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unprecedented challenges imposed by the current pandemic on all aspects of our lives, centres across the globe were able to work together to collect and analyse detailed outcome data for more than 700 patients with SARS-CoV-2 infection, thus providing crucial information on a potentially at-risk population, with an efficiency and scale only possible through international collaboration.

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We declare no competing interests.

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## COVID-19 as a barrier to attending for gastrointestinal endoscopy: weighing up the risks

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See Online for appendix

For more on the **National Endoscopy Database** see <https://nedpilot.thejag.org.uk>

Gastrointestinal endoscopy is the cornerstone of gastrointestinal cancer diagnostics. Services were largely suspended during the peak of the COVID-19 pandemic (appendix p 1),<sup>1</sup> with procedures done during April and May, 2020, representing only 12% of pre-COVID-19 activity.<sup>2</sup> Following British Society of Gastroenterology<sup>3</sup> guidance on recommending gastrointestinal endoscopy at the end of April, 2020, UK services have increased; however, levels vary by procedure type and unit. According to the National Endoscopy Database, by July 5, 2020, activity had only reached 42% of pre-COVID levels.

After recommencement of endoscopy procedures in April, 2020, delivery issues, including reduced staff and room capacity, need for enhanced personal protective equipment, creation of COVID-minimised pathways, including room downtime, enhanced cleaning, and need for linear flow of patients through units, have resulted in substantially reduced services (appendix p 1). Reluctance of patients to attend for investigations is also a major factor contributing to the reduction in services, and despite the implementation of measures to protect patients and staff,<sup>4</sup> many services have reported a substantial number of patients are not attending appointments.

During the peak of the COVID-19 epidemic, people were strongly encouraged to avoid attending hospital. Many patients remain concerned about this: a UK YouGov survey done in June, 2020,<sup>5</sup> indicated that 42% of respondents felt uncomfortable about

attending a routine hospital appointment. Research done before the COVID-19 epidemic identified anxiety as a major factor for patients attending endoscopy, affecting experience; patients feel anxious about why they have been referred, what the test involves, whether it will be painful or embarrassing, and what results might show. COVID-19 adds further complexity and UK endoscopy units have reported many patients citing anxiety about contracting COVID-19 as an important factor in deciding whether to attend.

Decision making about attendance, what factors influence this, and how patients assess competing risks that cancer (and other conditions detected by endoscopy) and COVID-19 pose, are poorly understood. Anxiety about COVID-19, family pressures, logistical considerations, such as carer responsibilities, and travel to and from the hospital while adhering to social distancing, might also be barriers. The cultural attitude of sparing health services is important and varies between countries but is likely to have been reinforced during COVID-19, when for example the message from the UK Government was to protect health services. The scarcity of evidence on what influences behaviour hinders our ability to take action to reassure patients and increase uptake.

To minimise the potential impact of COVID-19 associated diagnostic and treatment delays on patients with cancer, it is vital that endoscopic procedures are safely and effectively reinstated and that patients feel reassured that it is safe to attend. In June, 2020, an

estimated two million people in the UK were waiting for potential cancer investigations and treatment as a result of delays caused by the pandemic.<sup>6</sup> Delayed presentation and temporary suspension of screening and diagnostic services were estimated to have resulted in 2700 fewer patients being diagnosed with cancer in the UK each week<sup>7</sup> with delays in investigation and treatment potentially leading to excess cancer deaths (across all cancer types) of up to 7000 in England and more than 30 000 in the USA.<sup>8</sup> One study<sup>9</sup> used cancer registry and admissions data to model the impact of COVID-19 delays on additional cancer deaths among four major cancers (breast, lung, colorectal, and oesophageal). This estimated an additional 3291–3621 avoidable cancer deaths in the next 5 years in the UK with an increase of 15.3–16.6% colorectal cancer deaths and 5.8–6.0% oesophageal cancer deaths. A study done in Hong Kong estimated a 6 month delay in diagnostic gastrointestinal endoscopy might be associated with higher stage at diagnosis in 4.6% of patients with gastric cancer and 6.4% of patients with colorectal cancer.<sup>10</sup>

A balancing of risks is essential. Informed consent involves providing individuals with sufficient information to allow them to make an informed decision regarding investigation and treatment and thus consideration should be given to the risks and benefits of attending for endoscopy.

The diagnostic rate of cancer at gastrointestinal endoscopy varies depending on risk factors, including age and the indication for the procedure. The risk of cancer diagnosis at endoscopy across all patients is around 2%,<sup>2</sup> however in some settings, such as individuals undergoing screening colonoscopy on the basis of the faecal immunochemical test, 10% of individuals have cancer diagnosed (appendix p 1).

The prevalence of COVID-19 varies significantly by country and region, fluctuating over time. In mid-July, 2020, the prevalence of COVID-19 in England was one in 2300.<sup>11</sup> Endoscopy departments take multiple steps to reduce infection risk, including symptom checklists, temperature checking, self-isolation, and swab testing (appendix p 1). Departments have adopted strict social distancing rules to reduce patient-to-patient contact and minimise patient time spent in departments. Precise quantification of the risk of patients contracting COVID-19 while attending endoscopy is difficult.

However, preliminary UK data (Hayee B, unpublished) of more than 6000 patients who were prospectively followed up between April and June, 2020, found no patients with COVID-19 at 14 days after procedure. We are aware of only one published case worldwide of a patient who might have contracted COVID-19 at endoscopy, who tested positive 15 days after the procedure.<sup>12</sup> The data so far would suggest that the risk of contracting COVID-19 during endoscopy is low and substantially outweighed by the risks of delayed endoscopic diagnosis of serious pathology.

How risk is perceived and communicated is complex, particularly when considering relative risks, such as the risk of not having cancer diagnosed early and thus presenting later with poorer outcomes versus the risk of contracting COVID-19. Deciding whether to attend for endoscopy involves patients considering risks. Evidence suggests numerical risks are not necessarily helpful. Health literacy—an individual's capacity, understanding, and confidence to access, evaluate, and use health information—is an important consideration. 43% of adults aged younger than 65 years struggle to understand textual health information materials, increasing to 61% when numbers are included.<sup>13</sup> Moreover, people do not generally consider risk objectively—eg, people react to cancer risk on the basis of emotion, intuition, social comparison, and social identity.

For many patients, COVID-19 risk (and the risk of dying from it) is perceived as high, and real, whereas cancer might be considered as a potential risk and even if diagnosed, might be considered by many in the population not to be curable. Negative beliefs about cancer are common with many individuals believing it represents a death sentence or that treatment is worse than cancer and thus individuals might avoid potential diagnosis.<sup>14</sup> It is important that risks are explained in addition to the message that earlier cancer diagnosis makes it more likely to be curable. It is also important that the measures endoscopy units have taken to minimise transmission risk are communicated to patients in a manner that helps reassure them, emphasising that the risks of late cancer diagnosis hugely exceed the risks of catching COVID-19 infection at endoscopy.

Research to investigate the factors that influence patient attendance for gastrointestinal endoscopy during the pandemic is ongoing. It is equally important to

conduct research into quantifying and communicating risk and understanding how patients might be reassured regarding the safety of gastrointestinal endoscopy in relation to COVID-19. Helping patients access, judge, and weigh risks (appendix p 1) and translating that into behaviour will be key to mitigating the unintentional collateral damage of the COVID-19 pandemic.

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## Incorporating standardised reporting guidelines in clinical trials of artificial intelligence in gastrointestinal endoscopy

Early research efforts on clinical applications of artificial intelligence (AI) have focused largely on the diagnostic accuracy of various algorithms, often applied to previously collected images such as chest x-rays or retinal images. Gastroenterology has leapt ahead of other medical fields due to the successful completion of several randomised trials of AI interventions that reported on clinically meaningful outcomes. Progress has been most rapid in applying computer vision to colonoscopy. Computer vision is a specific application of AI technology that allows computers to see and interpret visual content, such as computer-aided detection (CADe) of polyps. Several randomised controlled trials have

shown an increase in adenoma detection rate when CADe technology was used.<sup>1–3</sup>

Although most advancements in the use of AI in gastrointestinal endoscopy have been in colon polyp detection, several other potential applications exist in which AI could aid the performance of gastrointestinal endoscopists. These areas include computer-aided diagnosis (CADx; eg, to distinguish between a hyperplastic or an adenomatous polyp without the need for biopsy), detection of small bowel bleeding in capsule endoscopy, and detection of early neoplasia in the oesophagus and stomach.<sup>4–6</sup> Additionally, we are starting to see the combination of computational biology and

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