities in proximity can act on one another with any manner of effect. For instance, by touching an oak leaf, a human can acquire the height of its parent tree. By the law of similarity, entities that resemble one another are linked causally. For instance, because a walnut looks like a brain, eating one will directly improve the eater's IQ score. While Frazer analyzed myths and practices from a distant past among ancient populations, such patterns of thought still prevail in medicine and referrals to gastroenterology. The following two sections provide some typical examples.

ASSOCIATION BY CONTACT

How many colonoscopy referrals are made for a "family history of cancer" when the patient has a unique relative with *uterine* or *prostate* cancer? Naturally, the prostate is a neighbor of the rectum; however, proximity does not equal risk. There is also the all-too-common referral of patients for "high-risk" screening programs, whose aunt or grandfather developed a sporadic colon cancer in their eighth decade of life. No amount of closeness with a beloved relative diagnosed with colorectal cancer late in life increases a patient's own risk for that disease. Yet, a contact-oriented model of risk association between *all* family members leads to a considerable number of unnecessary colonoscopies in young patients. A positive

family history of sporadic colorectal cancer increases the patient's own cancer risk about twofold.² At the age of 45–49, the baseline risk for colorectal cancer would thus increase from 0.02 to 0.04%.³ In other words, two times tiny is still small. Sometimes more than one probability value is involved in assessing a patient's risk. Consider, for example, a patient who is referred because his father died from colon cancer and his own prior colonoscopy showed multiple polyps. On further questioning, however, it becomes clear that the patient does not know for sure whether it was a cancer that killed his father and whether it truly affected the colon. Moreover, it appears that the patient's own colonoscopy had revealed only hyperplastic polyps. Even if each individual risk is given an appreciable probability estimate of—let's say—50%, their joint contribution drops to less than 13%≈50%·50%·50%.

Hemicolectomy for colorectal cancer typically involves the creation of anastomotic margins far away from the cancer site. Similarly, esophagectomy and gastric pull-up for esophageal adenocarcinoma result in approximation of normal margins far away from the index neoplasm. While there is some theoretical risk of intraoperative implantation of cancer cells within the anastomotic tissue, in practice this constitutes an extremely rare exception rather than the rule. In general, none of the two index cancers recurs at the surgical anastomosis or elsewhere in the colon or esophagus, but rather as distant metastases to the liver or other adjacent organs. Repeat colonoscopy after hemicolectomy does not serve to assess for recurrent cancer at the anastomosis, but to search for new adenomatous polyps. Yet, out of an irrational fear of recurrent cancer, patients are referred for colonoscopy soon after the initial operation and then repeatedly for surveillance in short intervals ever after. Additional surveillance by abdominal computed tomography scan may incidentally reveal concentric thickening of the bowel wall that is then mistaken as yet another indication for repeat endoscopy, even if the last negative endoscopic examination was only few months ago.

ASSOCIATION BY SIMILARITY

It is in referrals for anemia that one finds many of the most egregious examples of magical thinking. All too often an isolated, mildly low hematocrit is erroneously called iron-deficiency anemia (IDA), when the iron panel is either absent

¹Portland VA Medical Center, Oregon Health & Science University, Portland, Oregon, USA

Correspondence: Amnon Sonnenberg, MD, MSc, Portland VA Medical Center, Oregon Health & Science University, P3-GI, 3710 SW US Veterans Hospital Road, Portland, Oregon 97239, USA. E-mail: sonnenbe@ohsu.edu

or normal and the red blood cells are of normal color and size. Similarly, the incidental finding of an isolated low ferritin level often initiates a cascade of fruitless endoscopic examinations. Excepting very rare and unusual cases, IDA necessitates the presence of both low ferritin *and* low mean corpuscular volume.⁴ A low hematocrit may be related to an important pathological entity, and while it may be (in some sense) *similar* to IDA from GI blood loss or malabsorption, it is obviously not the same. Bidirectional endoscopies for isolated, slightly low hematocrit or ferritin levels are mostly wasted and unwarranted. Although an initial endoscopic work-up failed to detect any potential bleeding site, these patients are repeatedly referred for the same type of endoscopic procedure by their primary care providers, hoping that eventually one endoscopy will magically reveal a source of bleeding that all previous examiners failed to see. Some patients will be subjected to fecal occult blood testing shortly after the negative endoscopy.

Even when low hematocrit or ferritin levels seemingly support the diagnosis of IDA, many simple explanations remain unexplored and patients end up undergoing unnecessary tests and examinations. For instance, serial blood donors often end up on the endoscopy table because no one thought to ask them a simple question. They are joined by many similar patients with recent surgeries involving major blood loss, partial gastrectomy, or renal insufficiency, pre-menopausal women with metromenorrhagia, or patients with longstanding anemia of chronic disease that has come to serologically resemble IDA. Even more egregious associations underlie the request for repeat endoscopy of patients, in whom previous endoscopic findings of erosive esophagitis, Barrett's esophagus, or colon polyps are now being seriously considered as potential sources for GI blood loss and IDA.

Weight loss is another fertile soil for magical thinking. Most recent prospective and retrospective studies have found that, if anything, new weight gain is more concerning for colorectal cancer risk than weight loss.⁵ Similar to IDA, not all weight loss is equal. Weight loss must involve an involuntary, objectively demonstrated loss of greater than 5% of body weight over 6 months with *no other explanation*. Even then, unless it is accompanied by a GI-specific alarm sign or a low ferritin, weight loss alone is insensitive and nonspecific for GI cancers.^{5,6} Extreme involuntary weight loss can be a sign of esophageal, gastric, or pancreatic cancer; however, it is nearly always accompanied by other clinical abnormalities, whose presence can be easily detected before embarking on a more invasive endoscopic work-up. Referrals for work-up of weight loss in patients with previous endoscopic diagnoses of colorectal polyps or Barrett's esophagus are based on even more tenuous associations. Both latter conditions obviously constitute precursor lesions for colorectal cancer and esophageal adenocarcinoma, respectively. However, many unlikely events would need to happen in sequence, before any of these two conditions resulted in a cancer-related weight loss. When *Helicobacter pylori* was newly discovered, gastroenterologists would frequently receive referrals for management of alleged *H. pylori*-induced abdominal pain, GI dysmotility, or failure to thrive.

SCALE AND IMPACT OF THE PROBLEM

Inappropriate referrals cause harm five times over. (1) They exhaust the time and mental energy of the reviewing consultant charged with separating the wheat from the chaff. (2) When they lead to an encounter with a specialist, they result in wasteful, low-yield expenditure of limited clinical resources. (3) They delay work-up in patients with true medical needs or emergencies. (4) When they result in a procedure, they expose patients to unnecessary risk. (5) They occasion immense personal and societal costs without conferring a matching benefit. Prospective and retrospective studies show the inappropriate referral rates from all specialties to gastroenterology to be from 19 to 47%.⁷⁻⁹ Indeed, even referrals for endoscopy by gastroenterologists themselves were found to be inappropriate nearly one-in-five times in one study, and a disconcerting one-in-four in another.^{7,8} A 2012 study of 2009 data showed that that year's direct expenditures for endoscopy in the United States topped \$32.4 billion.¹⁰ On the basis of the above published rates of inappropriate referrals, which are very consistent across a number of prospective and retrospective studies, one can estimate that the annual waste, in upfront billing costs alone, is between \$6 and 15 billion. This does not take into account the substantial secondary and tertiary costs, such as lost productivity, wasted clinical resources, and care for complications, to name a few.

CAUSES AND POSSIBLE REMEDIES

No board certification, professional credentialing, and quality assurance have made a dent in the prevalence of magical thinking. In fact, increasing assiduity of administrative efforts to eliminate risks of medical practice may have paradoxically resulted in a proliferation of magical thinking. Because of the specialization of clinical practice and the loss of general medical knowledge, many referring physicians no longer understand the inconvenience, risk, and cost that are associated with GI endoscopy. As byproduct of a bureaucratized and liability-driven medical environment, the extreme compartmentalization of health care amplifies magical thinking in referrals by walling off clinicians into increasingly narrow specialty guilds. The increased burden of perpetual certification and re-certification to prove one's fitness to practice medicine, while occasionally weeding out the anomalous bad actor, actually drives many clinicians to burrow into increasingly smaller niches of expertise.¹¹ Frequently, they have become unable to manage general signs and symptoms, such as abdominal pain, changes in bowel habits, or changes in the common laboratory panel. Ordering a slew of new tests, procedures, or consults is an expression of this inability. It may also provide the comfort and illusion of remaining in control in an otherwise fearsome and poorly understood medical situation.¹²

Obviously, the root cause of unwarranted consultations or procedures is not alone magical thinking by referring primary care providers, and some of the blame rests with gastroenterologists and how they respond to inappropriate consults. From the perspective of a gastroenterologist, it is much easier to support magical thinking and schedule a

patient for a poorly indicated procedure than to spend time trying to refute an erroneous concept and to educate providers or patients. Moreover, there is a strong financial incentive for gastroenterologists to perform endoscopies. The practice of defensive medicine affects the indication for endoscopic procedures. Even if the referring physician and the endoscopist do not anticipate a positive finding, they may be trying to protect themselves and their patients against any rare events with potentially poor outcomes. Finally, patient expectations also contribute to the occurrence of unwarranted consultations, as some patients insist on procedures as means “to be checked out and make sure that nothing is wrong.”

Although gastroenterology often functions as an adjunct service to other medical specialties, unlike the clinical laboratory, pathology, or radiology services, gastroenterologists cannot detach themselves from the merits of the referring indication. Because endoscopic procedures are associated with side effects and complications, the gastroenterologist ultimately carries the responsibility for the appropriateness and outcome of their correct execution. The reputation, professional standing, and income of gastroenterologists depend on their willingness to cater to the needs of their referring colleagues. Gastroenterologists who frequently question decisions made by referring physicians would lose them as customers and soon find themselves out of business. It is not easy to strike a proper balance between being an accommodating team player and critical partner, who occasionally rejects the most outrageous referrals and tries to educate referring colleagues about the ways and means of digestive diseases.

CONCLUSION

Whereas it would be unrealistic to imagine that someday magical thinking will altogether vanish from medical practice, it is our duty to expunge its most noxious strongholds from our specialty. Rather than serving as willing enablers of misconceptions by accepting the inappropriate referrals and performing unnecessary endoscopies, occasionally, it falls

on us as gastroenterologists to do the more onerous and difficult task of just saying no.

CONFLICT OF INTEREST

Guarantor of the article: Amnon Sonnenberg, MD, MSc.

Specific author contributions: Both authors contributed equally to conception, design, and writing of manuscript.

Financial support: None.

Potential competing interests: None.

1. Frazer JG. *The Golden Bough: the Roots of Religion and Folklore*. Wordsworth: London, 1993.
2. Butterworth AS, Higgins JP, Pharoah P. Relative and absolute risk of colorectal cancer for individuals with a family history: a meta-analysis. *Eur J Cancer* 2006; **42**: 216–227.
3. National Cancer Institute Surveillance Epidemiology and End Result. Available at <http://seer.cancer.gov>.
4. Goddard AF, McIntyre AS, Scott BB, British Society of Gastroenterology. Guidelines for the management of iron deficiency anaemia. *Gut* 2000; **46** (Suppl 3-4): iv1–iv5.
5. Bisschop CNS, van Gils CH, Emaus MJ *et al*. Weight change later in life and colon and rectal cancer risk in participants in the EPIC-PANACEA study. *Am J Clin Nutr* 2014; **99**: 139–147.
6. Baicus C, Caraiola S, Rimbasi M *et al*. Ferritin about 100 mcg/L could rule out colon cancer, but not gastric or rectal cancer in patients with involuntary weight loss. *BMC Gastroenterol* 2012; **12**: 86.
7. Baron TH, Kimery BD, Sorbi D *et al*. Strategies to address increased demand for colonoscopy: guidelines in an open endoscopy practice. *Clinic Gastroenterol Hepatol* 2004; **2**: 178–182.
8. Aljebreen AM, Alswat K, Almadi MA. Appropriateness and diagnostic yield of upper gastrointestinal endoscopy in an open-access endoscopy system. *Saudi J Gastroenterol* 2013; **19**: 219–222.
9. Petruzzello L, Hassan C, Alvaro D *et al*. Appropriateness of the indication for colonoscopy: is the endoscopist the ‘gold standard’? *J Clin Gastroenterol* 2012; **46**: 590–594.
10. Peery AF, Dellon ES, Lund J *et al*. Burden of gastrointestinal disease in the United States: 2012 update. *Gastroenterology* 2012; **143**: 1179–1187.
11. Sonnenberg A, Boardman CR. Costs of fear. *Am J Gastroenterol* 2013; **108**: 173–175.
12. Sonnenberg A. Cost and benefit of medical rituals in gastroenterology. *Aliment Pharm Ther* 2004; **20**: 939–942.

The Editors encourage readers with comments and opinions regarding the Gut Instincts: My Perspective series to submit a letter to the editor expressing their views to mc.manuscriptcentral.com/ctg.



Clinical and Translational Gastroenterology is an open-access journal published by Nature Publishing Group. This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>