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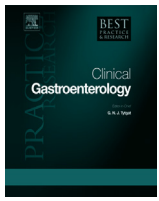

6

# Cost-effectiveness of Barrett's oesophagus screening and surveillance

Louisa G. Gordon, BEc, MPH, PhD, Senior Research Fellow [a,*], George C. Mayne, BSc(Hons), PhD, Medical Scientist [b,1]

[a] *Centre for Applied Health Economics, Griffith Health Institute, Griffith University, Logan Campus, University Dr, Meadowbrook, Queensland 4131, Australia*
[b] *Flinders University, Department of Surgery, Flinders Medical Centre, Bedford Park, South Australia 5042, Australia*

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A B S T R A C T

Endoscopic screening and surveillance of patients with Barrett's oesophagus to detect oesophageal cancer at earlier stages is contentious. As a consequence, their cost-effectiveness is also debatable. Current health economic evidence shows mixed results for demonstrating their value, mainly due to varied assumptions around progression rates to cancer, quality of life and treatment pathways. No randomized controlled trial exists to definitively support the efficacy of surveillance programs and one is unlikely to be undertaken. Contemporary treatment, cost and epidemiological data to contribute to cost-effectiveness analyses are needed. Risk assessment to stratify patients at low- or high-risk of developing cancer should improve cost-effectiveness outcomes as higher gains will be seen for those at higher risk, and medical resource use will be avoided in those at lower risk. Rapidly changing technologies for imaging, biomarker testing and less-invasive endoscopic treatments also promise to lower health system costs and avoid adverse events in patients.



* Corresponding author. Tel.: +61 7 3382 1320; fax: +61 7 3382 1160.
*E-mail addresses:* louisa.gordon@griffith.edu.au (L.G. Gordon), george.mayne@flinders.edu.au (G.C. Mayne).
[1] Tel.: +61 8 8204 6088; fax +61 8204 6130.

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## Introduction

Barrett's oesophagus is defined as a metaplastic change from normal oesophageal mucosa to columnar-lined epithelium containing goblet cells [1]. It is commonly categorized into non-dysplasia, low-grade or high-grade dysplasia with the relative proportions in patients being 86%, 10% and 2% [2], respectively. Barrett's oesophagus is found in approximately 6–14% of patients who undergo endoscopy for symptomatic gastro-oesophageal reflux disease, but the condition goes under-reported because many patients with Barrett's oesophagus are asymptomatic [3]. Currently, patients with chronic gastro-oesophageal reflux disease are screened for Barrett's oesophagus, and as Barrett's oesophagus is associated with the development of oesophageal adenocarcinoma, these patients are monitored under endoscopic surveillance. Oesophageal adenocarcinoma is an aggressive cancer with a poor five-year survival rate [4], while its incidence has increased considerably in recent decades, particularly in Western populations. Observed risk factors for oesophageal adenocarcinoma include smoking and smoking duration; acid-reflux; obesity; alcohol; family history and diabetes [5,6], while a risk reduction is seen with frequent use of non-steroidal anti-inflammatory drugs [7]. The strongest risk factor and only known precursor to oesophageal adenocarcinoma is Barrett's oesophagus. Patients with Barrett's oesophagus are at least 30 times more likely to develop oesophageal adenocarcinoma than patients without Barrett's oesophagus [8].

With five-year survival rates for early stage oesophageal adenocarcinoma two to three times higher than late stage cases, surveillance of patients with Barrett's oesophagus as a means to detect early stage oesophageal adenocarcinoma is recommended by several leading bodies [9,10]. As an early-detection cancer strategy, endoscopic surveillance of Barrett's oesophagus is controversial because the majority of patients undergoing surveillance do not develop oesophageal cancer and subsequently derive no benefit [11]. The yield of early-stage cancers for patients within a Barrett's surveillance program varies widely from 1/285 to 1/52 patient-years [12–17], or 0.2%–2% per year [4]. However, advocates of surveillance suggest it is the only option for early detection, and since adenocarcinoma occurs through a known sequence of metaplastic-dysplastic states, detecting pre-cancerous states within a surveillance program is critical to ensure optimal survival [1]. While this appears to be a compelling argument in favour of routine surveillance of patients with Barrett's oesophagus, there are a number of complicating issues. A definitive diagnosis of dysplasia state can be difficult [18]. Low-grade dysplasia is difficult to differentiate from inflammatory reactive atypia. Furthermore, dysplastic lesions can be flat and difficult to detect with standard endoscopic techniques, and biopsy sampling protocols can miss focal lesions [19–21]. Surveillance methods are not always consistent [22] and the survival benefit conferred by surveillance is unclear due to the absence of randomized controlled trials on the efficacy of surveillance [18,23]. Consequently, these issues continue to present a dilemma for clinicians and hospital administrators as to whether screening and surveillance endoscopies should be supported within routine programs.

There are also economic considerations for screening and surveillance of Barrett's oesophagus. Cost-effectiveness analysis is the process of systematically comparing the relative health care costs and benefits of alternative strategies for the purpose of informing decision-makers of the strategy with the best value [24]. Systematic assessment of incremental costs and effects requires knowledge of natural history and interaction with practice, and this is particularly relevant for oesophageal adenocarcinoma which has multiple strategies and pathways for monitoring, diagnosis and management, all conditional on the stage of disease at presentation [25]. Although health provider costs may be of lesser concern to clinicians who will be focussing on optimizing outcomes for individual patients, ultimately, resource allocation decisions affect everyday clinical care in settings with budgetary pressures [26]. It is mandatory for regulatory bodies in Canada, the UK, Australia and most of the Western world to evaluate cost-effectiveness of new technologies when considering potential government reimbursement.

Against this background, the present review introduces the economic issues of screening patients for Barrett's oesophagus and surveillance of those patients diagnosed with the condition. The current state of evidence is presented, along with the limitations of this evidence-base, and future directions on this topic. This review focuses particularly on surveillance strategies and assessments of their cost-effectiveness because this is where most of the research evidence is concentrated.