

# Implementing Quality Measures for Inflammatory Bowel Disease

Shahzad Ahmed · Corey A. Siegel · Gil Y. Melmed

Published online: 12 March 2015  
© Springer Science+Business Media New York 2015

**Abstract** Variation in care for inflammatory bowel disease (IBD) is present across multiple aspects of IBD management, suggesting overall poor quality of care. Quality indicators are intended to provide clear, measurable processes and outcomes of quality care. Initial sets of process and outcome measures have been developed to address areas of inconsistent care and to allow for standardized measurement of outcomes. Measures developed by the Crohn's and Colitis Foundation of America (CCFA) are intended to provide measurable standards for improvement in care. These measure sets will warrant updates overtime to best represent gaps in IBD management. Practically, implementation of quality measures may depend on the care setting and whether quality measurement and improvement can be incorporated into workflows and electronic medical records. Collaborative networks, utilization of care pathways, and standardized treatment algorithms may represent avenues for wide-scale implementation of quality improvement. Implementation efforts should assess the impact on outcomes in order to identify successful models for improvement in IBD care.

**Keywords** Quality · Improvement · Inflammatory bowel disease · Crohn disease · Ulcerative colitis

---

This article is part of the Topical Collection on *Inflammatory Bowel Disease*

---

S. Ahmed · G. Y. Melmed (✉)  
Cedars-Sinai Medical Center, 8730 Alden Dr 2E, Los Angeles, CA 90048, USA  
e-mail: melmedg@cshs.org

C. A. Siegel  
Dartmouth-Hitchcock Inflammatory Bowel Disease Center,  
Lebanon, NH, USA

## Introduction

The Institute of Medicine's (IoM) seminal report "To err is human" spurred conversations and initiatives addressing quality improvement across the spectrum of medicine [1]. In its subsequent report "Crossing the quality chasm," the IoM recommended that efforts to improve quality should be focused on six dimensions: safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity [2]. Efforts to improve care should be geared toward achieving the "triple aim" of improved individual outcomes, population health, and reduced healthcare expenses [3]. Methods for improving the quality of care through various initiatives across medicine have had variable and inconsistent impact on patient outcomes [4]. Therefore, optimal implementation strategies for improving quality of care need to be identified and spread.

Over the past 20 years, broad areas across medicine have seen the expansion of evidence-based studies which have been shown to improve various outcomes including morbidity and mortality leading to well-accepted treatment guidelines [5–9]. There has been widespread adoption of these processes of care; however, process measures do not always clearly lead to improved patient outcomes. This disconnect may be due to the feasibility of implementing such measures, the inability to associate processes with outcomes, and the perception among healthcare providers that care is being rationed or automated [10, 11].

Variation in care for patients across practice settings is ubiquitous across medicine and has been shown to be a reliable surrogate for suboptimal care [12–14]. Variation in care for inflammatory bowel disease (IBD) has been well characterized and relates to multiple aspects of IBD management [15–20]. Conversely, standardization and "consistency" of care to promote best practices has been shown to improve outcomes and decrease healthcare spending [21]. Quality indicators and care pathways for IBD have been recently

developed and aim to reduce variation in care and improve individual and population outcomes. Implementation of protocolized measurement and care algorithms has been demonstrated for IBD at the individual practice level, and as part of a collaborative network which can facilitate rapid spread.

### Quality Improvement Efforts in Inflammatory Bowel Disease

Variation in management exists within the care of IBD patients in areas that include disease screening, preventive care, use of corticosteroids, immunomodulators and anti-TNF therapy, timing of referral to surgery, and adherence to various treatment guidelines [15–20]. Variation in care also exists in specialized areas of management such as medical and surgical management of women of reproductive age with UC and CD [22]. Analysis of surgical outcomes of IBD patients across centers reveals improved outcomes including mortality rates among higher volume practices despite having populations with a greater proportion of patients with severe disease [23, 24].

A variety of different groups have developed quality measures for improved IBD care. A national audit in the UK demonstrated variations in many aspects of IBD care, resulting in the development of cross-disciplinary “Standards” of IBD care [25, 26]. The American Gastroenterology Association (AGA) developed quality measures following the PCPI methodology, which have been incorporated into the physician quality reporting system (PQRS) linked with financial incentives and penalties as well as provider recognition through Bridges to Excellence [27, 28]. The Crohn’s and Colitis Foundation of America (CCFA) developed a conceptual framework demonstrating the potential impact of quality of care through various aspects of IBD management (Fig. 1), and then developed process and outcome measures based on expert interpretation of the literature with multidisciplinary input using the RAND/UCLA appropriateness method [29]. Process measures were developed for practical implementation and need to be evaluated to determine effects on outcomes [30]. The outcome measures developed with multi-stakeholder input (including patients) include proportion of patients with corticosteroid-free remission, hospitalization and surgery, and a normal health-related quality of life (Table 1).

Development of quality measures however is only an initial step toward improvement. As described above, implementation of measures for improvement is needed to realize potential improvement in patient outcomes. These can be facilitated through the development of algorithms and care pathways, and spread utilizing the framework of a collaborative network. Collaboratives are linked practices or systems of care specifically organized to improve quality and outcomes of care using a structured method, such as the Breakthrough Series developed at the Institute for Healthcare Improvement [31].

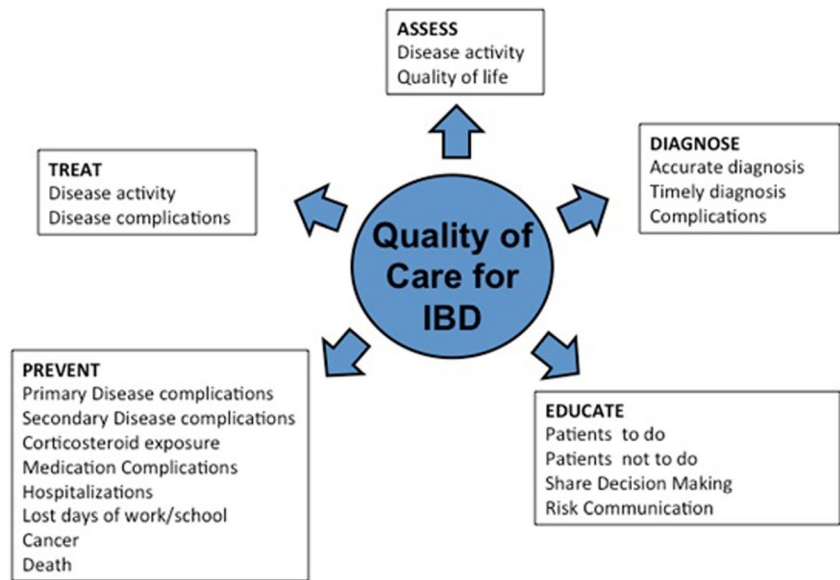
Collaboratives have been credited with improving outcomes following coronary artery bypass surgery, central line placement, and in treatment for patients with cystic fibrosis [32–35] as well as improving adherence to established guidelines leading to reduced healthcare spending [36]. Topics for collaborative efforts are typically first selected by leadership groups and focus on implementing existing practices that are sound but not widely used. Implementation occurs over a 6–18-month period that includes regular face-to-face meetings that supplement monthly updates of methods and results via webinars and other learning materials to identify practices that can be shared across the network. Using this framework, significant improvement in remission rates overtime has been demonstrated in pediatric IBD through the ImproveCareNow network, a pediatric collaborative of over 70 sites with facilitated implementation of quality measures in a learning health network [37]. Structured performance feedback in these closed networks can identify specific factors leading to variability in care that is amenable to further quality improvement. Outcomes can also be directly examined to compare management strategies. Drawbacks of this approach include the need for significant investments in infrastructure and the lack of generalizable implementation outside of the closed healthcare network. As medicine becomes increasingly organized under larger care organizations with healthcare reform, this approach may become increasingly attractive for patients, providers, payors, and healthcare systems.

Currently, there are several ways in which quality measures are being practically implemented. Electronic health records with options for template customization can be configured to build in placeholders for documentation of several measures. For manual documentation, a checklist of items can serve as a clinical tool in a paper chart to document health maintenance measures (see <http://www.ccfa.org/science-and-professionals/programs-materials/ibd-nurses/best-practices/cornerstones-checklist.pdf> for a downloadable checklist). Participants in AGA’s Digestive Health Registry Program are required to report measures for 20 patients in order to qualify for PQRS, and can also receive credit for BTE as well as maintenance of certification credit for the American Board of Internal Medicine through self-directed performance improvement modules. However, while reporting on quality measures for 20 patients may currently be sufficient to receive incentives, it likely falls short of true practice-wide improvement unless it is accompanied by sustained, systematic changes to improve the quality of care within a practice, group, or health system environment.

### Standardization of Care Leading to Improved Patient Outcomes

Across several areas of medicine, one way that variability of care has been successfully reduced has been through the

**Fig. 1** Conceptual framework of an overall approach to improved quality of care in IBD. The Assess, Diagnose, Educate, Prevent, Treat (ADEPT) model [29•]



implementation of standardized management algorithms. For example, standardized treatment algorithms in the ICU have demonstrated improvement in outcomes with reduced mortality, length of stay, and complications that have subsequently led to widespread adoption of algorithm-based process measures [38–43].

**Standardized Treatment Algorithms in IBD: a Future Model for Quality Improvement?**

It has been suggested that quality measures for IBD should be updated to aim toward treating inflammation to resolution,

which is likely to improve important outcomes including hospitalizations and surgery [44••]. There have been a few randomized clinical trials that provide rationale to evaluate competing management strategies, including the timing of introducing biologic therapy, and ways to optimize their use. In a randomized controlled trial, investigators assessed a “top-down” strategy of early (episodic) infliximab use with azathioprine relative to conventional “step-up” with sequential corticosteroids, followed by azathioprine, followed by anti-TNF use among patients with Crohn’s disease [45, 46]. Clinical outcomes were not significantly different at the end of the 2-year treatment period, although those treated “top down” had reduced systemic steroid exposure. The SONIC trial demonstrated that patients with Crohn’s disease naïve to both immunomodulators and anti-TNF therapy were more likely to achieve corticosteroid-free remission and mucosal healing when treated with combination of both azathioprine and infliximab relative to either agent alone [47]. More recently, the Randomized Evaluation of an Algorithm for Crohn’s Treatment (REACT) trial demonstrated improved patient outcomes using a standardized treatment algorithm in community practices [48•]. In this trial, practices were randomized to the algorithm versus standard of care for the management of patients with Crohn’s disease. The algorithm utilized early combined therapy with immunomodulator + anti-TNF treatment. While in this trial the primary outcome of clinical remission at 12 and 24 months was not significantly different between the treatment groups, the secondary outcomes of complications, hospitalizations, and surgeries were less frequent in the early combined immunosuppression group. This trial demonstrates successful implementation of a treatment algorithm leading to measurable improvements in clinical outcomes. The study also addresses the generalizability of management strategies

**Table 1** Ten most highly rated outcome measures (CCFA quality measures) [29•]

- Steroid use
  - Proportion of patients with steroid-free clinical remission for 12-month period
  - Proportion of patients currently taking prednisone (excluding those diagnosed within the last 112 days)
- Number of days per month/year lost from school/work attributable to IBD
- Number of days per year in the hospital attributable to IBD
- Number of emergency room visits per year for IBD
- Proportion of patients with malnutrition
- Proportion of patients with anemia
- Proportion of patients with normal disease-targeted health-related quality of life
- Proportion of patients currently taking narcotic analgesics
- Proportion of patients with nighttime BM’s or leakage
- Proportion of patients with incontinence in the last month

developed in academic centers and suggests that early combined treatment with immunomodulators and anti-TNF therapies is broadly relevant among different care settings.

In recognition of the need for updated, standardized care pathways for IBD, the AGA Institute has published a decision support tool for Crohn's disease that reflects management strategies designed to go beyond control of symptoms to control of inflammation in order to improve upon long-term outcomes of hospitalizations and surgery [44••]. This decision support tool can help provide a framework within which care pathways can be defined and implemented.

## Conclusions

Changes in the broader healthcare environment are demanding the delivery of consistent, high-quality care to improve individual patient outcomes and population health at an affordable cost. The development of best practice measures and simply "trying harder" to follow the latest published guidelines and recommendations will not be sufficient to achieve this "triple aim." Instead, gastroenterologists will need to systematically implement strategies to incorporate measures, pathways, and algorithms and measure themselves in order to demonstrate improvement in patient outcomes. Furthermore, the recommended processes and outcomes of care will need to be updated over time as new knowledge is generated. Specific implementation strategies will depend upon incentives for improvement placed upon providers and systems by healthcare payors, the demands of patients for high-quality care, and the desire to "do the right thing." Programs to spread improvement strategies might include the development of standardized treatment algorithms, care pathways, and collaborative learning networks, which will need to be tailored to individual practice settings and populations.

## Compliance with Ethics Guidelines

**Conflict of Interest** Shahzad Ahmed declares no conflict of interest.

Gil Melmed declares consultancy fees not related to this article from Abbvie, Celgene, Genentech, Given Imaging, Janssen, Luitpold, Takeda, and UCB, and has received research funding from Pfizer and Prometheus labs.

Corey A. Siegel declares consultancy fees not related to this article from AbbVie, BiolineRX, Given Imaging, Lilly, Janssen, Salix, Millenium, Pfizer, Prometheus, Takeda, and UCB and has received honoraria from AbbVie, Janssen, and Merck as well as travel accommodations or reimbursements from Crohn's and Colitis Foundation of America.

Dartmouth-Hitchcock Inflammatory Bowel Disease Center has received grants from CCFA, AHRQ (1R01HS021747-01) AbbVie, Janssen, Salix, Warner-Chilcott, and UCB.

Gil Y. Melmed is the co-chair, CCFA Quality of Care Committee, member of AGA Quality Measures Committee; CAS—chair, CCFA Quality of Care Committee.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

## References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

1. Institute of Medicine. To err is human: building a safer health system. Washington: National Academies Press; 2000.
2. Institute of Medicine. Crossing the quality chasm: a new health system for the 21st century. Washington: National Academies Press; 2001.
3. Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health Aff (Millwood)*. 2008;27:759–69.
4. de Jonge V, Sint Nicolaas J, van Leerdam ME, et al. Overview of the quality assurance movement in health care. *Best Pract Res Clin Gastroenterol*. 2011;25:337–47.
5. Singh AK, Szczech L, Tang KL, et al. Correction of anemia with epoetin alfa in chronic kidney disease. *N Engl J Med*. 2006;355:2085–98.
6. UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. *BMJ*. 1998;317:703–13.
7. Serruys PW, Morice MC, Kappetein AP, et al. Percutaneous coronary intervention versus coronary-artery bypass grafting for severe coronary artery disease. *N Engl J Med*. 2009;360:961–72.
8. Chen ZM, Jiang LX, Chen YP, et al. Addition of clopidogrel to aspirin in 45,852 patients with acute myocardial infarction: randomised placebo-controlled trial. *Lancet*. 2005;366:1607–21.
9. Chen ZM, Pan HC, Chen YP, et al. Early intravenous then oral metoprolol in 45,852 patients with acute myocardial infarction: randomised placebo-controlled trial. *Lancet*. 2005;366:1622–32.
10. Berwick DM. Disseminating innovations in health care. *Jama*. 2003;289:1969–75.
11. Grol R, Wensing M. Implementation of quality assurance and medical audit: general practitioners' perceived obstacles and requirements. *Br J Gen Pract*. 1995;45:548–52.
12. Wennberg JE. Unwarranted variations in healthcare delivery: implications for academic medical centres. *BMJ*. 2002;325:961–4.
13. Fisher ES, Wennberg DE, Stukel TA, et al. The implications of regional variations in medicare spending. Part 1: the content, quality, and accessibility of care. *Ann Intern Med*. 2003;138:273–87.
14. Fisher ES, Wennberg DE, Stukel TA, et al. The implications of regional variations in medicare spending. Part 2: health outcomes and satisfaction with care. *Ann Intern Med*. 2003;138:288–98.
15. Reddy SI, Friedman S, Telford JJ, et al. Are patients with inflammatory bowel disease receiving optimal care? *Am J Gastroenterol*. 2005;100:1357–61.
16. Esrailian E, Spiegel BM, Targownik LE, et al. Differences in the management of Crohn's disease among experts and community providers, based on a national survey of sample case vignettes. *Aliment Pharmacol Ther*. 2007;26:1005–18.
17. Altschuler A, Collins B, Lewis JD, et al. Gastroenterologists' attitudes and self-reported practices regarding inflammatory bowel disease. *Inflamm Bowel Dis*. 2008;14:992–9.
18. Spiegel BM, Ho W, Esrailian E, et al. Controversies in ulcerative colitis: a survey comparing decision making of experts versus

- community gastroenterologists. *Clin Gastroenterol Hepatol* 2009;7:168–74, 174 e1.
19. Kornbluth A, Hayes M, Feldman S, et al. Do guidelines matter? Implementation of the ACG and AGA osteoporosis screening guidelines in inflammatory bowel disease (IBD) patients who meet the guidelines' criteria. *Am J Gastroenterol*. 2006;101:1546–50.
  20. Kottachchi D, Yung D, Marshall JK. Adherence to guidelines for surveillance colonoscopy in patients with ulcerative colitis at a Canadian quaternary care hospital. *Can J Gastroenterol*. 2009;23:613–7.
  21. James BC, Savitz LA. How Intermountain trimmed health care costs through robust quality improvement efforts. *Health Aff (Millwood)*. 2011;30:1185–91.
  22. Bradford K, Melmed GY, Flesher P, et al. Significant variation in recommendation of care for women of reproductive age with ulcerative colitis postileal pouch-anal anastomosis. *Dig Dis Sci*. 2014;59:1115–20.
  23. Kaplan GG, McCarthy EP, Ayanian JZ, et al. Impact of hospital volume on postoperative morbidity and mortality following a colectomy for ulcerative colitis. *Gastroenterology*. 2008;134:680–7.
  24. Ananthakrishnan AN, McGinley EL, Binion DG. Does it matter where you are hospitalized for inflammatory bowel disease? A nationwide analysis of hospital volume. *Am J Gastroenterol*. 2008;103:2789–98.
  25. Eliakim R, Yassin K, Shlomi I, et al. A novel diagnostic tool for detecting oesophageal pathology: the PillCam oesophageal video capsule. *Aliment Pharmacol Ther*. 2004;20:1083–9.
  26. UK IBD Audit. Model action plan for IBD Services. 2006 <url: [https://www.rcplondon.ac.uk/sites/default/files/uk\\_ibd\\_audit\\_2006\\_national\\_report\\_appendices\\_print\\_copy.pdf](https://www.rcplondon.ac.uk/sites/default/files/uk_ibd_audit_2006_national_report_appendices_print_copy.pdf). Accessed 11 Jan 2014.
  27. Services CfmaM. Physician Quality Reporting System (PQRS) measures list. 2013.
  28. Fireman Z, Paz, D. Capsule endoscopy: improving the transit time and the image view (abstract). *Digestive Disease Week 2004 2004*;abstract id. 101871.
  29. Melmed GY, Siegel CA, Spiegel BM, et al. Quality indicators for inflammatory bowel disease: development of process and outcome measures. *Inflamm Bowel Dis*. 2013;19:662–8. *This article describes the methodology of development of quality indicators for adults with IBD.*
  30. Fireman Z, Eliakim R, Adler S, et al. Capsule endoscopy in real life: a four-centre experience of 160 consecutive patients in Israel. *Eur J Gastroenterol Hepatol*. 2004;16:927–31.
  31. IHI. The Breakthrough Series: IHI's Collaborative model for achieving breakthrough improvement. IHI Innovation Series white paper. 2003.
  32. Miller MR, Niedner MF, Huskins WC, et al. Reducing PICU central line-associated bloodstream infections: 3-year results. *Pediatrics*. 2011;128:e1077–83.
  33. Neu AM, Miller MR, Stuart J, et al. Design of the standardizing care to improve outcomes in pediatric end stage renal disease collaborative. *Pediatr Nephrol*. 2014;29(9):1477–84.
  34. Schechter MS, Fink AK, Homa K, et al. The cystic fibrosis foundation patient registry as a tool for use in quality improvement. *BMJ Qual Saf*. 2014;23 Suppl 1:i9–14.
  35. O'Connor GT, Plume SK, Olmstead EM, The Northern New England Cardiovascular Disease Study Group, et al. A regional intervention to improve the hospital mortality associated with coronary artery bypass graft surgery. *Jama*. 1996;275:841–6.
  36. Farias M, Jenkins K, Lock J, et al. Standardized Clinical Assessment and Management Plans (SCAMPs) provide a better alternative to clinical practice guidelines. *Health Aff (Millwood)*. 2013;32:911–20.
  37. Crandall WV, Boyle BM, Colletti RB, et al. Development of process and outcome measures for improvement: lessons learned in a quality improvement collaborative for pediatric inflammatory bowel disease. *Inflamm Bowel Dis*. 2011;17:2184–91. *This paper describes efforts of the ImproveCareNow network to develop quality improvement measures for pediatric IBD.*
  38. Rivers E, Nguyen B, Havstad S, et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. *N Engl J Med*. 2001;345:1368–77.
  39. Yealy DM, Kellum JA, Huang DT, et al. A randomized trial of protocol-based care for early septic shock. *N Engl J Med*. 2014;370:1683–93.
  40. King KM, Adams BD, ACP Journal Club. In septic shock, early goal-directed or standard protocol-based therapy did not reduce mortality. *Ann Intern Med*. 2014;160:Jc9.
  41. Koves IH, Leu MG, Spencer S, et al. Improving care for pediatric diabetic ketoacidosis. *Pediatrics*. 2014;134(3):e848–56.
  42. Blackwood B, Alderdice F, Burns KE, et al. Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients. *Cochrane Database Syst Rev*. 2010;12(5), CD006904.
  43. Barnes AJ, Unruh L, Chukmaitov A, et al. Accountable care organizations in the USA: types, developments and challenges. *Health Policy*. 2014;118(1):1–7.
  44. Sandborn WJ. Crohn's disease evaluation and treatment: clinical decision tool. *Gastroenterology*. 2014;147:702–5. *This framework provides strategies for risk stratification and treatment of patients with Crohn's Disease with the goal of achieving resolution of mucosal inflammation. This goal is geared towards ultimately preventing progression of disease activity with the associated increased morbidity and mortality.*
  45. D'Haens GR. Top-down therapy for IBD: rationale and requisite evidence. *Nat Rev Gastroenterol Hepatol*. 2010;7:86–92.
  46. 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.
  47. 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.
  48. Khanna RLB, Bressler B, Zou G, Stitt L, Greenberg GR, Panaccione R, et al. Early combined immunosuppression for the management of Crohn's disease: a community-based cluster randomized trial. *J Crohn's Colitis*. 2014;8:S2–3. *This study demonstrated successful implementation of a "top down" treatment algorithm in community gastroenterology practice. The algorithm was associated with decreased hospitalization, complications and surgeries in comparison to conventional management.*