Journal of Crohn's and Colitis, 2020, S798–S806
doi:10.1093/ecco-jcc/jjaa160
Advance Access publication July 29, 2020
ECCO Position Statement

ECCO Position Statement

Inflammatory Bowel Disease Management During the COVID-19 Outbreak: The Ten Do's and Don'ts from the ECCO-COVID Taskforce

F. Magro,[a] J.-F. Rahier,[b] C. Abreu,[c] E. MacMahon,[d] A. Hart,[e] C. J. van der Woude,[f] H. Gordon,[g] M. Adamina,[h] N. Viget,[i] S. Vavricka,[j] T. Kucharzik,[k] S. Leone,[l] B. Siegmund,[m] S. Danese,[n,o] L. Peyrin-Biroulet[p,q]

[a]Department of Biomedicine, Unit of Pharmacology and Therapeutics, Faculty of Medicine, University of Porto, Porto, Portugal; Department of Gastroenterology, Centro Hospitalar de São João, Porto, Portugal; Department of Clinical Pharmacology Centro Hospitalar de São João, Porto, Portugal [b]CHU UCL Namur, Université catholique de Louvain, service de Hépato-gastroentérologie, Yvoir, Belgium [c]Infectious Diseases Service, Centro Hospitalar Universitário São João, Porto, Portugal; Instituto de Inovação e Investigação em Saúde (I3s), Faculty of Medicine, Department of Medicine, University of Porto, Portugal [d]Department of Infectious Diseases, Guy's and St Thomas' NHS Foundation Trust, London, UK [e]IBD Unit, St Mark's Hospital, London, UK [f]Department of Gastroenterology and Hepatology, Erasmus Medical Center, Rotterdam, The Netherlnads [g]Department of Gastroenterology, Royal London Hospital, Barts Health NHS Trust, London, UK; Centre for Immunobiology, The Blizard Institute, Barts and the London School of Medicine, Queen Mary University of London, London, UK [h]Department of Surgery, Cantonal Hospital Winterthur, Winterthur, Switzerland [i]Department of Infectious Diseases, Tourcoing Hospital, Tourcoing, France [j]Center for Gastroenterology and Hepatology, Zürich, Switzerland [k]Lüneburg Hospital, University of Hamburg, Department of Gastroenterology, Lüneburg, Germany [l]EFCCA, European Federation of Crohn's and Ulcerative Colitis Associations, Brussels, Belgium [m]Charité – Universitätsmedizin Berlin, corporate member of Freie Universität Berlin, Humboldt-Universität zu Berlin and Berlin Institute of Health, Medizinische Klinik für Gastroenterologie, Infektiologie und Rheumatologie, Berlin, Germany [n]IBD Center, Department of Gastroenterology, Humanitas Clinical and Research Center- IRCCS-, Rozzano, Milan, Italy [o]Department of Biomedical Sciences, Humanitas University, Pieve Emanuele, Milan, Italy [p]Department of Gastroenterology, Nancy University Hospital, Vandoeuvre-Les-Nancy, France [q]Inserm NGERE U1256, Lorraine University, Vandoeuvre-Les-Nancy, France

Corresponding author: Laurent Peyrin-Biroulet, MD, PhD, Inserm NGERE and Department of Gastroenterology, Nancy University Hospital, University of Lorraine, 1 Allée du Morvan, 54511 Vandoeuvre-lès-Nancy, France. Tel: (+33) 383153661; Fax: (+33) 383153633; Email: peyrinbiroulet@gmail.com

Abstract

Our knowledge of COVID-19 is changing and evolving rapidly, with novel insights and recommendations, almost on a daily basis. It behooves the medical community to provide updated information on a regular basis, on best practice to facilitate optimal care of infected patients and on appropriate advice for the general population. This is particularly important in the case of patients with chronic conditions, such as inflammatory bowel disease [IBD]. In this review, we have compiled existing evidence on the impact of COVID-19 in IBD patients and provide guidance on the most appropriate care to adopt during the pandemic. Our review highlights that IBD, per se, is not a risk factor for COVID-19. However, all IBD patients with symptoms should be tested for SARS-CoV-2 and the procedures for disease management should be carefully adapted: [i] in SARS-CoV-2-positive IBD patients, medical treatments should be re-evaluated [with a particular focus on corticosteroids] always with the purpose of treating active disease and maintaining remission; [ii] non-urgent surgeries and endoscopic procedures should be postponed for all patients; [iii] online consultancy should be implemented; and [iv] hospitalization and surgery should be limited to life-threatening situations.

Key Words: COVID-19; SARS-CoV-2; covid management; inflammatory bowel disease

© The Author(s) 2020. Published by Oxford University Press on behalf of European Crohn's and Colitis Organisation.
All rights reserved. For permissions, please email: journals.permissions@oup.com

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024

1. Introduction

At the end of 2019, a cluster of patients with pneumonia emerged in Wuhan, Hubei Province, China, with possible zoonotic origin.[1] This unidentified pneumonia was later found to be related to a novel coronavirus [CoV][2] named as severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2], by the International Committee on Taxonomy of Viruses [ICTV].[3] To prevent the use of inaccurate or stigmatizing names, the World Health Organization [WHO] proposed a standard format for the disease nomenclature: COronaVIrus Disease-2019 [COVID-19].[4]

SARS-CoV-2 is a single positive-stranded RNA virus enveloped in a lipid bilayer. The virus enters the human body via the mucous membranes [mouth, nasal, ocular] and enters host cells through the binding of viral spike proteins [S-protein] to the human protein receptor angiotensin converting enzyme-2 [ACE2].[5] This receptor is abundant in lung, heart, kidney, adipose tissue, oesophagus, stomach, bladder, ileum and colon.[6,7]

Transmission of COVID-19 is efficient. Aerosol and fomite transmission of SARS-CoV-2 is plausible, because the virus can remain viable and infectious in aerosols for hours, and on surfaces up to days [depending on the inoculum shed].[8] In fact, the concentration of viral RNA in airborne samples is minimal or close to zero,[9] but it can be detected on fomites including plastic.[10] Transmission occurs from close contact and respiratory droplets, without evidence of airborne transfer.[10] Thus, people who are in close contact with patients, their family members or healthcare workers are part of the high-risk population.[11]

The spread of SARS-CoV-2 identifed two important modes of disease transmission: [i] local transmission, at each local epicentre; and [ii] transmission via international travellers which favoured the global spread of the infection, fuelling the COVID-19 pandemic. Large outbreaks were reported in closed communities and hospitals, raising the possibility of 'superspreading' events, as reported before in previous CoV outbreaks.[12] By May 2020, the pandemic had affected almost 2 million people, worldwide, accounting for over 125 000 deaths, with the numbers rising sharply [Worldometer's COVID-19 data].[13]

SARS-CoV-2 infection is associated with five different clinical courses: asymptomatic infection, mild to medium cases, severe cases, critical cases and death.[11] Although it is highly transmissible, more than 80% of the patients have mild disease.[14] In the face of these challenging circumstances, gastroenterologists need to adapt priorities, reset standards of quality of care and guide patients by providing relevant information.

In this context, the European Crohn's and Colitis Organization [ECCO] gathered a group of gastroenterologists, with particular interest in opportunistic infections, and infectious disease experts, to deliver guidance to physicians in the setting of gastrointestinal [GI] diseases during the COVID-19 pandemic. The aim of the current review is to provide healthcare professionals with understanding and knowledge of the optimal care we can provide to our patients, including those taking immunomodulatory treatment.

According to WHO[15,16] and to the European Centre for Disease Prevention and Control [ECDC],[17] social distancing, hand hygiene and respiratory etiquette should be adopted by all the population to prevent spread of the infection. Hand hygiene is considered to be a rational precaution, involving limited costs without associated risks. Hands should be washed regularly, using soap and water for 20–40 s, taking care to ensure no areas are missed[17] [ECDC]. In community settings, alcohol-based hand sanitizers provide limited added benefit over soap and water and, if used, should contain 60–85% alcohol.

1: General Measures

Do's

- Do avoid contact with infected people
- Do avoid touching eyes, nose or mouth with unwashed hands
- Do clean hands using soap and water or an alcohol-based solution
- Do avoid crowded places
- Do use face masks according to local policies
- Do ensure flu vaccination for all non-vaccinated IBD patients
- Do ensure pneumococcal vaccination for all non-vaccinated IBD patients
- Do discourage travelling

A combination of personal protective and environmental measures increases effectiveness. Such measures include routine cleaning of frequently used surfaces and objects [phones, tablets, keyboards], and minimizing the sharing of objects[17] [ECDC]. Surgical masks may be used as an infection control measure or as a mitigation measure, in community settings, when used by individuals with respiratory symptoms but who have not yet sought medical attention. People at high risk of exposure include care providers with extensive face-to-face contact. A recent meta-analysis on influenza prevention suggested that N95 respirators should not be recommended to the general public and low-risk medical staff.[18] Travelling should be limited, for everyone, as much as possible, with the aim of reducing: [i] acquisition of infection by travellers to areas or countries where community transmission is ongoing; [ii] importation of cases from affected countries; and [iii] transmission among travellers.

Patients with inflammatory bowel disease [IBD], taking immunomodulatory therapy, are at increased risk of influenza and pneumococcal disease.[19,20] To avoid pulmonary comorbidities with influenza and pneumococcal disease during the current outbreak, and next winter, all IBD patients should be vaccinated. Influenza and pneumococcal vaccination are recommended for the majority of patients with immune-mediated disorders, including IBD.[21,22] Because influenza infection rates can be reduced by annual vaccination, the flu vaccine is recommended in all non-vaccinated IBD patients, and especially during the COVID-19 pandemic. Although not numerous, some cases of influenza co-infection with SARS-CoV-2 have been described.[23,24] During the next seasonal outbreak, SARS-CoV-2 and influenza are likely to occur simultaneously. Patients who have not been previously vaccinated against *Streptococcus pneumoniae*, should receive a dose of PCV13 followed by a dose of PPSV23, at least 8 weeks later.[25]

So far, IBD patients have not shown increased susceptibility to COVID-19.[26–28] This is clearly evidenced in very recent studies, in Spanish, French and Italian IBD cohorts, in which the risk of infection, associated mortality and incidence of COVID-19 were similar to those reported for the general population.[26,27] A recent study from Wuhan, performed during the local outbreak of the disease, including 318 patients with IBD, did not report a single COVID-19 case.[28] However, all biological and immunomodulatory treatments were discontinued, rendering interpretation difficult.[29] The therapeutic approach for these patients should instead consider the risk of viral infection weighed against the risk of disease recurrence. Quantifying the immediate and long-term risks of a new disease is challenging, especially within an immunosuppressed population.

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024

2: Should we stop drugs in patients without symptoms suggestive of COVID-19 [not tested or tested negative]?

Do's

- Do continue immunomodulators
- Do continue biologics
- Do continue JAK inhibitors
- Do reduce corticosteroids whenever possible
- Do keep infusions in an infusion centre whenever possible

Don'ts

- Don't reduce the dose of immunomodulators or biologics to prevent SARS-CoV-2 infection
- Don't switch infliximab to adalimumab in a stable patient, unless it is not possible to provide intravenous infusions
- Don't assume that IBD patients are at increased risk of being infected

Don't Know

- Patients with IBD, who are exposed to SARS-CoV-2, have a higher risk of developing symptomatic or severe COVID-19

In theory, immunosuppression may reduce viral clearance, but may also reduce the cytokine storm implicated in adult respiratory distress syndrome [ARDS]. However, current evidence does not suggest that patients on immunomodulatory therapy are faring worse than the general population, in the COVID-19 pandemic, either in the risk of contracting SARS-CoV-2 or in disease severity. A study of 191 patients, in Wuhan, who had completed inpatient treatment for COVID-19, did not identify immunosuppressed status [due to transplantation, chemotherapy or other conditions requiring immunomodulatory treatment] to be a risk factor for adverse outcomes.[30] A national Chinese dataset of 1099 hospitalized patients identified only two patients with immunodeficiency, neither of whom developed severe disease.[31] A large European centre for paediatric liver transplantation, located in Lombardy (Italy), showed that among patients in follow-up for cirrhosis, transplantation, autoimmune liver disease or chemotherapy for hepatoblastoma, none developed clinical pulmonary disease, despite several testing positive for SARS-CoV-2.[32] To date, the SECURE-IBD database has identified 959 cases of COVID-19 in IBD patients. Within this cohort, immunomodulators, anti-tumour necrosis factor [anti-TNF] therapy, anti-integrins and anti-interleukin 12/23 [anti-IL12/13] were not associated with increased mortality.[33] Therefore, on balance, we believe that immunomodulatory drugs should be maintained in IBD patients without COVID-19 infection.

There are biological reasons to support why COVID-19 may not pose increased risk to IBD patients on immunomodulatory therapy. [i] It has been suggested that the soluble form of ACE2 acts as a competitive binding partner for SARS-CoV-2 sequestring the virus, hindering binding to the virus's cell surface receptor, the full-length ACE2 protein.[34,35] Elevated levels of ACE2 have been measured in the plasma from patients with IBD[36] with evidence of limited infection progression and low susceptibility to infection.[37] The role of ACE2 was also evidenced through the use of a chemical inhibitor of ACE2 [GL1001],that was able to reduce dextran sulfate sodium [DSS] colitis severity, in the mouse model, suggesting that ACE2 plays a pathogenic role in colitis.[35,38] [ii] TNF inhibitors might be effective in reducing organ damage.[39] This effect is achieved through decreased shedding of the ACE2 ectodomain [mediated by TNF-α-converting enzyme], which is essential for the penetration of SARS-CoV-2 into the cell. [iii] Because interferon-γ [IFN-γ] and TNF production has been associated with severe SARS-CoV infection, inhibition of TNF has been proposed as a treatment for the cytokine release syndrome that can occur in some of these patients.[40] [iv] Mercaptopurine and 6-thioguanine have potential antiviral activity against Middle East respiratory syndrome [MERS] and SARS, at least *in vitro*.[41] [v] Tacrolimus is a potent *in vitro* antiviral for human coronaviruses.[42] [vi] Most of the drugs used in IBD have a long elimination half-life and maintain some activity even after treatment cessation.[43] [vii] Viral infections did not increase among IBD patients receiving ustekinumab and vedolizumab therapy. In addition, in a phase I clinical trial, the viral load of human immunodeficienct virus [HIV] patients on vedolizumab did not change significantly. In conclusion, the available data suggest that immunosuppressed patients are not at increased risk for severe disease and complications, compared with the general population.

In circumstances where it is not possible to safely run an infusion service, it may be reasonable to consider switching to subcutaneous alternatives. However, this practice must be used judiciously because elective switching from infliximab to adalimumab is associated with a loss of tolerance and efficacy within 1 year.[44]

3: Should we stop IBD drugs in patients who are SARS-CoV-2 positive, whether symptomatic or asymptomatic?

Do's

- Do postpone administration of biologics
- Do stop/reduce corticosteroids whenever possible
- Do stop azathioprine/mercaptopurine therapy
- Do stop azathioprine in patients in combination therapy with an anti-TNF agent
- Do stop JAK inhibitors

Don'ts

- Do not continue prednisone at doses above 20 mg/day
- Do not restart the treatment until nasopharyngeal PCR-SARS-CoV-2 swab tests [if available] give a negative result

Don't Know

- Patients taking oral budesonide and beclomethasone therapy must stop treatment if testing positive
- IBD-related drugs protect against severe forms of COVID-19 [related to cytokine storm]

In IBD patients aged over 65 years, disease activity and comorbidities were significantly associated with COVID-19 pneumonia and COVID-19-related death, whereas concomitant IBD treatments were not.[45] In these patients, COVID-19 complications and lethality seem to be unrelated to the use of immunomodulatory therapy.[45]

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024

However, there is more evidence to suggest that corticosteroids may pose significant risk to the IBD patient population. Steroid use is associated with increased morbidity and mortality in other viral infections, including influenza, SARS-CoV and MERS-CoV, along with complications in survivors. A recent uncontrolled study, in the setting of COVID-19, suggested that patients taking high steroid dosages have significantly worse clinical outcomes [ARDS, shock, secondary infection] than patients without a history of steroid use.[46] Within the IBD population, at the time of writing, patients who entered into the IBD-SECURE registry, with steroid use at presentation, had strikingly high rates of intensive care unit [ICU] admission [19%] and death [11%], although the data are currently unadjusted for age or comorbidity.[33] Concerning SARS-CoV-2 infection, steroids were not effective for the treatment of lung injury or shock.[47] However, short-term steroids [≤0.5–1 mg/kg for 7 days] may be beneficial to control overwhelming inflammation and cytokine-related lung injury, particularly in severe forms of ARDS.[48–50] Data on low-dose and short-term steroids, budesonide and beclomethasone therapy, are not currently available.

The first analysis of the SECURE-IBD data also identified 5-aminosalicylic acids [5-ASAs] as a risk for severe COVID-19 infection (odds ratio [OR] 3.1, 95% confidence interval [CI] 1.3–7.7).[33] This may be justified by methodological reasons or by the action of 5-ASA on peroxisome proliferator-activated receptor-γ [PPAR-γ], and subsequent perturbation of ACE2, the binding site of SARS-CoV-2. Thus, in light of these data, and in the absence of more detailed information on the interaction between 5-ASA, PPAR-γ, and ACE2, we recommend pausing 5-ASA therapy in patients with confirmed infection.

Lymphopenia is associated with worse prognosis of COVID-19.[51] The Saint-Antoine experience, with a total observation time of more than 15 000 person-years [4800 for thiopurines, 3800 for anti-TNF], reported 31 cases of serious viral infection (Epstein–Barr virus, cytomegalovirus [CMV], varicella-zoster virus [VZV], herpes simplex virus], mostly in patients exposed to thiopurines.[52] This can be related to the ability of azathioprine/6-mercaptopurine and tofacitinib to reduce the number of activated T cells and affect T-cell activation and effector function.[35] Tofacitinib has also been associated with viral infections [VZV][53] and demonstrated inhibition of IFN-α production *in vitro*.[54] The decision to pharmacologically immunosuppress a patient with COVID-19 remains difficult. The possible beneficial effects in reducing inflammation should be carefully weighed against the potential deleterious impairment of antimicrobial immunity.

4: Can we start drugs for an IBD flare?

Do's

- Do test all IBD patients for SARS-CoV-2
- Do treat active IBD according to the standard guidance, as before the pandemic
- Do consider subcutaneous drugs to minimize hospital visits, and home delivery service

Because COVID-19 symptoms can mimic IBD manifestations, all patients with a suspected IBD flare should be tested to exclude SARS-CoV-2 infection.[55] In a recent ECCO survey, most of the physicians [75.1%] considered SARS-CoV-2 testing to be unnecessary even in patients treated with immunomodulators or biological drugs [62.8%]. On the other hand, in IBD patients with suspicious symptoms or active disease, SARS-CoV-2 testing was supported by 54.6% of the responders.[56] In early reports, 2–10% of patients with COVID-19 had GI symptoms such as diarrhoea and vomiting.[46] In the Lu *et al*. cohort, 12% of the patients presented with GI symptoms at onset and 50% during hospitalization.[57]

In the context of SARS-CoV-1, the virus was cultured from stool samples during the SARS 2002–2003 outbreak.[58,59] Now, SARS-CoV-2 has been cultured from stool samples during the COVID-19 outbreak.[60] However, in a series of 20 COVID-19 patients the infectious virus could not be isolated from stool samples, despite the high virus RNA concentration.[61] In SARS-CoV-2 infection, nasopharyngeal swabs are more sensitive than oropharyngeal swabs and are best taken when the first symptoms emerge.[62] Swabs from both sites are often combined to increase sensitivity. Due to its simplicity, easy methodology and to the range of extensively validated standard operating procedures, RT-PCR is now the preferred and most widely used method for detection of the current infection.[63] According to recent evidence, the sensitivity of many of the available RT-PCR tests, for detecting SARS-CoV-2, may be lower than optimal. Several factors warrant consideration. These include poor sample quality, variable presence of virus in lower vs the upper respiratory tract and the timing of sampling. A study including 1014 suspected COVID-19 cases, who underwent multiple RT-PCR testing and chest computed tomography [CT],[64] showed that 88% of patients had positive chest CT scans, whilst RT-PCR positivity was found only in 59%. Combining epidemiological evidence with the analytical sensitivity of the currently used RT-PCR assays, it is not surprising that at least two grey zones could be identified: [i] the initial phase of infection, when the patient is still asymptomatic or only mildly symptomatic; and [ii] later stages in which virus shedding may persist, although below the analytical sensitivity of some RT-PCR assays.[65] Rapid antigen tests would theoretically provide fast results [15–30 min] and low-cost detection. These tests are in the launch phase and might prove sufficiently sensitive and specific,[66] making them potentially very useful in IBD.

Serological antibody tests could be a useful supplement to RNA or antigen detection. Many individuals will not have been tested, having had asymptomatic or minimally symptomatic infections, or had a negative test result [due to sampling timing] or a false-negative result in nucleic acid amplification technology [NAAT] tests.[67] Serological tests do not provide a direct detection of the virus, but rather a measurement of the immune response to the infection, which can provide insights into the kinetics of this response. In terms of public health, serological tests are vital to: [i] recognize those who overcame the infection and have developed an immune response; [ii] identify those who can return to work; and [iii] select donors of convalescent plasma, a potential treatment for patients with severe COVID-19.[68] However, these tests do not provide a direct detection of the virus, but rather a measurement of the immune response to the infection, which can provide insights into the kinetics of this response. ELISA detected IgM in more cases than NAAT, on day 5.5 of illness, and the combination of both tests detected 98.6% of cases vs 51.9% with a single NAAT.[69]

In the case of a negative test, IBD patients should be treated according to standard guidelines, and the physician should promote and advise home drug delivery and remote patient programmes.
The maximal viral shedding of SARS-CoV-2 occurs in the early stages of infection, meaning that spreading from asymptomatic patients is a reality. In hospitals and clinics caring for a large number of COVID-19 patients, the rate of infection is high among health workers.[70] In IV infusion clinics, the first measure is to identify those patients who are possibly infected, because the approach and safety

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024

requirements will be different. Thus, symptomatic [fever, cough, fatigue, myalgia, expectoration, diarrhoea, and loss of sense of smell or taste] or suspected [contact with a positive person] patients should be tested promptly and submitted to protective measures.

5: How can we continue IV infusion clinics?

Do's

- Do implement screening procedures for suspected COVID-19 in all patients
- Do implement measures to minimize crowding
- Do implement at least 2 m distance between chairs
- Do impose the use of surgical face masks in all patients
- Do continue biologics at regular intervals and doses

Don'ts

- Don't switch infliximab to adalimumab in stable patients unless it is not possible to provide intravenous infusions
- Don't allow accompanying persons inside the hospital

6: Do patients need specific protective equipment? Do physicians need specific equipment when seeing IBD patients?

Do's

- Do avoid close contact with people and wash hands frequently
- Do use face masks [patient and physician]

Don'ts

- Don't see patients with accompanying persons unless strictly necessary

7: How to manage outpatient IBD clinics?

Do's

- Do implement telemedicine
- Do monitor at distance
- Do report outcomes online
- Do promote local labs with e-mail reports
- Do implement point-of-care biomarkers
- Do implement calprotectin measurement at home
- Do implement measurement of drug levels [therapeutic drug monitoring] with rapid tests
- Do perform cross-sectional imaging, including intestinal ultrasound instead of invasive procedures

Don'ts

- Don't hospitalize patients unless strictly necessary
- Don't schedule unnecessary appointments; limit to what is strictly decision-making

The use of masks, in patients attending hospitals, is highly recommended, even in those without symptoms.[71,72] In the above mentioned ECCO survey, most respondents [physicians] confirmed the use of protections during consultations [72.2%] and considered it important to advise IBD patients to wear protection equipment in their daily lives [53%].[56]

When considering patients who are in regular monitoring, virtual clinics or an online consultancy is advisable. Patients can be asked to have had laboratory tests in advance, and complete a simple questionnaire on symptoms, concomitant medications and relevant questions. To replace visits, the IBD team can schedule phone calls with the patients, on the same date and at the same time as the scheduled visit. If social isolation prevents the patient from going to get a stool test, a home faecal test for calprotectin is a valid alternative, if available. This would be for all patients, including those in remission receiving subcutaneous biologics or small molecule therapies.[73] Telemonitoring, using specific questionnaires and calprotectin home test measurement, was studied before the COVID-19 era. It proved to be as safe as conventional follow-up, both in paediatric[74] and in adult[75] populations. In fact, faecal calprotectin levels showed a significant correlation with endoscopic extent, mucosal healing and histological activity.[76,77] Moreover, non-invasive imaging, such as ultrasonography, is essential for diagnosis and monitoring because it is a low-risk procedure with the advantage of providing a rapid assessment of disease activity [location, extension, inflammation, and presence of complications such as fistula, strictures or intra-abdominal abscesses].[78]

In the case of patients enrolled in clinical trials before the outbreak, the sponsors can be asked to: [i] postpone non-necessary follow-up visits or to replace them by virtual clinics; [ii] identify local laboratories that can guarantee the regular laboratory tests required by the protocol; and [iii] manage home delivery of study drugs, mainly those of oral and subcutaneous administration. In this scenario, patients would go to the hospital only for key visits [end of induction, re-randomization, end of study] and to receive intravenous drugs, when these cannot be suspended. The administration of intravenous drugs can also be adapted, mainly regarding dose intervals. For instance, infliximab administration can be postponed to every 10 weeks.[79] Regarding vedolizumab, the GEMINI trial showed that patients randomized to placebo can maintain remission up to week 24. Therefore, postponing vedolizumab for 4–8 weeks may be reasonable. However, maintaining the original schedule remains the best strategy in most cases.

8: Can IBD patients on immunomodulator/biological treatment continue working? What about healthcare professionals with IBD?

Do's

- Do avoid contact with infected patients
- Do use masks when working
- Do redirect towards the lowest risk zones
- Favour teleworking when possible

IBD patients on immunomodulators do not seem to have a higher risk of infection than the rest of the population. However, due to disease specificities and possible side effects of the treatment, avoidance of SARS-CoV-2 requires an additional set of precautions. Thus, patients should take extra protective measures, over and above those of

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024

the general population. Some societies use the concept of 'stringent social distancing' and 'shielding', with measures ranging from avoidance of crowded places to advice to not leave the house altogether. The specifics vary between nations depending upon SARS-CoV-2 prevalence and disease control strategies. Within some European countries people to shield include patients on anti-TNF induction regimes and high doses of steroids and immunomodulators.[80,81]

It is not rare to find IBD patients working in healthcare systems. Considering that this population experiences higher rates of infections than the general population, it may be necessary to introduce extra precautions in healthcare workers with IBD. If possible, these professionals should be redirected from high-risk areas [e.g. emergency departments, infectious disease units and ICUs] to -isk areas and, when possible, working from home should be implemented. Protective personal equipment [PPE] should be used according to international guidelines, when homeworking is not viable.

9: Can we perform non-urgent endoscopy? If not, what is non-urgent endoscopy?

Do's

- Do perform endoscopy as priority 3 months after the infection rates decrease
  - IBD patients with mild–moderate flare-up should be confirmed by biomarkers, to exclude CMV infection
  - Long-standing IBD in surveillance for colorectal cancer [CRC], if prior dysplasia
  - Endoscopic resection in IBD patients known to have low-grade dysplasia/high-grade dysplasia colonic lesions already detected
- Do perform endoscopy within 3–6 months after the infection rates decrease
  - Pouchitis
  - IBD patients with flare-up not confirmed by biomarkers
  - Long-standing IBD in surveillance for CRC

Dont's

- Don't perform non-urgent endoscopy
- Don't use surgical masks in the endoscopy room

Endoscopy is extremely important in the management of IBD. In the context of COVID-19, viral SARS-CoV-2 RNA was found in the stool of a significant percentage of infected patients and, in some cases, the test was still positive after nasal swabs became negative. Even though the presence of the virus in gut mucosa does not seem to have a direct impact on GI symptoms, it is not known if viral shedding is associated with faecal–oral transmission. The SARS-CoV-2 infection rate among endoscopy personnel is significantly lower [4.3%] than the average infection rate reported for healthcare workers [about 10%].[82] However, it is higher than the values of the pre-COVID-19 era, when it ranged from 1.1 [in colonoscopies] to 3.0 [in oesophagogastroduodenoscopy], for every 1000 procedures.[83] Thus, risk/benefit scales should be carefully weighted, ensuring that endoscopic procedures are only performed in patients who urgently require endoscopy.[78] A first approach is to stratify patients according to the risk of SARS-CoV-2 infection: [i] patients with fever, fatigue or respiratory symptoms, myalgia, diarrhoea, loss of sense of smell or taste, close contact with a COVID-19 patient, or travelling to outbreak areas are considered to have high risk[12]; [ii] the remaining patients are considered to be of intermediate risk.

Endoscopy should be performed in a negative-pressure room, if possible, in accordance with the guidelines for infection control in endoscopy.[84,85] In addition, the staff of the endoscopy department should follow standardized precautions.[12] SARS-CoV-2 is easily inactivated by many common disinfectants and no additional approach should be implemented to clean and disinfect the endoscope.[86] Even so, due to the risk of aerosolization, the room should be kept empty for at least for 1 h before the next procedure in the absence of negative pressure, and for 30 min in the case of a negative-pressure room.[87] The basic protection requirements of the medical staff, in the endoscopy centre, should reach Biosafety level 2 [wearing of disposable gowns, N95 masks, goggles, caps and shoe covers during endoscopy] in all GI endoscopic procedures. Biosafety level 3 protection [PPE, respirators, plus negative-pressure rooms due to the aerosolization risk of SARS-CoV-2 during endoscopy] is required for all endoscopic procedures in SARS-CoV-2-infected or suspected patients, and in those with very high risks of potential exposure.

During the pandemic outbreak, non-urgent endoscopic procedures should be postponed. These would include all the procedures that are not urgently required, and whose benefits do not outweigh the risk of SARS-CoV-2 infection. In this category, Iacucci *et al.*[78] included new diagnosis of IBD with moderate/severe activity, severe acute flares of ulcerative colitis, refractory medical obstruction manageable through endoscopy or jaundice in patients with IBD, and primary sclerosing cholangitis with a dominant stricture. All patients with a scheduled endoscopy should be contacted, by phone, the week before, and again 1–2 days before the procedure, to identify those with suspected COVID-19 or at risk of being infected. At the hospital, one patient checkpoint is mandatory, at every public entrance or endoscopy unit, and the endoscopist and/or the nurse must be double-checked. Urgent scenarios could be: [i] in priority cases, endoscopy must be performed within 3 months: mild-to-moderate flare-ups, patients with long-standing IBD in surveillance for CRC with dysplasia, endoscopic resection in patients with low- or high-grade dysplastic colonic lesions, symptomatic patients with moderate pouchitis and altered blood test]; and [ii] in all the other cases, endoscopy can be delayed until 6 months after the infection rates decrease [mild pouchitis, IBD patients with flare-up not confirmed by biomarkers, long-standing IBD in surveillance for CRC].[78] Some conditions may require more prompt evaluation than others, depending on results of blood tests, non-invasive inflammatory markers, and previous history of dysplasia or cancer.

Emergency surgery is required in life-threatening situations, such as bowel perforation, closed loop obstruction, or medically refractory acute severe colitis. Conversely, non-urgent surgery should be postponed to protect patients and healthcare workers, and facilitate the management of healthcare resources, in times of scarcity of staff and material.[88–90]

Non-elective surgery is indicated for invasive CRC/high-grade dysplasia, intractable stenosis and abdominal/perianal abscesses not amenable to medical/interventional management.[91] Perioperative complexity should be minimized, including liberal use of terminal ostomy instead of a high-risk anastomosis, and drainage procedures, with or without antibiotics, instead of complex surgery.[91] Keeping track of deferred surgeries is the key to provide responsible surgical care after the pandemic.

Owing to the paucity of symptoms in the majority of COVID-19-positive patients and to the surgical morbidity reported during viral incubation [mortality 20.5%, ICU requirement 44.1%], it is mandatory to test all patients for SARS-CoV-2 before surgery.[88,92,93]

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024

10: Can we still perform IBD surgery?

Do's

- Do emergency surgery in life-threatening situations:
  - free bowel perforation
  - closed loop obstruction
  - acute severe colitis refractory to medical treatment
  - active bleeding not amenable to interventional therapy
- Do non-elective surgery as soon as possible:
  - invasive colorectal cancer, high-grade dysplasia
  - intractable stenosis failing medical management
  - penetrating luminal disease resistant to medical therapy
  - perianal abscesses
- Do postpone surgery in uncomplicated IBD
- Do test all IBD patients with SARS-CoV-2-PCR before any surgery
- Do use N95 respirators as a minimal requirement for surgery

Don'ts

- Don't perform non-urgent IBD surgery

When rapid PCR tests are unavailable, chest CT can be diagnostic. If neither testing nor imaging is available, all patients must be considered positive.[91]

At surgery, the risk of aerosolization is high and contamination with body fluids is a concern.[92] To date, infectious virus has been found in airway, blood and faeces.[60] Aerosol formation is potentiated by tissue dissection with energy devices, while concentration of abdominal aerosol is inherent to laparoscopy.[94–96] Consequent use of PPE is mandatory, including face shield/goggles, N95 mask, and proper donning and doffing.[94] The number of staff should be minimized and negative-pressure operating rooms should be preferred. Scientific societies have issued conflicting statements regarding the use of laparoscopy, with no firm contraindication in the COVID-19 era. Avoidance of laparoscopy is thus debatable, as open surgery will translate to additional morbidity and resource utilization. A low-energy setting and pneumoperitoneum pressure, avoidance of two-way insufflators, closed circulation with efficient filtration of pneumoperitoneum, and gentle desufflation are advised.[97]

2. Conclusions

The existing evidence shows that IBD is not a risk factor for COVID-19. However, medical treatments should be re-evaluated in SARS-CoV-2-positive IBD patients and corticosteroid therapy should be re-evaluated regardless of symptoms. A goal should be to treat active disease and maintain remission, while adopting the same protective measures as the general population. In addition, non-urgent surgeries and endoscopic procedures should be postponed.

Funding

This paper was published as part of a supplement financially supported by ECCO and IOIBD.

Conflict of Interest

ECCO has diligently maintained a disclosure policy of potential conflicts of interests. The conflict of interest declaration is based on a form used by the International Committee of Medical Journal Editors. The conflict of interest statement is not only stored at the ECCO Office and the editorial office of *Journal of Crohn's and Colitis*, but also open to public scrutiny on the ECCO website [https://www.ecco-ibd.eu/about-ecco/ecco-disclosures.html] providing a comprehensive overview of potential conflicts of interest of authors.

Author Contributions

This paper is a joint expert consensus activity. Hence, all authors participated sufficiently, intellectually and practically in this work and take public responsibility for the content of the article, including the conception, design, data interpretation and writing of the manuscript. All authors and the ECCO Governing Board approved the final version for submission.

References

1. Li Q, Guan X, Wu P, *et al*. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020;**382**:1199–207.
2. Zhu N, Zhang D, Wang W, *et al*. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med* 2020;**382**:727–33.
3. Gorbalenya AE, Baker SC, Baric RS, *et al*. The species severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol* 2020;**5**:536–44.
4. WHO. *Naming the coronavirus disease (COVID-19) and the virus that causes it*. Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it.
5. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. *Lancet* 2020;**395**:470–3.
6. Turner AJ, Hiscox JA, Hooper NM. ACE2: from vasopeptidase to SARS virus receptor. *Trends Pharmacol Sci* 2004;**25**:291–4.
7. Zou X, Chen K, Zou J, Han P, Hao J, Han Z. Single-cell RNA-seq data analysis on the receptor ACE2 expression reveals the potential risk of different human organs vulnerable to 2019-nCoV infection. *Front Med* 2020. Doi: 10.1007/s11684-020-0754-0.
8. WHO. Available at: https://www.who.int/. Accessed May 5, 2020.
9. Wölfel R, Corman VM, Guggemos W, *et al*. Clinical presentation and virological assessment of hospitalized cases of coronavirus disease 2019 in a travel-associated transmission cluster. *medRxiv* 2020. Doi: 10.1101/2020.03.05.20030502.
10. van Doremalen N, Bushmaker T, Morris DH, *et al*. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med* 2020;**382**:1564–7.
11. Jin Y, Yang H, Ji W, *et al*. Virology, epidemiology, pathogenesis, and control of COVID-19. *Viruses* 2020;**12**:372.
12. Magro F, Abreu C, Rahier JF. The daily impact of COVID-19 in gastroenterology. *United Eur Gastroenterol J* 2020:205064062092015. Doi: 10.1177/2050640620920157.
13. Worldmeter. *Worldometer's real-time data on COVID-19*. Available at: https://www.worldometers.info/coronavirus/. Accessed May 5, 2020.
14. Danese S, Cecconi M, Spinelli A. Management of IBD during the COVID-19 outbreak: resetting clinical priorities. *Nat Rev Gastroenterol Hepatol* 2020;**17**:253–5.
15. WHO. *Non-pharmaceutical public health measures for mitigating the risk and impact of epidemic and pandemic influenza*. 2020. Available at: https://www.who.int/influenza/publications/public_health_measures/publication/en/.
16. WHO. *Coronavirus disease (COVID-19) advice for the public*. Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public. Accessed May 5, 2020.
17. ECDC. *Q & A on COVID-19*. Available at: https://www.ecdc.europa.eu/en/covid-19/questions-answers. Accessed May 5, 2020.

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024

18. Long Y, Hu T, Liu L, *et al*. Effectiveness of N95 respirators versus surgical masks against influenza: a systematic review and meta-analysis. *J Evid Based Med* 2020:jebm.12381. Doi: 10.1111/jebm.12381.
19. Tinsley A, Navabi S, Williams ED, *et al*. Increased risk of influenza and influenza-related complications among 140,480 patients with inflammatory bowel disease. *Inflamm Bowel Dis* 2019;**25**:369–76.
20. Kantsø B, Simonsen J, Hoffmann S, Valentiner-Branth P, Petersen AM, Jess T. Inflammatory bowel disease patients are at increased risk of invasive pneumococcal disease: a nationwide danish cohort study 1977–2013. *Am J Gastroenterol* 2015;**110**:1582–7.
21. Rahier JF, Magro F, Abreu C, *et al*.; European Crohn's and Colitis Organisation (ECCO). Second European evidence-based consensus on the prevention, diagnosis and management of opportunistic infections in inflammatory bowel disease. *J Crohns Colitis* 2014;**8**:443–68.
22. Furer V, Rondaan C, Heijstek MW, *et al*. 2019 update of EULAR recommendations for vaccination in adult patients with autoimmune inflammatory rheumatic diseases. *Ann Rheum Dis* 2020;**79**:39–52.
23. Ding Q, Lu P, Fan Y, Xia Y, Liu M. The clinical characteristics of pneumonia patients coinfected with 2019 novel coronavirus and influenza virus in Wuhan, China. *J Med Virol* 2020. Doi: 10.1002/jmv.25781.
24. Nowak MD, Sordillo EM, Gitman MR, Paniz Mondolfi AE. Co-infection in SARS-CoV-2 infected patients: where are influenza virus and rhinovirus/enterovirus? *J Med Virol* 2020:jmv.25953. Doi: 10.1002/jmv.25953.
25. Matanock A, Lee G, Gierke R, Kobayashi M, Leidner A, Pilishvili T. Use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine among adults aged ≥65 years: updated recommendations of the advisory committee on immunization practices. *MMWR Morb Mortal Wkly Rep* 2019;**68**:1069–75.
26. Taxonera C, Sagastagoitia I, Alba C, Mañas N, Olivares D, Rey E. 2019 novel coronavirus disease (COVID-19) in patients with inflammatory bowel diseases. *Aliment Pharmacol Ther* 2020. Doi: 10.1111/apt.15804.
27. Allocca M, Fiorino G, Zallot C, *et al*. Incidence and patterns of COVID-19 among inflammatory bowel disease patients from the Nancy and Milan cohorts. *Clin Gastroenterol Hepatol* 2020;**18**:2134–5.
28. An P, Ji M, Ren H, *et al*. Prevention of COVID-19 in patients with inflammatory bowel disease in Wuhan, China. *Lancet Gastroenterol Hepatol* 2020. Doi: 10.1016/S2468-1253(20)30121–7.
29. D'Amico F, Peyrin-Biroulet L, Danese S. Inflammatory bowel diseases and COVID-19: the invisible enemy. *Gastroenterology* 2020. Doi: 10.1053/j.gastro.2020.04.032.
30. Zhou F, Yu T, Du R, *et al*. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet* 2020;**395**:1054–62.
31. Guan W, Ni Z, Hu Y, *et al*. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020;**382**:1708–20.
32. D'Antiga L. Coronaviruses and immunosuppressed patients: the facts during the third epidemic. *Liver Transplant* 2020:lt.25756. Doi: 10.1002/lt.25756.
33. Kappelman M, Brenner E, Ungaro R, Colombel J-F. *SECURE-IBD database*. Available at: https://covidibd.org/. Accessed May 5, 2020.
34. Ibrahim IM, Abdelmalek DH, Elshahat ME, Elfiky AA. COVID-19 spike-host cell receptor GRP78 binding site prediction. *J Infect* 2020;**80**:554–62.
35. Neurath MF. Covid-19 and immunomodulation in IBD. *Gut* 2020:gutjnl-2020–321269. Doi: 10.1136/gutjnl-2020–321269.
36. Garg M, Royce SG, Tikellis C, *et al*. Imbalance of the renin-angiotensin system may contribute to inflammation and fibrosis in IBD: a novel therapeutic target? *Gut* 2020;**69**:841–51.
37. Batlle D, Wysocki J, Satchell K. Soluble angiotensin-converting enzyme 2: a potential approach for coronavirus infection therapy? *Clin Sci (Lond)* 2020;**134**:543–5.
38. Byrnes JJ, Gross S, Ellard C, Connolly K, Donahue S, Picarella D. Effects of the ACE2 inhibitor GL1001 on acute dextran sodium sulfate-induced colitis in mice. *Inflamm Res* 2009;**58**:819–27.
39. Deng X, Yu X, Pei J. Regulation of interferon production as a potential strategy for COVID-19 treatment. 2020; arXiv preprint arXiv:2003.00751.
40. Li CK, Wu H, Yan H, *et al*. T cell responses to whole SARS coronavirus in humans. *J Immunol* 2008;**181**:5490–500.
41. Cheng KW, Cheng SC, Chen WY, *et al*. Thiopurine analogs and mycophenolic acid synergistically inhibit the papain-like protease of Middle East respiratory syndrome coronavirus. *Antiviral Res* 2015;**115**:9–16.
42. Carbajo-Lozoya J, Ma-Lauer Y, Malešević M, *et al*. Human coronavirus NL63 replication is cyclophilin A-dependent and inhibited by non-immunosuppressive cyclosporine A-derivatives including Alisporivir. *Virus Res* 2014;**184**:44–53.
43. Rubin DT, Abreu MT, Rai V, Siegel CA. Management of patients with Crohn's disease and ulcerative colitis during the COVID-19 pandemic: results of an international meeting. *Gastroenterology* 2020. Doi: 10.1053/j.gastro.2020.04.002.
44. Van Assche G, Vermeire S, Ballet V, *et al*. Switch to adalimumab in patients with Crohn's disease controlled by maintenance infliximab: prospective randomised SWITCH trial. *Gut* 2012;**61**:229–34.
45. Bezzio C, Saibeni S, Variola A, *et al*. Outcomes of COVID-19 in 79 patients with IBD in Italy: an IG-IBD study. *Gut* 2020:gutjnl-2020–321411. Doi: 10.1136/gutjnl-2020–321411.
46. Huang C, Wang Y, Li X, *et al*. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;**395**:497–506.
47. Russell CD, Millar JE, Baillie JK. Clinical evidence does not support corticosteroid treatment for 2019-nCoV lung injury. *Lancet* 2020;**395**:473–5.
48. Zhou W, Liu Y, Tian D, *et al*. Potential benefits of precise corticosteroids therapy for severe 2019-nCoV pneumonia. *Signal Transduct Target Ther* 2020;**5**:18.
49. Shang L, Zhao J, Hu Y, Du R, Cao B. On the use of corticosteroids for 2019-nCoV pneumonia. *Lancet* 2020;**395**:683–4.
50. Alhazzani W, Møller MH, Arabi YM, *et al*. Surviving Sepsis Campaign: guidelines on the management of critically ill adults with coronavirus disease 2019 (COVID-19). *Intensive Care Med* 2020;**46**:854–87.
51. Wu C, Chen X, Cai Y, *et al*. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Intern Med* 2020. Doi: 10.1001/jamainternmed.2020.0994.
52. Wisniewski A, Kirchgesner J, Seksik P, *et al*.; the Saint-Antoine IBD network. Increased incidence of systemic serious viral infections in patients with inflammatory bowel disease associates with active disease and use of thiopurines. *United European Gastroenterol J* 2020;**8**:303–13.
53. Sandborn WJ, Ghosh S, Panes J, Vranic I, Wang W, Niezychowski W; Study A3921043 Investigators. A phase 2 study of tofacitinib, an oral Janus kinase inhibitor, in patients with Crohn's disease. *Clin Gastroenterol Hepatol* 2014;**12**:1485–93.e2.
54. Boor PPC, de Ruiter PE, Asmawidjaja PS, Lubberts E, van der Laan LJW, Kwekkeboom J. JAK-inhibitor tofacitinib suppresses interferon alfa production by plasmacytoid dendritic cells and inhibits arthrogenic and antiviral effects of interferon alfa. *Transl Res* 2017;**188**:67–79.
55. Zingone F, Savarino EV. Viral screening before initiation of biologics in patients with inflammatory bowel disease during the COVID-19 outbreak. *Lancet Gastroenterol Hepatol* 2020. Doi: 10.1016/S2468-1253(20)30085–6.
56. D'Amico F, Danese S, Peyrin-Biroulet L, *et al*. Inflammatory bowel disease management during the COVID-19 outbreak: a survey from the European Crohn's and Colitis Organization (ECCO). *Gastroenterology* 2020. Doi: 10.1053/j.gastro.2020.04.059.
57. Lin L, Jiang X, Zhang Z, *et al*. Gastrointestinal symptoms of 95 cases with SARS-CoV-2 infection. *Gut* 2020:gutjnl-2020–321013. Doi: 10.1136/gutjnl-2020–321013.
58. Cheng PK, Wong DA, Tong LK, *et al*. Viral shedding patterns of coronavirus in patients with probable severe acute respiratory syndrome. *Lancet* 2004;**363**:1699–700.
59. Xu D, Zhang Z, Jin L, *et al*. Persistent shedding of viable SARS-CoV in urine and stool of SARS patients during the convalescent phase. *Eur J Clin Microbiol Infect Dis* 2005;**24**:165–71.
60. Wang W, Xu Y, Gao R, *et al*. Detection of SARS-CoV-2 in different types of clinical specimens. *JAMA* 2020. Doi: 10.1001/jama.2020.3786.
61. Wölfel R, Corman VM, Guggemos W, *et al*. Virological assessment of hospitalized patients with COVID-2019. *Nature* 2020. Doi: 10.1038/s41586-020-2196-x.

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024

62. Zou L, Ruan F, Huang M, *et al*. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *N Engl J Med* 2020;**382**:1177–9.
63. Yan Y, Chang L, Wang L. Laboratory testing of SARS-CoV, MERS-CoV, and SARS-CoV-2 (2019-nCoV): current status, challenges, and countermeasures. *Rev Med Virol* 2020. Doi: 10.1002/rmv.2106.
64. Ai T, Yang Z, Hou H, *et al*. Correlation of chest CT and RT-PCR testing in coronavirus disease 2019 (COVID-19) in China: a report of 1014 cases. *Radiology* 2020:200642. Doi: 10.1148/radiol.2020200642.
65. Lippi G, Simundic AM, Plebani M. Potential preanalytical and analytical vulnerabilities in the laboratory diagnosis of coronavirus disease 2019 (COVID-19). *Clin Chem Lab Med* 2020. Doi: 10.1515/cclm-2020-0285.
66. Bruning AHL, Aatola H, Toivola H, *et al*. Rapid detection and monitoring of human coronavirus infections. *New Microbes New Infect* 2018;**24**:52–5.
67. Li Y, Yao L, Li J, *et al*. Stability issues of RT-PCR testing of SARS-CoV-2 for hospitalized patients clinically diagnosed with COVID-19. *J Med Virol* 2020. Doi: 10.1002/jmv.25786.
68. Shen C, Wang Z, Zhao F, *et al*. Treatment of 5 critically ill patients with COVID-19 with convalescent plasma. *JAMA* 2020;**323**:1582. Doi: 10.1001/jama.2020.4783.
69. Guo L, Ren L, Yang S, *et al*. Profiling early humoral response to diagnose novel coronavirus disease (COVID-19). *Clin Infect Dis* 2020. Doi: 10.1093/cid/ciaa310.
70. Wang X, Liu W, Zhao J, *et al*. Clinical characteristics of 80 hospitalized frontline medical workers infected with COVID-19 in Wuhan, China. *J Hosp Infect* 2020. Doi: 10.1016/j.jhin.2020.04.019.
71. Adhikari SP, Meng S, Wu YJ, *et al*. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. *Infect Dis Poverty* 2020;**9**:29.
72. Javid B, Weekes MP, Matheson NJ. Covid-19: should the public wear face masks? *BMJ* 2020;**369**:m1442.
73. Fiorino G, Lytras T, Younge L, *et al*. Quality of care standards in inflammatory bowel diseases: a European Crohn's and Colitis Organisation (ECCO) position paper. *J Crohn's Colitis* 2020;**14**:1037–48.
74. Heida A, Dijkstra A, Muller Kobold A, *et al*. Efficacy of home telemonitoring versus conventional follow-up: a randomized controlled trial among teenagers with inflammatory bowel disease. *J Crohns Colitis* 2018;**12**:432–41.
75. Puolanne AM, Kolho KL, Alfthan H, Färkkilä M. Is home monitoring of inflammatory bowel disease feasible? A randomized controlled study. *Scand J Gastroenterol* 2019;**54**:849–54.
76. D'Amico F, Bonovas S, Danese S, Peyrin-Biroulet L. Review article: Faecal calprotectin and histologic remission in ulcerative colitis. *Aliment Pharmacol Ther* 2020;**51**:689–98.
77. Magro F, Lopes S, Coelho R, *et al*. Accuracy of faecal calprotectin and neutrophil gelatinase B-associated lipocalin in evaluating subclinical inflammation in UlceRaTIVE colitis—the ACERTIVE study. *J Crohn's Colitis* 2017;**11**:435–44.
78. Iacucci M, Cannatelli R, Labarile N, *et al*. Endoscopy in inflammatory bowel diseases during the COVID-19 pandemic and post-pandemic period. *Lancet Gastroenterol Hepatol* 2020. Doi: 10.1016/S2468-1253(20)30119-9.
79. Papamichael K, Karatzas P, Mantzaris GJ. De-escalation of infliximab maintenance therapy from 8- to 10-week dosing interval based on faecal calprotectin in patients with Crohn's disease. *J Crohns Colitis* 2016;**10**:371–2.
80. Society BT. *COVID-19: identifying patients for shielding*. Available at: https://brit-thoracic.org.uk/about-us/covid-19-identifying-patients-for-shielding.
81. Kennedy NA, Jones GR, Lamb CA, *et al*. British Society of Gastroenterology guidance for management of inflammatory bowel disease during the COVID-19 pandemic. *Gut* 2020;**69**:984–90.
82. Repici A, Aragona G, Cengia G, *et al*. Low risk of covid-19 transmission in GI endoscopy. *Gut* 2020:gutjnl-2020–321341. Doi: 10.1136/gutjnl-2020–321341.
83. Wang P, Xu T, Ngamruengphong S, Makary MA, Kalloo A, Hutfless S. Rates of infection after colonoscopy and osophagogastroduodenoscopy in ambulatory surgery centres in the USA. *Gut* 2018;**67**:1626–36.
84. Beilenhoff U, Biering H, Blum R, *et al*. Reprocessing of flexible endoscopes and endoscopic accessories used in gastrointestinal endoscopy: position statement of the European Society of Gastrointestinal Endoscopy (ESGE) and European Society of Gastroenterology Nurses and Associates (ESGENA) – update 2018. *Endoscopy* 2018;**50**:1205–34.
85. Calderwood AH, Day LW, Muthusamy VR, *et al*. ASGE guideline for infection control during GI endoscopy. *Gastrointest Endosc* 2018;**87**:1167–79.
86. Geller C, Varbanov M, Duval RE. Human coronaviruses: insights into environmental resistance and its influence on the development of new antiseptic strategies. *Viruses* 2012;**4**:3044–68.
87. Repici A, Maselli R, Colombo M, *et al*. Coronavirus (COVID-19) outbreak: what the department of endoscopy should know. *Gastrointest Endosc* 2020;**92**:192–7.
88. Pryor A. *SAGES and EAES recommendations regarding surgical response to COVID-19 crisis*. Available at: https://www.sages.org/recommendations-surgical-response-covid-19/.
89. Collaborative Covids. Global guidance for surgical care during the COVID-19 pandemic. *Br J Surg* 2020. Doi: 10.1002/bjs.11646.
90. Brindle M, Gawande A. Managing COVID-19 in surgical systems. *J Craniofac Surg* 2020:1. Doi: 10.1097/SLA.0000000000003923.
91. Remzi FH, Panis Y, Spinelli A, *et al*. International organization for the study of inflammatory bowel disease recommendations for surgery in patients with inflammatory bowel disease during the COVID-19 pandemic. *Dis Colon Rectum* 2020:1. Doi: 10.1097/DCR.0000000000001718.
92. Liu Z, Zhang Y, Wang X, *et al*. Recommendations for surgery during the novel coronavirus (COVID-19) epidemic. *Indian J Surg* 2020. Doi: 10.1007/s12262-020-02173-3.
93. Aminian A, Safari S, Razeghian-Jahromi A, Ghorbani M, Delaney CP. COVID-19 outbreak and surgical practice. *Ann Surg* 2020:1. Doi: 10.1097/SLA.0000000000003925.
94. Brat GA, Hersey S, Chhabra K, Gupta A, Scott J. Protecting surgical teams during the COVID-19 outbreak. *Ann Surg* 2020:1. Doi: 10.1097/SLA.0000000000003926.
95. Yeo D, Yeo C, Kaushal S, Tan G. COVID-19 and the general surgical department - measures to reduce spread of SARS-COV-2 among surgeons. *Ann Surg* 2020:1. Doi: 10.1097/SLA.0000000000003957.
96. Zheng MH, Boni L, Fingerhut A. Minimally invasive surgery and the novel coronavirus outbreak: lessons learned in China and Italy. *Ann Surg* 2020. Doi: 10.1097/SLA.0000000000003924.
97. Vigneswaran Y, Prachand VN, Posner MC, Matthews JB, Hussain M. What is the appropriate use of laparoscopy over open procedures in the current COVID-19 climate? *J Gastrointest Surg* 2020;**24**:1686–91.

Downloaded from https://academic.oup.com/ecco-jcc/article/14/Supplement_3/S798/5877458 by guest on 20 March 2024