A risk-profiling approach for surveillance of inflammatory bowel disease-colorectal carcinoma is more cost-effective: a comparative cost-effectiveness analysis between international guidelines

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Background: Colonoscopic surveillance for neoplasia is recommended for patients with inflammatory bowel disease (IBD)-related colitis. However, data on cost-effectiveness predate current international guidelines.

Objective: To compare cost-effectiveness based on contemporary data between the surveillance strategies of the American Gastroenterological Association (AGA) and British Society of Gastroenterology (BSG).

Design: We constructed a Markov decision model to simulate the clinical course of IBD patients.

Setting: We compared the 2 surveillance strategies for a base case of a 40-year-old colitis patient who was followed for 40 years.

Patients: AGA surveillance distinguishes 2 groups: a high-risk group with annual surveillance and an average-risk group with biannual surveillance. BSG surveillance distinguishes 3 risk groups with yearly, 3-year, or 5-year surveillance.

Interventions: Patients could move from a no-dysplasia state with colonoscopic surveillance to 1 of 3 states for which proctocolectomy was indicated: (1) dysplasia/local cancer, (2) regional/metastasized cancer, or (3) refractory disease. After proctocolectomy, a patient moved to a no-colon state without surveillance.

Main Outcome Measurements: Direct costs of medical care, quality-adjusted life-years (QALYs), and incremental cost-effectiveness ratios.

Results: BSG surveillance dominated AGA surveillance with $9846 per QALY. Both strategies were equally effective with 24.16 QALYs, but BSG surveillance was associated with lower costs because of fewer colonoscopies performed. Costs related to IBD, surgery, or cancer did not affect cost-effectiveness.

Limitations: The model depends on the accuracy of derived data, and the assumptions that were made to reflect real-life situations. Study conclusions may only apply to the U.S. health care system.

Conclusion: The updated risk-profiling approach for surveillance of IBD colorectal carcinoma by the BSG guideline appears to be more cost-effective. (Gastrointest Endosc 2014;80:842-8.)

Abbreviations: AGA, American Gastroenterological Association; BSG, British Society of Gastroenterology; CRC, colorectal carcinoma; IBD, inflammatory bowel disease; PSC, primary sclerosing cholangitis; QALY, quality-adjusted life-year.

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Patients with ulcerative and Crohn's colitis are advised to undergo colonoscopic surveillance for neoplasia after 8 to 10 years of disease duration. Several guidelines are currently available, with the most important being the American Gastroenterological Association (AGA)[1] and British Society of Gastroenterology (BSG)[2] guidelines. Data on the cost-effectiveness of these guidelines predate the publication of these guidelines[3,4] or focus on specific subsets of patients.[5,6]

Both the BSG and AGA updated their guidelines in 2009[2] and 2010,[1] respectively. With this update, the BSG included a risk-profiling approach by assigning inflammatory bowel disease (IBD) patients to risk groups that determined the interval between surveillance colonoscopies. The AGA did not make a clear recommendation with regard to risk profiling besides their guidelines recommendation of yearly surveillance for patients with primary sclerosing cholangitis (PSC). This strategy for PSC has not changed and already was advocated by both AGA and BSG guidelines since the previous iterations of the guidelines in 2002[7] and 2003.[8]

Apart from the decision analysis by Nguyen et al,[5] distinguishing between continued surveillance and total colectomy when low-grade dysplasia is found, no overall analysis describing the cost-effectiveness of these guidelines has been published. We hypothesized that risk profiling as proposed by the BSG would be more cost-effective than biannual surveillance as recommended by the AGA for the majority of patients. Our aim was therefore to compare the cost-effectiveness of the BSG and AGA guidelines.

Take-home Message

- A risk-profiling approach to colonoscopic surveillance in inflammatory bowel disease could prevent unnecessary costs without sacrificing effectiveness for detecting neoplasia.

METHODS

We performed a decision analysis by developing a Markov model to simulate the clinical course of IBD patients at the start of surveillance for the remainder of their lifetime (Fig. 1). We compared the colonoscopic surveillance guidelines of the AGA and BSG. The AGA surveillance guideline consists of annual or biannual colonoscopic surveillance depending on the presence or absence of PSC, respectively. The BSG recommends surveillance colonoscopy annually, every 3 years, or every 5 years depending on the risk profile of each individual patient. The outcomes of this study were cost, quality-adjusted life-years (QALYs), and the incremental cost per QALY gained.

Patient population

Our study was designed for a base case IBD patient with either ulcerative colitis or Crohn's colitis that was diagnosed at the age of 30, and colonoscopic surveillance started after 10 years of disease at the age of 40 with an intact colon.[9] Life expectancy at the age of 40 was another 40.0 years.[10]

Model structure

Patients were assigned to either AGA or BSG surveillance and followed through 1-year Markov cycles over a lifetime horizon. All patients started in a health state of no neoplasia. At the end of a cycle, patients could remain neoplasia free, transfer to 1 of 3 total colectomy health states, or die. The 3 proctocolectomy health states were (1) proctocolectomy for therapy-refractory disease; (2) proctocolectomy for low-grade dysplasia, high-grade dysplasia, or local cancer; and (3) proctocolectomy for regional or distant cancer including chemotherapy. After proctocolectomy, patients transferred to a no-colon health state where they remained until death. Although guidelines recommend proctocolectomy for confirmed nonadenoma-like low-grade dysplasia, many physicians perform enhanced surveillance when low-grade dysplasia is found. We incorporated this optional health state, which indicated 2 colonoscopies per year until high-grade dysplasia or cancer was found. These patients would then undergo proctocolectomy or die.

Clinical representation

To determine annual incidence rates of neoplasia for each risk group of annual, biannual, 3-year, or 5-year surveillance, we derived yearly incidence rates from the literature[12-16] (Table 1). Subsequently, these incidence rates were proportionally multiplied by applicable risk multipliers (Table 2).[17-20,26] To determine the distributions between risk groups and proportions of risk multipliers within risk groups, we used data from our cohort as recently reported by Mooiweer et al,[11] in which 1018 consecutive patients undergoing colonoscopic surveillance in our tertiary referral center and 1 large general hospital were studied. This allowed allocation of patients to AGA and BSG risk groups.

Following the AGA guidelines, 6% of patients should have to undergo annual surveillance and the remaining 94% biannual surveillance. When using the BSG guidelines, 20% of patients should have to undergo annual surveillance and 39% 3-year and 41% 5-year surveillance. All distributions, proportions, and risk multipliers are shown in Table 2.

Mortality. Annual incidence of death of the general U.S. population[10] was multiplied by standardized mortality ratios for ulcerative colitis and Crohn's disease after 10 years of disease (1.1 and 1.49, respectively).[21] This was done in a ratio of 1.7:1 for ulcerative colitis versus Crohn's disease based on prevalence data of Olmsted County in the