

To the editor (JAMA) (Draft)

RE: Association of Colonoscopy Adenoma Findings With Long-term Colorectal Cancer Incidence (Click, Benjamin, Pinsky, Payl F, et al) (JAMA. 2018;319(19):2021-2031.):

The promise of virtual elimination of mortality from colorectal cancer (CRC), as predicted in the National Polyp Study (NPS) published over twenty-five years ago,{Winawer, 1992 #4576} failed to materialize. Polypectomy then achieved an eighty percent reduction in subsequent CRC, yet to date we have witnessed less than half the predicted protection.{Kahi, 2018 #4774} As a result, 150,000 Americans continue to be diagnosed with CRC and 50,000 die every year.{Siegel, 2017 #4597} Rather than dramatic reductions, we see one or two percent per year. Rather than victory parties, we read articles with titles such as “Does Colonoscopy Work?”{Hewett, 2015 #4658} The current referenced study claims goes as far as to suggest that detecting non-advanced adenomas may not be associated with a patient’s increased risk of CRC. We vehemently disagree. CRC is the leading cause of cancer deaths among non-smokers and is a very protracted and resource-utilization intensive disease. Our study demonstrating an 83% reduction in incidence and 89% reduction in mortality from CRC{de Groen, 2014 #3308} suggests we have won the war. But only when the colonoscopy is done well. If we could mirror the screening compliance achieved by our breast cancer screening advocates (three out of four get screened){Finney Rutten, 2014 #4775} with colonoscopy of the protective benefit initially projected, we would currently be celebrating an incredible 60% reduction in deaths. Once we pass fifty percent reduction, we begin to think in the terms postulated in *Victory over CRC in 2018*.{Lloyd, 2018 #4786} During the past quarter of a century, more than one-million excess patients have suffered the ravages of a disease we contended we had the tool to prevent. We successfully expanded capacity, but the protection from subsequent CRC eludes us. At the current average cost of over \$200,000 per case, and 75,000 unnecessary cases each year, Americans burn through \$15 billion and say final good-byes to 30,000 friends, relatives, loved-ones and co-workers we failed to protect, in spite of them having undergone the rigors of screening colonoscopy.

The calculations of excess morbidity and mortality are based only on the predicted protective benefits for a reasonable proportion of the population projected to comply with screening colonoscopy (80%), not a hypothetical idealized compliance rate and/or theoretical optimal protection projections. As the American Cancer Society hopes to achieve its 80 percent by 2018 campaign, the increase in screening has not made the highly touted impact on incidence or mortality. In the real world, we SHOULD be preventing more than two-thirds of the cases and deaths. We are not waiting for new technology, new treatments, innovative chemotherapy, or advances in surgery, we only need to perform colonoscopy as effectively as the participants in the National Polyp Study (NPS) initially published in 1993. Eighty percent protection of eighty percent of the population yields a realistically achievable (64 percent) two-thirds reductions in diagnoses and deaths.

Many ask what happened? We went from one-million colonoscopies a year to ten million in less than five years. We currently perform more than twenty million annually. The number of gastroenterologists has less than tripled. The technique of colonoscopy has never been standardized, nor have the expectations for colonoscopy’s protection from cancer or death been projected as concrete goals. There is no text-book method for performing colonoscopy. Most trainees learn by trial and error with little guidance.{Anderson, 2015 #4777} As the volume of colonoscopy expanded exponentially, the quality in terms of protection from cancer apparently plummeted.{Inra, 2017 #4327} Over the past twenty-five years there have been no substantive changes in the technique of colonoscopy. We still use scopes of the same essential design as used in the NPS. Issues which

contribute to diluting the benefits of screening colonoscopy include missed lesions, incomplete removal of lesions, failure to achieve full insertion to the end of the colon and unacceptable complication rates (especially perforations).{Holub, 2018 #4665;Taveira, 2017 #4670;Pinto-Pais, 2017 #4662} Articles exploring the cause for the failure of colonoscopy to protect patients have looked at numerous factors, the most frequent explanation being “operator error.”{Inra, 2017 #4327;Garborg, 2017 #3831;Rex, 2015 #4643} Some physicians take less than five minutes to examine the five foot organ we refer to as the large bowel.{Moritz, 2012 #681;Overholt, 2010 #1353;Barclay, 2006 #366} It is well known that the time invested in examining the colon surfaces strongly correlates with polyp detection. Polyp detection correlates strongly with protection from subsequent CRC.{Rex, 2018 #4778} Many other factors also contribute to the difficulty in performing conscientious colonoscopy.{Rajasekhar, 2016 #4779}

The politics and the economic impacts of the near eradication of colorectal cancer through an standardized colonoscopy technique (Tandem Colonoscopy) is far beyond the scope of this letter. We only wish to summarize the objective data on compliance, quality, safety and outcomes. We also postulate several reasons for the combined improved protection, dramatic decrease in complications and the high patient compliance with the innovations of the model. Quality in colonoscopy is a public health concern of mammoth proportions.

A simple to measure quality metric has long been available and utilized in proposals to measure and monitor quality. Two frightening statistics reflect the status that defies conventional wisdom. The first study published in the *New England Journal of Medicine* in 2006 documented a more than 1000% variability in adenoma detection per patient among a single group of twelve gastroenterologists practicing outside Chicago, Illinois.{Barclay, 2006 #366} The second demonstrated that 86 percent of the gastroenterologists in a European country exhibited adenoma detection rates *below* the prevailing standard (finding an adenoma in a minimum of 20 percent of screening patients).{Kaminski, 2010 #1342} One explanation for the continued consideration of stool based screening for CRC is the massive dilution of the protective benefit of screening colonoscopy by the low-quality colonoscopists. Done well, a colonoscopy, as predicted in the National Polyp Study, reduces both incidence and mortality greater than 80 percent. That we witness one-third the protection in the community suggests a majority of colonoscopies deliver negligible protection. The small group of *outliers* who exceed the minimal standard are unable to corroborate the dramatic power of colonoscopy to decisively win the war against CRC (mortality reductions of ninety percent). Most patients of screening age have undergone colonoscopy in America,{Sauer, 2018 #4787} yet the incidence and mortality only have dropped by one or two percent per year since the predictions of the eighty percent drop first appeared a quarter of a century ago. If we can restore colonoscopy to its rightful place, the alternatives (FOBT, FIT, stool-DNA, and virtual colonoscopy) will no longer remain prudent as legitimate screening options. Eighty percent protection compared to a purported ten percent is not sufficiently similar for consideration as equivalent options in a screening guideline menu. The most extensive study of the benefits of stool based testing showed no benefit whatsoever.{Pitkaniemi, 2015 #4766}

When a physician encounters a polyp, it is incumbent upon them to safely and completely destroy the lesion. A study of polypectomy competency looked at ten standards of polyp removal.{Duloy, 2018 #4781} The frightening revelation was that more than half of polyps are not properly removed according to the Royal College of Physicians Joint Advisory Group on GI Endoscopy’s Direct Observation of Endoscopy Skills (DUPyS) criteria.{Siau, 2018 #4782} Of even more concern is the finding that the quality of polypectomies did NOT correlate with the traditional measure of colonoscopy quality, the adenoma detection rate (ADR). It is of little value to have a doctor detect pre-cancerous

polyps only to remove them incompletely. To win the war over CRC we must vigilantly **detect** AND **destroy** all pre-malignant tissue.

A thorough review of colonoscopy appeared in *Gastrointestinal Endoscopy Clinics of North America* in 2005. {Swain, 2005 #2871} It succinctly articulates the challenge: "Colonoscopy is an unlikely technique. Inserting one flexible tube through another, even more flexible tube and judging progress by guesswork and feel sound like madness, and sometimes, it even seems like it to the experts." Advancing the insertion tube is a complex process and there have not developed any consistent successful approaches to achieving complete visualization of the colonic surfaces. As described, much learning is from trial and error. The doctor is aware of the initial goal of obtaining a pristine photograph of the appendiceal orifice, that new-moon-shaped crescent opening at the base of the cecum. Documentation of the aperture of the appendix confirms cecal intubation, the second most frequently employed quality measure in colonoscopy. Evaluations of fresh gastroenterology fellowship graduates estimate that these less experienced endoscopists may achieve the full intubation in only ninety percent of cases. {Patwardhan, 2016 #4773} Too seldom in healthcare does the patient obtain the benefit of a team approach to problem solving. The patient consults with their personal primary care physician and may be referred to individual specialists, but no significant collaboration ensues to ensure accuracy, safety and quality. In our model, the expert provides an essential contribution. In essence, the patient gets the best of their Tandem Colonoscopy physician's colonoscopy skill set PLUS that of an experienced expert, when needed.

Adding additional dominant hands to the process dramatically reduces the complexity and explains in large measure the outstanding results achieved in an environment where conventional wisdom might assume the colonoscopist is insufficiently experienced and trained to handle such complex polypectomies. We agree. What healthcare needs is to have an expert available when needed, but not wasted on the perfunctory performance of the routine screening exams. Patients do not arrive with a warning that a complex polyp lurks within. The Tandem Colonoscopy Model makes provisions to ensure the patient is always in receipt of the level of care appropriate and commensurate with the current circumstances.

In summary, we are of the opinion that colonoscopy, done well (such as in the Tandem Colonoscopy model) can solve perplexing problems that have impeded the ability of community colonoscopy to vanquish CRC. The three barriers have been compliance, capacity and quality. If we can achieve 80% by 2018, as the American Cancer Society has espoused we can reduce CRC cases by 100,000 per year and save 30,000 lives. Simultaneously, we arrest the squandering of over \$20 billion in healthcare expenditures. We do not currently possess adequate capacity in high-quality colonoscopy with the existing pool of more than 10,000 gastroenterologists. The Tandem Colonoscopy model can provide scalable capacity within months, not decades (as with gastroenterology capacity shortages). The Tandem Colonoscopy model addresses compliance because the patient's PCP is involved in the procedure and the patients have proven to follow their cogent advice in this model. The capacity shortage can be addressed immediately if only 15% of the existing primary care community commits to one-half day per week for screening colonoscopy services. The quality documented demonstrates cancer protection levels triple that currently delivered in America. It confirms the estimate that colonoscopy by a doctor with an ADR above 20 delivers ten times the CRC protection. If as many as half the colonoscopies performed today are done by doctors with sub-standard ADRs, then it is no wonder that in some segments, there is still a push to use alternative screening modalities of limited effectiveness. If stool based testing for hidden (occult) blood delivers less than ten percent mortality

reduction and Tandem Colonoscopy is ten times as effective, it is morally indefensible to continue to recommend such alternatives. The definitive study from Finland should have eliminated any further proposals to employ FOBT/FIT as an effective CRC screening mechanism.{Chiu, 2017 #4783} As expensive as colorectal cancer is to treat, colonoscopy is an overwhelming medical bargain. Colonoscopy, when done to industry standards (adequate ADR), costs less than \$10,000 per quality adjusted year of life saved (QAYL), more than ten times the benefit for mammography and one-hundred times that for cervical cancer screening.{Cleemput, 2011 #1969}

It is high time that we take the quality problem in colonoscopy more seriously. If nearly half of the colonoscopies performed provide only one-tenth the protection that they could, why aren't the insurers refusing to pay for these almost worthless services? Why, when the ADR is so easy to calculate, has no demand surfaced that all colonoscopists measure quality and make the measurements available to our patients to benefit their decision making? If we, as physicians, have no more respect for the health and lives of our patients, we deserve the scrutiny that will soon invade us from external sources. It is time we admit our failures and take more seriously that sacred oath to which we solemnly ascribed upon matriculation from the hallowed halls of medical education. We must restore confidence in our profession. This can only occur with transparency. We have delivered colonoscopies that are too often below well-understood and established standards and more than a million patients have paid the price of suffering from a preventable cancer. The colonoscopy process has been maintained as unnecessarily complicated. It is time to use trained assistants and physician experts for the benefit of colorectal cancer prevention and improved patient care. We need to accept and embrace the advantages afforded through technological innovations such as video colonoscopy and the use of surgical technicians. One hundred thousand cases, thirty thousand lives and \$20 billion annually lay in the balance. We can do better. We must do better. The proposal to expand alternative providers to meet the demand for high-quality colonoscopy (such as the Tandem Colonoscopy technique) is achievable and scalable. As long as we permit the mediocre (or worse) colonoscopists cases to be included in analysis of protective benefits, the one-tenth protection delivered will substantially dilute the results. If, as suggested, as many as half of colonoscopies deliver benefits analogous to the below 10% protection of FIT and/or FOBT, it is no wonder these modalities remain in the guidelines. We need to stop permitting the below the accepted minimum ADR standard physicians from performing screenings. Just stop paying them would be the quickest solution. But at a minimum, all studies of the benefits of colonoscopy should remove the cases performed by physicians functioning below the accepted ADR standard. Studies suggest there is a dramatic improvement in protection when the ADR is above 20, delivering ten times the protection.{Kaminski, 2010 #1342} Once we acknowledge the vast superiority of high-quality colonoscopy, we look forward to the day, hopefully within the current decade, when we declare not only *Victory over Colorectal Cancer by 2018*,{Lloyd, 2018 #4786} but victory for our patients that the medical profession unabashedly assures quality to all. We do not need external medical police. We need to effectively adjudicate ourselves. This is the mandate for our profession. The failed War On Cancer has stalled. It need not be so. Break the stranglehold of bias against innovation and soon CRC will be vanquished. We have the tool, do we have the will?

Stephen C. Lloyd, MD, PhD