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The 5C Concept and 5S Principles in Inflammatory Bowel Disease Management

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Abstract

Background and Aims: The international Inflammatory Bowel Disease [IBD] Expert Alliance initiative [2012–2015] served as a platform to define and support areas of best practice in IBD management to help improve outcomes for all patients with IBD.
Methods: During the programme, IBD specialists from around the world established by consensus two best practice charters: the 5S Principles and the 5C Concept.
Results: The 5S Principles were conceived to provide health care providers with key guidance for improving clinical practice based on best management approaches. They comprise the following categories: Stage the disease; Stratify patients; Set treatment goals; Select appropriate treatment; and Supervise therapy. Optimised management of patients with IBD based on the 5S Principles can be achieved most effectively within an optimised clinical care environment. Guidance on optimising the clinical care setting in IBD management is provided through the 5C Concept, which encompasses: Comprehensive IBD care; Collaboration; Communication; Clinical nurse specialists; and Care pathways. Together, the 5C Concept and 5S Principles provide structured recommendations on organising the clinical care setting and developing best-practice approaches in IBD management.
Conclusions: Consideration and application of these two dimensions could help health care providers optimise their IBD centres and collaborate more effectively with their multidisciplinary team colleagues and patients, to provide improved IBD care in daily clinical practice. Ultimately, this could lead to improved outcomes for patients with IBD.

Key Words: Inflammatory bowel disease; optimised clinical care; best-practice management

1. Introduction

The international Inflammatory Bowel Disease [IBD] Expert Alliance initiative served as a platform to define and support areas of best practice in IBD management. As part of the initiative, IBD specialists from Canada, the USA, Europe, Japan and New Zealand gathered for a series of meetings held in Calgary, Canada, and Tokyo, Japan, from 2012 to 2015 [see Appendix for a full list of participants]. The programme aimed to establish inter-regional sharing of best practice,

communicating areas of clinical and technical expertise, and aligning specialist opinion behind common themes where joint working could improve outcomes for all patients with IBD. Two best practice charters—the 5S Principles and the 5C Concept—were generated through the programme. The aim of this article is to convey these charters to the wider gastroenterology community, highlighting their potential value towards improving IBD clinical practice and patient outcomes.

2. The 5S principles

The 5S Principles in IBD management were conceived during round-table group discussions at the inaugural IBD Expert Alliance meeting in Calgary, Canada, in 2012. They are based on Japan's 5S organisational methodology. This is a method initially applied in business environments to provide a structure for implementation of corporate programmes. It includes a series of identifiable steps, each building on its predecessor, to improve access to information and efficiency.[1] 5S engages individuals through highlighting and applying a set of agreed standards; therefore, it forms a good foundation to focus on continuous improvement. 5S can be applied across all sectors to achieve high-impact results, and has recently been extended from business to other industries, including education and health care.

The objective of the 5S Principles in IBD is to provide health care providers [HCPs] with key guidance for improving clinical practice based on best management approaches. The final 5S Principles in IBD were reached through group consensus and comprise the following: Stage the disease; Stratify patients; Set treatment goals; Select appropriate treatment; and Supervise therapy [Table 1]. Application of the 5S Principles in clinical practice was discussed in detail during subsequent Expert Alliance meetings to allow ongoing sharing of best practice approaches; the outputs are shared in this article.

3. Adopting the 5S Principles in IBD Management

3.1. Staging the disease

IBD is heterogeneous in nature, so each patient has an individual disease profile. The first step in managing patients with IBD in clinical practice is to stage the disease. This includes defining the location of the disease and determining whether complications [such as extra-intestinal manifestations] are present, along with considering other factors that are specific to Crohn's disease or ulcerative colitis.

3.1.1. Crohn's disease

In patients with Crohn's disease, recommendations on staging the disease are provided by the Montreal Classification.[2] This involves defining the disease location [ie ileal, colonic, or ileocolonic], including whether there is upper gastrointestinal involvement, determining

Table 1. The 5S Principles in IBD management.

Principle	Implications in CD	Implications in UC
Stage the disease	• Define the location [ileal, colonic, ileocolonic; perianal disease; upper GI involvement] • Define the duration [early or late onset of disease] • Define the behaviour [inflammatory, stricturing, or penetrating] • Exclude complications	• Define the location [proctitis, left-sided, extensive] • Define the severity [mild, moderate, severe, or ASUC] • Identify risk markers for disease course [CRP, endoscopy, anaemia] • Exclude complications • Surveillance colonoscopy for UC-associated tumour, with best practice
Stratify patients	Based on risk factors for a more aggressive disease course: • Extensive small bowel disease • Severe upper GI disease • Severe rectal disease • Patients with complex perianal disease • Patients with early stricturing / penetrating disease • Patients with deep colonic ulcers	Based on risk factors for a more aggressive disease course: • ASUC • Steroid-refractory disease • Thiopurine-refractory disease • Surgery risk [high stool frequency, high CRP, severe endoscopic lesions, histological inflammation, anaemia, low albumin, malnutrition]
Set treatment goals	• Based on the time-bound treatment algorithm in IBD • Based on a treat-to-target approach • Resolution of clinical symptoms and inflammation, including mucosal healing, with normalisation of quality of life, tailored to the individual patient [STRIDE][15]	• Based on the time-bound treatment algorithm in IBD • Based on a treat-to-target approach • Resolution of clinical symptoms and inflammation, including mucosal healing, with normalisation of quality of life, tailored to the individual patient [STRIDE][15]
Select appropriate treatment	Based on treatment goals: • Tailored use of the current IBD drug armamentarium to deliver specific management goals and improve patient outcomes	Based on treatment goals: • Tailored use of the current IBD drug armamentarium to deliver specific management goals and improve patient outcomes
Supervise therapy	• Use optimised, objective monitoring • Determine non-response or loss of response to medical therapy quickly and modify treatment, for example with accelerated step-up approach	• Use optimised, objective monitoring • Determine non-response or loss of response to medical therapy quickly and modify treatment accordingly

ASUC, acute-severe ulcerative colitis; CD, Crohn's disease; CRP, C-reactive protein; GI, gastrointestinal; IBD, inflammatory bowel disease; STRIDE, Selecting Therapeutic Targets in Inflammatory Bowel Disease; UC, ulcerative colitis.

disease behaviour, and assessing if perianal disease is present.[2] Other factors to consider include the patient's age, disease duration [ie whether it is early- or late-onset disease], and the dominant behaviour since diagnosis [ie whether it is inflammatory, stricturing, or penetrating disease].

3.1.2. Ulcerative colitis

In patients with ulcerative colitis, the Montreal Classification focuses on determining disease extent and the severity of individual acute relapses.[2] In line with the Montreal classification, we recommend that staging should also involve defining the disease location [proctitis, left-sided, or extensive disease] and disease severity [mild, moderate, severe, or acute-severe disease]. However, staging should also consider risk markers for disease course such as biological disease severity (based on C-reactive protein [CRP] and haemoglobin levels, and endoscopy) at initial presentation.

3.2. Stratifying patients

Following disease staging, patients with IBD should be stratified based on risk factors and predictors of disease progression. As part of an IBD Ahead initiative, predictors of long-term IBD prognosis were identified via a comprehensive literature review. This enabled summary statements to be developed which outlined demographic and clinical features that could be used to help guide the clinician in identifying patients at higher risk for disease complications at diagnosis and throughout the disease course.[3]

3.2.1. Crohn's disease

Patient stratification in Crohn's disease is based on the presence or absence of poor prognosis factors at diagnosis, such as extensive small bowel disease, severe upper gastrointestinal disease, severe rectal disease, complex perianal disease, early stricturing or penetrating disease, and deep colonic ulcers. Although some factors are associated with poor outcomes in Crohn's disease [such as steroid dependency, colectomy, stenosis],[4–8] there is no ideal definition of predictors of a severe or disabling disease course. Furthermore, the role of serological and genetic markers of poor prognosis remains to be determined, and there is currently a lack of validated biomarkers for an aggressive disease course.[5,9–11]

3.2.2. Ulcerative colitis

Patients with ulcerative colitis should be stratified based on risk factors that predict future surgery, including high stool frequency, severe endoscopic lesions, histological inflammation, elevated CRP, or anaemia. A simple index involving the extent of disease, CRP, and haemoglobin at diagnosis predicts the likelihood of admission with acute severe colitis over the next 3 years.[12]

3.3. Setting treatment goals

In recent years, IBD treatment goals have evolved from simple symptomatic remission towards achieving clinical and endoscopic, steroid-free, remission aimed at changing the course of disease. Achieving the selected treatment goal requires selection of the most appropriate treatment strategy [eg conventional step care, accelerated step care, or an early top-down approach].[13] A treat-to-target strategy in IBD, based on regular [re-]assessment of disease activity using objective outcome measures [as well as patient-reported outcomes] and the subsequent adjustment of therapy [eg with rapid step up to biologic therapy in appropriate patients], can potentially help patients achieve the selected treatment goal.[14,15] The Selecting Therapeutic Targets in Inflammatory Bowel Disease [STRIDE] programme developed evidence- and consensus-based recommendations for Crohn's disease and ulcerative colitis with regard to selecting goals as part of a treat-to-target strategy.[15] Prospective studies are now needed to determine how these targets can be used to change the disease course and improve patient quality of life.

3.4. Selecting appropriate treatment

The most appropriate IBD therapy should be selected based on an individual patient's disease stage, stratification, and selected treatment goal. Importantly, optimised IBD management should be based on a time-bound treatment strategy involving timely evaluation of treatment success and rapid step-up where required in appropriate patients.[16–20]

Tailored use of the current IBD drug armamentarium (5-aminosalicylic acid [5-ASA], steroids, thiopurines, methotrexate, and biologics) can help deliver specific management goals and improve patient outcomes. Patients with potential poor prognosis [ie presence of inflammation determined by imaging, elevated CRP/calprotectin; markers of poor prognosis] may be considered for biologics [after safety assessment: to exclude presence of tuberculosis or viral infections]. Indeed, studies in patients with Crohn's disease suggest it is beneficial to start biologic therapy early [ie before the disease has progressed], with targeted early treatment potentially leading to more patients achieving and maintaining remission.[16–18,21] In both Crohn's disease and ulcerative colitis, anti-tumour necrosis factor [TNF] therapy is associated with steroid-free, clinical, and endoscopic remission as well as a reduced risk of surgery.[21–28] However, it is currently unclear whether biologics reduce disability and damage in IBD.

3.5. Supervising therapy

As part of a treat-to-target strategy, supervision of therapy using optimised monitoring can help improve management decisions in IBD. However, there is still a need to develop effective non-invasive monitoring techniques.[29]

In symptomatic patients, monitoring enables the right treatment to be provided at the right time and optimised quickly, with non-response identified early and treatment modified accordingly. In asymptomatic and postoperative patients, this strategy enables appropriate maintenance therapy to be provided, monitoring for signs of relapse with pro-active management, and prevention of complications. For example, patients with asymptomatic Crohn's disease may have elevated CRP levels,[30] and thus benefit from further evaluation and closer monitoring to prevent complications and hospitalisation. The Post-Operative Crohn's Endoscopic Recurrence [POCER] study investigated whether early endoscopic monitoring with treatment step-up for endoscopic recurrence was superior to standard drug therapy alone in patients with Crohn's disease who had undergone intestinal resection.[31] Study findings indicated that treatment according to clinical risk of recurrence, with early colonoscopy [at 6 months] and treatment step-up, was better than conventional drug therapy alone in preventing postoperative Crohn's disease recurrence. The authors concluded that whereas clinical risk factors predicted disease recurrence, patients at low risk also needed close monitoring.

In managing non-response to therapy, it is important first to define the appropriate time window in which to assess non-response [which is treatment-dependent]. In patients treated with biologics, therapeutic drug monitoring can help inform whether the drug dose should be optimised or whether an alternative strategy needs to be considered [ie switching within or out of drug class]; however,

therapeutic drug monitoring for biologics is not currently available in all countries. In patients treated with thiopurines, metabolite monitoring [6-thioguanine nucleotides and 6-methylmercaptopurine] can help determine why a patient is not responding to a standard dose of a thiopurine. This can help distinguish non-adherence, under-dosing, and thiopurine-resistant and thiopurine-refractory disease, to guide treatment decisions.[32]

4. The 5C concept in IBD management

The 5C Charter, which outlines the components of the 5C Concept, was established at the second IBD Expert Alliance meeting in Tokyo, Japan, in 2013, following comprehensive round-table discussions by key collaborators in the programme. During these sessions, it was evident that optimised management of patients with IBD [based on the 5S Principles] can be achieved most effectively within an optimised clinical care environment. Thus, the 5C Concept was conceived to provide guidance on the importance of optimising the clinical care setting in IBD management. The final components of the 5C Concept were agreed through group consensus and include the following categories: Comprehensive IBD care; Collaboration; Communication; Clinical nurse specialists; and Care pathways [Table 2]. Application of the 5C Concept in clinical practice was discussed further during subsequent Expert Alliance meetings, to allow ongoing sharing of best practice.

4.1. Comprehensive IBD care

Effective management of patients with IBD, based on the 5S Principles, can be achieved within a framework of comprehensive IBD care. This should encompass effective disease evaluation and monitoring based on the best available techniques. Patients should be assessed for disease status at baseline using the following where available: blood biochemical testing, endoscopic findings, computed tomography scanning, and magnetic resonance imaging, using standardised reporting indices where possible. Based on baseline results, patients should receive appropriate treatment, during which monitoring using biomarkers and imaging should be implemented to inform further management decisions. This can all be achieved within an environment that is governed by recognised standards of care and auditing processes.

Table 2. The 5C Concept in IBD clinical care

Concept	Use in clinical practice
Comprehensive IBD care	• Evaluate and monitor the disease using best techniques • Evaluate and manage complications • Specialist centres deliver specialist training
Collaboration	• Greater use of MDT meetings and networking • Collaborate with other specialists [eg dermatologist]
Communication	• Help patient to understand their disease and risk factors • Develop better patient education • Agree shared goals between physician and patient
Clinical nurse specialists	• Play a pivotal role in supporting patients and helping physicians to spend appropriate time with patient
Care pathways	• Define patient-centred pathways so that care for patients may be rapid and seamless

IBD, inflammatory bowel disease; MDT, multidisciplinary team.

4.2. Collaboration

The pattern and complexity of IBD varies considerably across patients and even within the same patient over time.[33] Individuals normally require long-term clinical follow-up because of disease exacerbations and the risk of complications. This can necessitate extensive diagnostic procedures, as well as medical and surgical treatments, over the patient's lifetime. A multidisciplinary team [MDT] approach, which includes HCPs with complementary therapeutic skills and knowledge, can provide patients with an optimised management experience. Core team members should include a gastroenterologist, colorectal surgeon, radiologist, pathologist, IBD specialist nurse and dietitian, with access to named specialists when appropriate, including a hepatologist, psychologist or psychiatrist, primary care physician, rheumatologist, dermatologist, ophthalmologist, respiratory physician, and obstetrician.[34] A pharmacist can be useful in providing assistance with drug monitoring and assessment of adherence to therapy, which is often suboptimal in some patient groups such as adolescents and patients with depression.[35] Importantly, an effective MDT can help provide optimised IBD clinical care by defining a realistic diagnostic and therapeutic pathway tailored to an individual patient's needs, based on locally available professional, structural, and technological resources. The organisation of an MDT should include its remit, decision documentation, and communication with the patient.

4.3. Communication

Given that IBD is a lifelong disease that affects key developmental and life events,[36] good communication between patients and HCPs is essential. Indeed, patients are faced with a growing amount of IBD information and an increasing number of available therapies. Furthermore, the benefit/risk profile of individual treatment strategies is often patient-specific. Therefore, patient engagement and involvement in the decision making process is very important. This can be achieved through effective communication between HCPs and patients, which helps to align the disease management approach and improves patients' understanding of their IBD. Educated patients are more likely to appreciate the importance of achieving and sustaining treatment goals, which can lead to better treatment compliance and persistence. Important aspects of communication include: reviewing symptoms and flare triggers; addressing queries on adherence; considering life stressors or events; reviewing and agreeing treatment goals; and reviewing treatment options [including risks and benefits, and the consequences of not taking therapy or delaying the decision to start treatment].

In support of effective communication, a meta-analysis of 127 studies in a variety of medical conditions showed that good HCP communication led to a significant improvement in patient adherence.[37] HCP communication skills training significantly increased patient adherence (odds ratio [OR]: 1.62); and pre-treatment assessment of perceived needs and concerns predicted subsequent adherence. Conversely, poor communication may result in physicians failing to understand issues that are important to patients, and underestimating the impact of IBD on all aspects of their patients' lives, and lead to poor adherence.

4.4. Clinical nurse specialists

Clinical nurse specialists have a pivotal role in IBD management, supporting both patients and the MDT. Importantly, multidisciplinary care that includes the IBD nurse role is endorsed in guidelines.[38,39]

IBD nurses can help support the physical, social, and psychological functioning of patients. They can help patients determine their unique meaning of health and illness, help patients determine their health goals [considering their limitations and capabilities], and identify actions alternative to standard of care when warranted. They are also essential in providing patients with tailored education and in connecting patients with other members of the MDT when required. On a broader level, IBD nurses may also educate other nurses through national and international media.

Use of standard protocols [eg for biologics] enables IBD nurses to provide consistent and safe patient management. This can be achieved through nurse-led clinics, nurse-led infusions, and telephone helplines, all of which improve patient care. Nurses can also use approved benefit/risk documents to further discuss medical options agreed between the patient and physician. Finally, IBD nurses have an important role in patient follow-up, where they may plan routine laboratory investigations and the timing of the next endoscopy, provide injection training, discuss the importance of adherence, review patient quality of life, and review laboratory assessments.

4.5. Care pathways

Carefully developed IBD care pathways are a structured way of developing and implementing local protocols of care founded on evidence-based clinical guidelines; as such, they integrate clinical practice guidelines and consensus reports with local specialist knowledge and clinical standards. Care pathways can include predictors of disease course and response, treatment algorithms, monitoring algorithms, and treatment targets. They provide high-quality, streamlined care from the point of diagnosis onwards to ensure an optimised experience for patients with IBD. Care pathways also enable effective collaboration between MDT members, as well as overall clarity with regards to disease management, which improves patient engagement. In the REACT study, a care pathway using early combined immunosuppression led to a significant (hazard ratio [HR]: 0·73, 95% confidence interval [CI] 0·62–0·86; P = 0.0003) reduction in the composite rate of major adverse outcomes [occurrence of surgery, hospital admission, or serious disease-related complications] compared with conventional management practices in patients with Crohn's disease.[40]

5. Implementing the 5C concept and 5S principles in clinical practice

Implementation of agreed best-practice strategies is essential to eliminate variability in patient care across regions and countries. To achieve this, it is important that each institution develop its own structured initiative to help deliver consistent IBD management. The 5C Concept and 5S Principles provide institutions with structured recommendations on organising the clinical care setting and developing best-practice approaches in IBD management. Consideration and application of these two concepts could help HCPs optimise their IBD centres and collaborate more effectively with their MDT colleagues and patients, to provide improved IBD care in daily clinical practice. Of course, the 5C concept and 5S principles represent a model situation, and so each institution would need to tailor the recommendations to their situation depending on availability of resources and treatments, as well as standard protocols. Ultimately, the success of each implemented initiative would be determined by individual institutions measuring their key achievements in improving patient care. In this way, IBD care can be continually assessed and modified if necessary, to benefit patient outcomes.

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Conflict of Interest

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Author Contributions

All authors made substantial contributions to the article, or critically revised it for important intellectual content, and approved the final manuscript.

References

1. Hirano H. *5 Pillars of the Visual Workplace*. Cambridge, MA: Productivity Press; 1995.
2. Silverberg MS, Satsangi J, Ahmad T, *et al*. Toward an integrated clinical, molecular and serological classification of inflammatory bowel disease: Report of a working party of the 2005 Montreal World Congress of Gastroenterology. *Can J Gastroenterol* 2005;**19**[Suppl A]:5A–36A.
3. Torres J, Caprioli F, Katsanos KH, *et al*. Predicting outcomes to optimize disease management in inflammatory bowel diseases. *J Crohns Colitis* 2016;**10**:1385–94.
4. Franchimont DP, Louis E, Croes F, Belaiche J. Clinical pattern of corticosteroid dependent Crohn's disease. *Eur J Gastroenterol Hepatol* 1998;**10**:821–5.
5. Allez M, Lemann M, Bonnet J, *et al*. Long term outcome of patients with active Crohn's disease exhibiting extensive and deep ulcerations at colonoscopy. *Am J Gastroenterol* 2002;**97**:947–53.
6. Lichtenstein GR, Olson A, Travers S, *et al*. Factors associated with the development of intestinal strictures or obstructions in patients with Crohn's disease. *Am J Gastroenterol* 2006;**101**:1030–8.
7. Beaugerie L, Seksik P, Nion-Larmurier I, Gendre JP, Cosnes J. Predictors of Crohn's disease. *Gastroenterology* 2006;**130**:650–6.
8. Loly C, Belaiche J, Louis E. Predictors of severe Crohn's disease. *Scand J Gastroenterol* 2008;**43**:948–54.
9. Munkholm P, Langholz E, Davidsen M, Binder V. Disease activity courses in a regional cohort of Crohn's disease patients. *Scand J Gastroenterol* 1995;**30**:699–706.
10. Weersma RK, Stokkers PC, van Bodegraven AA, *et al*. Molecular prediction of disease risk and severity in a large Dutch Crohn's disease cohort. *Gut* 2009;**58**:388–95.
11. Rutgeerts P, Geboes K, Vantrappen G, *et al*. Predictability of the postoperative course of Crohn's disease. *Gastroenterology* 1990;**99**:956–63.
12. Cesarini M, Collins GS, Ronnblom A, *et al*. Predicting the individual risk of acute severe colitis at diagnosis. *J Crohns Colitis* 2016;**11**:335–41.
13. Ordas I, Feagan BG, Sandborn WJ. Early use of immunosuppressives or TNF antagonists for the treatment of Crohn's disease: Time for a change. *Gut* 2011;**60**:1754–63.
14. Bouguen G, Levesque BG, Feagan BG, *et al*. Treat to target: A proposed new paradigm for the management of Crohn's disease. *Clin Gastroenterol Hepatol* 2015;**13**:1042–50 e2.
15. Peyrin-Biroulet L, Sandborn W, Sands BE, *et al*. Selecting therapeutic targets in inflammatory bowel disease [STRIDE]: Determining therapeutic goals for treat-to-target. *Am J Gastroenterol* 2015;**110**:1324–38.
16. D'Haens G, Baert F, van Assche G, *et al*. Early combined immunosuppression or conventional management in patients with newly diagnosed Crohn's disease: An open randomised trial. *Lancet* 2008;**371**:660–7.
17. Lemann M, Mary JY, Duclos B, *et al*. Infliximab plus azathioprine for steroid-dependent Crohn's disease patients: A randomized placebo-controlled trial. *Gastroenterology* 2006;**130**:1054–61.
18. Hanauer SB, Feagan BG, Lichtenstein GR, *et al*. Maintenance infliximab for Crohn's disease: The ACCENT I randomised trial. *Lancet* 2002;**359**:1541–9.
19. Colombel JF, Sandborn WJ, Rutgeerts P, *et al*. Adalimumab for maintenance of clinical response and remission in patients with Crohn's disease: The CHARM trial. *Gastroenterology* 2007;**132**:52–65.
20. Panaccione R, Rutgeerts P, Sandborn WJ, *et al*. Review article: Treatment algorithms to maximize remission and minimize corticosteroid dependence in patients with inflammatory bowel disease. *Aliment Pharmacol Ther* 2008;**28**:674–88.
21. Colombel JF, Sandborn WJ, Reinisch W, *et al*. Infliximab, azathioprine, or combination therapy for Crohn's disease. *N Engl J Med* 2010;**362**:1383–95.
22. Ardizzone S, Maconi G, Russo A, *et al*. Randomised controlled trial of azathioprine and 5-aminosalicylic acid for treatment of steroid dependent ulcerative colitis. *Gut* 2006;**55**:47–53.
23. Candy S, Wright J, Gerber M, *et al*. A controlled double blind study of azathioprine in the management of Crohn's disease. *Gut* 1995;**37**:674–8.
24. Feagan BG, Rochon J, Fedorak RN, *et al*. Methotrexate for the treatment of Crohn's disease. The North American Crohn's Study Group Investigators. *N Engl J Med* 1995;**332**:292–7.
25. Lakatos PL, Golovics PA, David G, *et al*. Has there been a change in the natural history of Crohn's disease? Surgical rates and medical management in a population-based inception cohort from Western Hungary between 1977–2009. *Am J Gastroenterol* 2012;**107**:579–88.
26. Peyrin-Biroulet L, Ferrante M, Magro F, *et al*. Results from the 2nd Scientific Workshop of the ECCO. I: Impact of mucosal healing on the course of inflammatory bowel disease. *J Crohns Colitis* 2011;**5**:477–83.
27. Rutgeerts P, Van Assche G, Sandborn WJ, *et al*. Adalimumab induces and maintains mucosal healing in patients with Crohn's disease: Data from the EXTEND trial. *Gastroenterology* 2012;**142**:1102–11 e2.
28. Sandborn WJ, van Assche G, Reinisch W, *et al*. Adalimumab induces and maintains clinical remission in patients with moderate-to-severe ulcerative colitis. *Gastroenterology* 2012;**142**:257–65 e1-3.
29. Papay P, Ignjatovic A, Karmiris K, *et al*. Optimising monitoring in the management of Crohn's disease: A physician's perspective. *J Crohns Colitis* 2013;**7**:653–69.
30. Vargas EJ, Ramos Rivers CM, Regueiro M, *et al*. Silent Crohn's disease: Elevated C reactive protein in asymptomatic patients and risk of subsequent hospitalization. *Gastroenterology* 2013;**144**[Suppl 1]:S102.
31. De Cruz P, Kamm MA, Hamilton AL, *et al*. Crohn's disease management after intestinal resection: A randomised trial. *Lancet* 2015;**385**:1406–17.
32. Gearry RB, Barclay ML. Azathioprine and 6-mercaptopurine pharmacogenetics and metabolite monitoring in inflammatory bowel disease. *J Gastroenterol Hepatol* 2005;**20**:1149–57.
33. Duricova D, Burisch J, Jess T, *et al*. Age-related differences in presentation and course of inflammatory bowel disease: An update on the population-based literature. *J Crohns Colitis* 2014;**8**:1351–61.
34. Ricci C, Lanzarotto F, Lanzini A. The multidisciplinary team for management of inflammatory bowel diseases. *Dig Liver Dis* 2008;**40**[Suppl 2]:S285–8.
35. Goodhand JR, Kamperidis N, Sirwan B, *et al*. Factors associated with thiopurine non-adherence in patients with inflammatory bowel disease. *Aliment Pharmacol Ther* 2013;**38**:1097–108.
36. Burisch J, Jess T, Martinato M, Lakatos PL; ECCO-EpiCom. The burden of inflammatory bowel disease in Europe. *J Crohns Colitis* 2013;**7**:322–37.
37. Zolnierek KB, Dimatteo MR. Physician communication and patient adherence to treatment: A meta-analysis. *Med Care* 2009;**47**:826–34.
38. Dignass A, Van Assche G, Lindsay JO, *et al*. The second European evidence-based consensus on the diagnosis and management of Crohn's disease: Current management. *J Crohns Colitis* 2010;**4**:28–62.
39. O'Connor M, Bager P, Duncan J, *et al*. N-ECCO consensus statements on the European nursing roles in caring for patients with Crohn's disease or ulcerative colitis. *J Crohns Colitis* 2013;**7**:744–64.
40. Khanna R, Bressler B, Levesque BG, *et al*. Early combined immunosuppression for the management of Crohn's disease [REACT]: A cluster randomised controlled trial. *Lancet* 2015;**386**:1825–34.

Appendix

Participants in the IBD Expert Alliance programme [2012–2015].

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• Hideki Iijima [Osaka University Graduate School of Medicine]	• Richard Gearry [University of Otago, New Zealand]
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• Toshiyuki Matsui [Fukuoka University Chikushi Hospital]	• Ailsa Hart [St Mark's Hospital, UK]
• Takayuki Matsumoto [Kyushu University]	• Joan Heatherington [University of Calgary, Canada]
• Katsuyoshi Matsuoka [Keio University]	• Peter Irving [Guy's and St Thomas' Hospital NHS Trust, UK]
• Minoru Matsuura [Kyoto University]	• Yvette Leung [University of Calgary, Canada]
• Hiroshi Nakase [Kyoto University]	• James Lindsay [Barts and the London NHS Trust, UK]
• Haruhiko Ogata [Keio University]	• Edouard Louis [University Hospital CHU of Liège, Belgium]
• Shinichiro Shinzaki [Osaka University Graduate School of Medicine]	• Remo Panaccione [University of Calgary, Canada]
• Yasuo Suzuki [Toho University Sakura Medical Centre]	• Julian Panés [University of Barcelona, Spain]
• Ken Takeuchi [Sakura Medical Center Toho University]	• Laurent Peyrin-Biroulet [Nancy University Hospital, France]
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• Takuya Yoshino [Kyoto University]	• Simon Travis [John Radcliffe Hospital, UK]
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The institution recorded is that at the time of the meetings.