

ORIGINAL RESEARCH

INTEGRATED CARE MODELS: OPTIMIZING ADULT AMBULATORY CARE IN INFLAMMATORY BOWEL DISEASE

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ABSTRACT

Background: Inflammatory bowel disease (IBD), including Crohn's disease and ulcerative colitis, is a chronic, complex and unpredictable disease affecting an increasing number of patients from a young age, worldwide. IBD is associated with multiple comorbidities and complications, requiring ongoing acute and chronic care. The purpose of this article is to review the literature on outpatient care models used to treat adults with IBD, and to gain insight on how to improve quality of care and reduce costs.

Methods: A comprehensive review of recent literature on PubMed, Scopus, and Google Scholar databases about care models used to treat IBD was performed. Key terms included "inflammatory bowel disease", "organizational models", "patient care team", "quality improvement", and "physician assistants".

Results: Studies showed that an integrated care model decreases hospital admissions, IBD-related

surgeries, and comorbidities of IBD, ultimately decreasing direct and indirect costs of IBD compared to a more traditional patient-physician model. A gastroenterologist-led multidisciplinary team (MDT), involving comprehensive care by IBD nurses, a surgeon, psychologist, dietician, pharmacist, and other members as needed is recommended. No research was found on the use of physician assistant (PAs) in IBD care.

Conclusions: A holistic approach to IBD care delivered by a MDT with structured monitoring, active follow-up, patient education, and prompt access to care improves outcomes for IBD patients. More research is needed on the cost-effectiveness of integrated care models to demonstrate long-term value and secure funding for implementation. Future research should examine how the use of PAs in IBD care influences patient outcomes, healthcare costs, as well as patient and physician satisfaction.

Introduction

Impact of Inflammatory Bowel Disease

Inflammatory bowel disease (IBD), including Crohn's disease and ulcerative colitis, is a group of chronic, relapsing and remitting immune-mediated conditions that cause inflammation and ulceration along the gastrointestinal tract. IBD affects a large number of the population worldwide, including approximately 1 in 150 Canadians (1). The average age of onset coincides with an important age of social, educational, and career development, with the majority of individuals being diagnosed before the age of 30 (1). The etiology of IBD is multifactorial and still largely unknown, and there is currently no cure for these illnesses (1,2).

IBD is associated with often debilitating comorbidities and can have a profound impact on both physical and mental health, greatly decreasing quality of life for those affected. Common symptoms of IBD include abdominal pain, bloating, frequent and urgent diarrhea, constipation, bloody stools, fatigue, and weight loss. Complications of Crohn's disease may include anal fissures, abscesses and fistulas, stricturing of the bowel with partial obstruction, and in severe cases, complete bowel obstruction and perforation (3,4). Persons with IBD affecting the colon are also at higher risk of developing colorectal cancer than the general population (1,3). Although IBD primarily affects the gastrointestinal tract, due to chronic inflammation, IBD is also associated with multiple extraintestinal manifestations affecting the skin, joints, bones, eyes, liver and blood system (1,3,4). Additionally, psychiatric comorbidities such as anxiety and depression are common in patients with IBD (5).

Due to the complexity and unpredictability of IBD and its potential complications, maintenance therapy, ongoing monitoring, and acute intervention is required at multiple levels of the healthcare system by a variety of healthcare providers (1,3). Without coordinated care, structured follow-up and access to appropriate care in a timely fashion, IBD care is often episodic and reactive, with some patients only receiving care with an acute flare-up of the disease or when severe complications arise. This often results in patients requiring hospitalization and surgical intervention, rendering the treatment costly both directly and indirectly (6).

In Canada, where rates of IBD are among the highest in the world, the medical cost was estimated to total \$2.8 billion dollars in 2012, which equates to \$11,900 per person affected (1). Direct medical costs, including medication, hospitalizations, and physician visits accounted for \$1.2 billion. Indirect costs amounted for \$1.6 billion, mainly through long-term work loss (1). The lifetime medical care cost of a patient with IBD can be comparable to a patient with other major chronic conditions such as diabetes mellitus (3).

Integrated Approach to IBD Management

Integrated models of care have been implemented worldwide with the goal of providing more comprehensive and holistic care to patients with chronic diseases (7). An integrated approach brings together a variety of healthcare services for patients to improve access to care, quality of care, patient

satisfaction, and health outcomes (1,5). Randomized controlled trials have demonstrated a positive impact of an integrated model of care for patients with psychiatric illnesses and hepatitis C (8,9). Exposure to an integrated model of care also improved care and decreased hospitalizations for elderly patients (7).

A potential strategy to optimize outpatient IBD care is to include a physician assistant (PA) as part of the integrated care team. A PA is a medically educated clinician who practices within a formalized relationship with a physician, as an extension of his/her services. PAs are qualified to obtain histories, perform physical exams and procedures, order and interpret diagnostic tests, assist in surgeries, educate and counsel patients, and provide therapeutic treatments including medical prescriptions. PAs are versatile, team-oriented healthcare providers who work in collaboration with physicians to fill gaps in care in both primary and specialty care settings. PAs have been shown to improve access to care, decrease wait times, and increase patient satisfaction with comparable quality of care to physicians across multiple settings.

The complexity, cost, patient impact, as well as the long duration of the disease that is leading to an increasing burden in elderly patients, make IBD a good candidate for management through an integrated model of care. Implementing an effective integrated care model with targeted resources for meeting the acute and chronic needs of patients with IBD is essential to improve overall health and quality of life, and to decrease healthcare costs (1,5–7). The purpose of this article is to review the literature on current outpatient care models for adults with IBD to gain an understanding of strategies and recommendations to optimize IBD care and decrease costs.

Methods

A review of the literature pertaining to inflammatory bowel disease (IBD) care models published within the last 10 years, between 2008 and 2018, was performed in the online PubMed database. Key terms used to search the database include “inflammatory bowel disease”, “organizational models”, “patient care team”, “patient care planning”, “quality improvement”, and physician assistant. The filters used for inclusion were English language, human species, adult population (19+ years), peer-reviewed, and free full-text articles. Articles were first screened by title and/or abstract, and included or excluded based on perceived relevance of the article to the core objectives of the literature review. Studies pertaining to specific medical treatments of IBD, paediatric populations, primary care settings, and inpatient groups were excluded. Additional articles were obtained by review of the reference sections in core articles retrieved in the literature search, with the same inclusion and exclusion criteria applied. Further information and data was obtained from a chapter in Cecil Essentials medical textbook, and prominent IBD and PA websites, such as Crohn’s and Colitis Canada, Crohn’s and Colitis UK, and Canadian Digestive Health Foundation, and Canadian Association of Physician Assistants.

Results

Article Selection

The initial search in the PubMed database using the key terms and inclusion filters described in the Methods section produced a total of 184 articles. After screening articles by title and abstract only, a total of 30 articles remained to be assessed. From the 30 articles, those not available in free full-text, those pertaining to primary care settings and those determined not to be related to the core objectives of the literature review were excluded, leaving a total of 14 articles appropriate to be included in the literature review. Prospective and retrospective cohort studies, international surveys, and systematic review articles were used. A total of 14 additional articles obtained through other resources were used in this literature review. Figure 1.

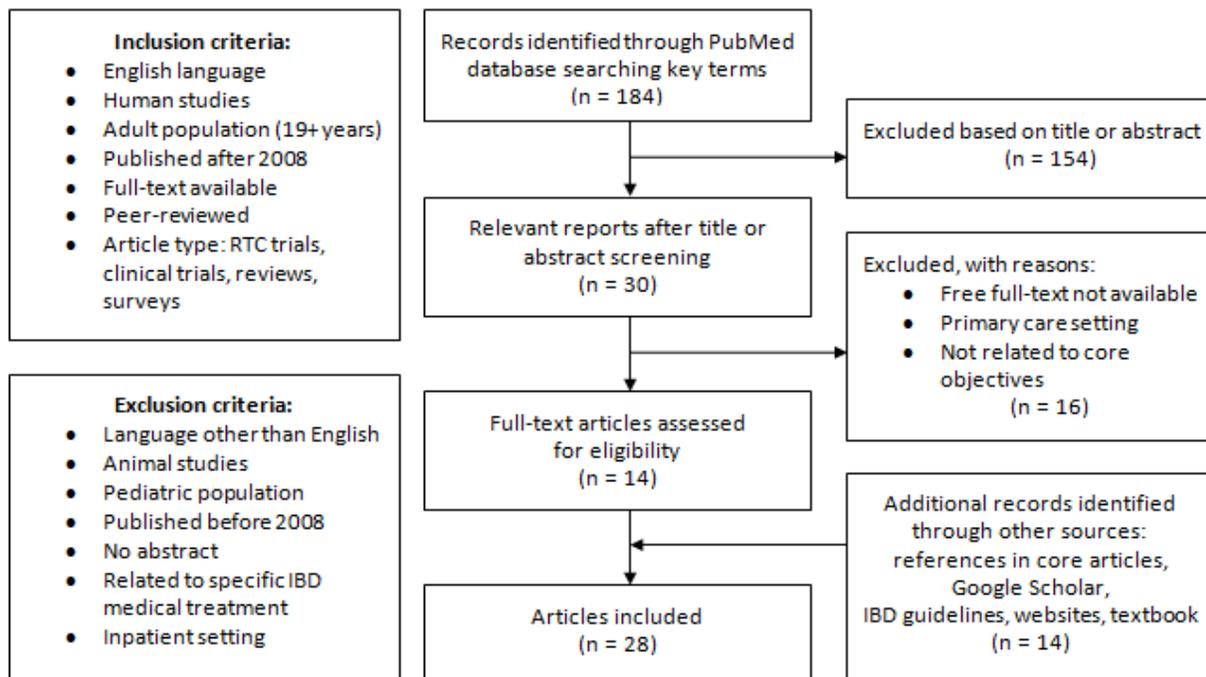


Figure 1: Selection process with inclusion and exclusion criteria for the 28 resources included in the literature review.

Integrated Care Models Involving Multidisciplinary Teams

An integrated care model involves a multidisciplinary team (MDT), which consists of a team of healthcare professionals from different specialties, working together to deliver comprehensive care to patients. Table 1. Experts in IBD support and recommend an integrated care approach for the most effective management of IBD (1–3,5,6,8), and the literature suggests that IBD care delivered by a gastroenterologist-led MDT is more effective (1–3,5,11) than the traditional patient-specialist model. Table 2. The patient-specialist model is a more simplistic approach to care, involving specialist physician,

the gastroenterologist in this case, in the treatment of IBD, without the integrated use of other healthcare professionals (1).

Over the last decade, there has been a gradual global trend to deliver IBD care through an integrated team approach (1,3,5). In an international survey done in 2014 by healthcare providers working in IBD, 54% of respondents reported using an integrated care model, while only 5% reported using an exclusively biomedical care model, defined as one that does not address psychosocial factors in the management of IBD (2). The services provided through integrated care models vary from centre to centre depending on funding and perceived necessity.

Research supports that the ideal integrated model would involve a gastroenterologist-led team, with a colorectal surgeon, IBD nurse specialists, a dietician, and a psychologist or counsellor (1,5,10,11). Some sources suggested that the ideal MDT would also include a pathologist, radiologist, and pharmacist with a special interest in IBD as core members of the team (8,9). Specialty services should be available and used based on individual patient needs. Table 1. These services may include a rheumatologist, ophthalmologist, dermatologist, psychiatrist, obstetrician, nutritional support team, social worker, and physiotherapist (1,3,5,8,9). The international survey reported that the specialists most commonly involved in IBD care were gastroenterologists, IBD nurses, colorectal surgeons, and dieticians, followed by radiologists, pathologists, psychologists, and pharmacists (2). Table 2.

The gastroenterologist specializes in the medical treatment of IBD, with the ultimate goal of preventing the progression of widespread bowel damage and complications of the disease (10). IBD often requires surgical intervention, which would involve a colorectal surgeon. The endoscopist, radiologist, and pathologist all play an important role in the proper diagnosis of IBD, monitoring disease progression and treatment effectiveness, detecting complications, and colorectal cancer surveillance (11,12). Most often the primary attending gastroenterologist is the endoscopist involved in the care. The dietician and psychologist are essential in the management of malnutrition and mental health issues respectively, which are both common in patients with IBD. Specialist IBD nurses play an important role in the care, education, advocacy, and support of patients (1,2,10,11).

Rheumatologists, ophthalmologists, and dermatologists may play a role in treating the extraintestinal manifestations of IBD in the joints, eyes, and skin (1,5,11). Birth, fertility, and breastfeeding can all be affected by IBD, thus referral to an obstetrician could be necessary (11). Specialized pregnancy planning and ongoing follow-up clinics for patient with IBD have emerged (13). A referral to psychology or psychiatry may be necessary for patients needing complex medical management of anxiety, depression, or other psychiatric comorbidities (1,2,5,8,9). A physiotherapist, social worker, and a nutritional support team are other resources recommended in the literature to support patients and families (1,2,10,11). All members of the team play an important role in optimizing care for patients with IBD.

Many healthcare centres worldwide are now using an integrated model to improve care for patients with IBD. A paper published by Mikocka-Walus et al. in 2012 described six IBD centres in various countries that were active in clinical IBD research and utilizing aspects of an integrated care

model to examine common features being implemented (5). All six IBD centres included a gastroenterologist, five of the six included IBD nurses, four included psychological services, and two included a surgeon as part of the MDT. Commonalities of the six models include patient-centred care, mechanisms for active patient follow-up, patient education about IBD, consideration of biopsychosocial function of the patient, significant role of IBD nurse, access to a variety of healthcare professionals, as well as coordination between child and adult services. Overall, the integrated model of care for IBD management was recommended by all six IBD centres over a patient-gastroenterologist approach (5).

Benefits of Integrated Care Models

The ultimate goal of multidisciplinary, integrated care models is to optimize IBD care by improving patient satisfaction, patient and population outcomes, and decreasing costs of IBD. An integrated approach provides a variety of targeted resources to patients to improve overall physical and mental health, reducing complications of IBD that lead to high healthcare costs and productivity loss. Of the IBD healthcare professionals who responded to the international survey conducted by Panes et al., 51% reported funding as the greatest perceived barrier to implementing the ideal model of care recommended for IBD patients (2). The next most commonly reported perceived barrier, by 14% of respondents, was that healthcare systems do not seem conducive to multidisciplinary care. This, despite that studies suggested that providing quality care to patients with IBD can actually reduce direct and indirect costs, proving to be cost-effective for the economy long-term.

A study conducted at the Royal Adelaide Hospital (RAH) in Australia demonstrated that the use of a gastroenterologist-led IBD service reduced hospital admissions, lowering health utilization and lowering inpatient costs (6). The authors hypothesized that a formal IBD service based on an integrated care model would be superior to the standard patient-physician model of care. In this prospective cohort study, authors compared IBD and non-IBD groups before and after the implementation of an IBD service program to improve care and reduce cost. Electronic hospital sources were used to identify IBD patients who attended the RAH within predetermined time-frames, and each IBD case was randomly assigned five age and gender-matched controls using a computer algorithm. The IBD service included specialty IBD nurses, a weekly IBD clinic, a joint medical-surgical IBD clinic, and regular radiology review sessions. The service also included a telephone help-line, formal protocols for blood test monitoring, post-clinic and hospital discharge phone follow-ups, patient education, and information leaflets. The variables measured in the study included the number of inpatient admissions, the total length of stay in the hospital, the cost of inpatient care, and the complexity of the care provided as determined by the number of comorbidities documented.

The results showed that after the implementation of the IBD service, the IBD-group had fewer inpatient hospital admissions, a reduced total length of stay in hospital, and a lower complexity of illness in hospital admissions (6). Due to inpatient care being the main factor in direct healthcare costs of IBD, and hospital admissions correlating to disease severity, the implementation of the IBD service is likely to be clinically relevant in terms of patient outcomes and economic impact (6). The authors concluded that having an integrated chronic care model for treating IBD patients leads to net savings in direct and

indirect healthcare costs, and improves clinical patient outcomes. The cost of the outpatient services was not measured in this study.

Another study done at the University of Saskatchewan in Canada, supported the concept that integrated care delivered through an MDT can enhance quality of care and improve outcomes for patients with IBD (7). A retrospective population-based matched cohort study was conducted using administrative health data, comparing outcomes between patients exposed and not exposed to an integrated model of care. The integrated model of care was a patient-centred, multidisciplinary IBD clinic with IBD fellowship-trained gastroenterologists, nurse practitioners, nurse clinicians, a clinical health psychologist, and clinical dietician with expertise in gastrointestinal nutrition (7). This model included biopsychosocial assessments, disease education, and active follow-up including nurse-led telephone follow-ups and telemedicine care for patients from rural communities. The variables measured in the study were IBD-related hospitalizations and surgical treatments, prescriptions medication claims, and corticosteroid dependency between the two groups (7).

The results showed that patients exposed to the integrated model of care had fewer IBD-related hospital admissions, surgeries for IBD, and corticosteroid dependence. Authors also found that patients receiving care at the integrated IBD clinic had earlier induction of medical treatments, and a lower risk of hospitalizations (7). The cost-effectiveness of this model was not studied directly.

Recommendations for MDTs

Based on the global literature of best practises, delivery of IBD care through a MDT is strongly recommended (1). There are a variety of recommendations suggested in the literature regarding MDTs to optimize IBD care and address gaps in care. Recommendations about MDTs focus on IBD nurses, psychological services, other MDT members, and communication, all of which are discussed separately below. No research about the use of PAs in IBD care was found.

IBD Nurses

There are strong recommendations in the literature to include IBD nurse specialists in the MDT, as they play an invaluable role in the care of IBD patients (1,2,11). In an international survey study, IBD healthcare providers considered an IBD nurse the most essential healthcare provider for good quality care, aside from the gastroenterologist (2). Several studies reported improvements in patient outcomes when IBD nurses are involved in care. Studies also showed that IBD nurses reduce referral times, risk of complications, hospital utilization, and burden of disease on patients (1,10,11).

Nurses are trained under the biopsychosocial model of care and have an understanding of the pathophysiology, symptoms, diagnosis, and treatment of diseases. Their role in IBD care may involve providing clinical care, educating patient, advocating for patient needs, performing research duties, coordinating flow of care, and ensuring consistent patient monitoring and support (1,11). Responsibilities may also include running telephone clinics, laboratory follow-ups, and prescription refills. An IBD nurse is also well suited to act as a case manager for patients, which is someone who coordinates and organizes

the overall care of patients, including drug monitoring, laboratory testing schedules and monitoring, and surveillance procedures (1). IBD nurses with competency in stoma care are also recommended to improve care (3). An IBD nurse's ability to fill a variety of roles in the care of patients with IBD make them an essential part of optimal care.

Psychological Services

There is a growing body of literature recognizing the importance of psychosocial factors in IBD, and the need for targeted resources to address the mental health of patient with IBD. The symptoms of chronic pain, fatigue, and unpredictable bowel habits are likely to disrupt education, employment, personal relationships, and social functioning (3). For these reasons, it is no surprise that those with IBD may struggle with poor self-esteem, anxiety, and low moods.

Research suggests that addressing psychological comorbidities not only improves mental health outcomes, but physical outcomes as well (5). A prospective study on gastrointestinal diseases showed that greater anxiety and depression are related to more frequent relapses in the follow-up period in IBD (5). Psychological distress, depression, and anxiety may actually trigger disease relapse (11). Despite evidence linking mental and physical health in IBD, mental health issues are not well addressed in IBD care (1,2). The IBD clinic at the University Hospital of Vienna developed a patient questionnaire to assess the demand for psychological care and found that about one-third of IBD patients demonstrated a high need for psychological intervention (5). An audit done in the UK found that only 24% of adult IBD services had defined access to a psychologist with an interest in IBD (3). Other studies showed that less than 40% of IBD patients with high levels of anxiety or depression receive treatment (11).

There is strong support in the IBD literature to include a psychologist or counsellor as a core member of the MDT to address mental health needs (1,2,5,11). Surveyed IBD experts agree that the ideal IBD model would include a psychological assessment for every patient, rather than just those expressing concern in mental health (2). The use of screening tools, such as a patient questionnaire done before or during an appointment, would be a quick, easy, and effective way to assess the need for further psychological intervention by a psychologist, counsellor, or psychiatrist. Psychological screening tools have been validated for use in the IBD population (14). Research is showing promise for psychotherapy treatment to improve outcomes in IBD (5).

Other MDT members

Involving an endoscopist, radiologist, pathologist, and pharmacist with special interest and knowledge in IBD is important, as they all play an important role in the proper diagnosis, treatment, and surveillance of IBD (1,11). In a study conducted by Louis et al., experts in the field of IBD were invited to discuss, modify, and vote on suggested recommendations identified in the literature to optimized IBD care (11). This study found that 81% agreed that an IBD unit should have an endoscopy suite or structured access to one, and 81% agreed that an IBD unit should have access to imaging, such as computerized tomography (CT), magnetic resonance imaging (MRI), and ultrasound, including a formalised discussion with a radiologist incorporated into care. In this same study, 94% agreed that an

IBD unit should have a pharmacist with experience in the administration of all approved drugs for IBD (11). These recommendations reflect the Canadian consensus for IBD quality indicators (15).

IBD experts also recommended a dietician with special knowledge and interest in IBD as a core member of the MDT for nutritional assessments, and management of malnutrition and nutritional deficiencies (1–3,11). A nutritional support team is recommended as a specialty service that should be available to patients needing further nutritional intervention (11). Using a screening tool for nutritional assessment in every patient has been recommended as a strategy for targeting nutritional services to those with the highest need (2). A new IBD specific screening tool, the Saskatchewan IBD-Nutrition Risk tool, has been validated to detect nutrition risk in persons with IBD (16).

Communication

Patient communication and education is an important aspect of quality IBD care. The literature suggested that MDT meetings should be formally documented and discussed with the patient (3). Studies showed that proper communication between the patient and their healthcare team can improve treatment adherence (10). Patients who are well informed about their disease and treatment are more likely to adhere to the treatment plan, making them better able to reach remission, limit bowel damage, and reduce long term disability, ultimately improving their quality of life (10). IBD care teams should empower patients to understand their disease and involve them in the management whenever possible.

Communication between the IBD team and the patient's primary care provider (PCP) is also an important aspect of outpatient IBD care (1,10). Although the PCP is not a member of the IBD team, he/she can play a key role in supporting, educating, and encouraging adherence to medications implemented by the gastroenterologist. The PCP can also assist the gastroenterologist in providing services such as keeping vaccinations up to date, monitoring bone health, encouraging smoking cessation, and providing treatment for mental health issues (17). Communication with the PCP can be a key component to improve patient outcomes.

Integrated Models in IBD Care

New and innovative integrated care models, such as specialty medical homes (SMH) and Centres of Excellence (CoEs), are being implemented to improve health outcomes and decrease the costs of IBD care. The effectiveness of these models is now being studied and is discussed below.

Medical Homes

A medical home is an integrated care model developed in the United States, traditionally used in a primary care setting to deliver patient-centred, comprehensive, team-based and accessible care to specific patient populations (18,19). SMHs, which are medical homes with a specialist acting as the primary provider coordinating all aspects of the patient's care, are now being used to treat patients with IBD in the United States. These models involve collaboration with an insurance company to improve value and reduce cost (18,19). Elements necessary for the success of these integrated models include

engaging patients in their own care, and having a team approach that embraces collaboration with physician-extenders, nurses, dietitians, psychologists, pharmacists, and other healthcare providers as needed (18).

The University of Pittsburgh Medical Center launched a SMH for patients with IBD in 2015 for all health plan-insured IBD patients with a focus on high-utilization patients (19). Services provided in this model include a personal nurse coordinator for each patient, 24/7 on-call gastroenterologist, telemedicine and home visits by nurses, and rapid access outpatient care (18,19). In this model, preventative, acute and chronic care is provided by the gastroenterologist, nurses, dietician, physician extenders, and behavioural health and pain specialists (18). Key components of this model included psychological care, pain management, nutritional support, increased access to care, and standardized checklists for vaccine-preventable illnesses, bone health, cancer prevention and medication-related toxicity evaluation. This model demonstrated significant overall cost savings and improved outcomes (18), through reduction in the total cost of care, a reduction in emergency room visits and hospital admissions within the first year, and improved patient-reported quality of life (20).

Centres of Excellence

A CoE is a framework for sharing best practises and addressing gaps in care, and is being utilized in many areas of medicine for chronic and complex diseases (1). The development of IBD CoEs is organized around three pillars of excellence: patient care, research, and education. Unlike SMHs, CoEs are often built around the healthcare team, more typically at academic centres and require collaboration with hospitals/medical centres (18). Integrated care delivered by a MDT at a CoE appears to be an effective model for long-term IBD care (1,10,12), and there is support for the use of this model worldwide (10). The Canadian Digestive Health Foundation recommends adoption of a multidisciplinary team approach in a CoE throughout the country. An IBD CoE may not be realistic to have in every area due to the start-up costs required, but they provide insight into best practices and ideas to include in integrated IBD care models as resources allow (1,10).

One example of a CoE comes from St Mark's Hospital in London, with a MDT made up of 15 gastroenterologists, 10 surgeons, five specialist nursing teams, a psychological medicine unit, pharmacy, radiology, paediatric services, as well as clinical research teams (10,21). Specialist nursing teams include an IBD team, stoma and pouch team, nutrition team, and endoscopy team. The role of the IBD nursing team involves patient educations, advocacy in team meetings, management of difficult symptoms, psychological support, and IBD telephone lines for better access to appropriate care. Several weekly MDT meetings take place including an IBD MDT meeting to discuss complex patients, a virtual biologic meeting to discuss monitoring of medical treatment, a dysplasia/polyp meeting to discuss surveillance, a psychosocial meeting to discuss overall well-being of patients, and an IBD executive meeting to discuss service planning. Meetings are documented to allow communication with patients and primary care practitioners. Data were not collected on the effectiveness of this model compared to other models of care.

In 2016, Canada launched the Promoting Access and Care through Centres of Excellence (PACE) network to unite CoE across the country to close the gap in IBD care (22). Crohn's and Colitis Canada is investing \$2.8 million over four years in five leading IBD centres across the nation in Toronto, Calgary, Edmonton, Hamilton, and Montreal. Each centre has a defined quality of care initiative which includes providing IBD specialist services to remote communities through telemedicine; monitoring patient health between visits through innovative and interactive mobile apps; establishment of EMR-integrated clinical care pathways to reduce chronic steroid use; and development of metrics and infrastructure for systematically measuring quality of care, including the PACE model itself. The telemedicine initiative has most elements of a MDT including an IBD nurse coordinator, urgent care services, a dietician, a surgeon, psychological services for cognitive behavioural therapy, and access to ancillary services as needed. The ultimate goal is to add more CoE to the PACE network as a means of sharing information to advance best practises and improve the standard of care for all patients living with IBD. Evidence gathered through clinical care and research can be used to promote change to improve IBD care in the public healthcare system (22). The studies are incomplete, but early results indicate increased access and quality of care, and decreased wait times for patients.

Discussion

Integrated Models of Care

Poorly controlled IBD is associated with decreased quality of life, psychological distress, multiple comorbidities and potentially life-threatening complications, which is a burden not only to patients with IBD, but also to the healthcare system and economy (1,3). Without organization of resources and prompt access to care, treatment for IBD is often emergent, reactive and costly, requiring more hospital admissions, surgeries and medications. It is well established in the literature that integrated care delivered by a gastroenterologist-led MDT is the most effective care model for patients with IBD (1,2,5,10,11). A comprehensive integrated care model employs a proactive, preventative, team approach to care, superior to the more traditional patient-physician model.

Common features of integrated multidisciplinary care models include patient-centred care, prompt access to care, mechanisms for active follow-up, patient education about IBD and treatment, interprofessional collaboration and communication, and a focus on addressing the biopsychosocial factors affecting patients. Studies showed that implementing a MDT with targeted resources to meet the needs of patients with IBD can decrease emergency room visits, hospital admissions, length of stay in the hospital, disease comorbidity, and IBD-related surgeries, ultimately improving health outcomes and patient reported quality of life while reducing overall IBD costs (6,7,23).

Recommendations put forth to optimize care focus on expanding the MDT of healthcare providers to better meet the needs of patients with IBD. In addition to the gastroenterologist, the MDT should include a surgeon, IBD nurse, psychologist or counsellor, dietician, as well as a radiologist, pathologist, and pharmacist with special knowledge and experience in IBD. As endoscopy specializes in

terms of sophisticated imaging for cancer diagnosis and resection of complex polypoid lesions, there may be a need for a specialized endoscopist distinct from the gastroenterologist leading the team (3,11). Supporting services should be available depending on patient need.

Aside from a gastroenterologist, the most crucial aspects of care come from IBD nurses and psychological services. IBD nurses perform a wide variety of tasks which improve quality, access and flow of care, while psychological services address mental health issues which are known to impact disease activity. Based on the literature, focusing more resources on psychological care in IBD patients has the potential for greatly improving quality of life for patients, reducing disability, and reducing cost to the healthcare system and economy (5,11).

A barrier to widely implementing a fully integrated care model for patients with IBD is the perceived cost associated. Although an MDT may initially be more resource-intensive than the simple patient-physician model of care, this proactive approach reduces the need for expensive healthcare utilization and reduces productivity loss of patients, which results in long-term cost saving. Higher quality of care is in fact less expensive with regards to IBD (20).

Promising initiatives for quality improvement have been implemented in different IBD clinics worldwide. Services such as telemedicine, telephone help-lines, telephone follow-ups, team meetings, IBD clinics offering urgent care, protocols for blood work and screening all have the potential to optimize care for patients with IBD. IBD CoEs offer hope for improving patient and population outcomes, and decreasing the overall cost of IBD in Canada.

Limitations and Future Research

One limitation of this literature review is the availability of previously published research using the selection process outlined in the methodology section. For example, only one main database was used for the search, and only free articles available in full-text were considered for the review. Furthermore, certain article exclusion criteria used were based on the author's discretion of perceived relevance of the article to the core objectives of the literature review. Another possible limitation of this review is the use of webpage articles to collect information. Though each webpage used was considered reliable based on the authors' judgement, these sources are not necessarily peer-reviewed and may be subject to bias.

There were several limitations to the studies found on integrated care models used in IBD. Limitations exist due to the design and data sources of the studies available, such as retrospective cohort studies and survey studies, which can be subject to confounding. For example, the international survey of IBD health professionals had a small sample size, and survey studies are often subject to selection bias. Also, changes and advances in medical treatment over time may confound prospective and retrospective cohort studies. Studies used in this literature review discuss limitations and account for them in their conclusions.

Another limitation of the studies on IBD care models was the lack of description of the point of reference for comparison. The integrated services being implemented were well described, but the

services in place for IBD patients before implementation were not. Similarly, many articles that discussed the effectiveness of integrated care models compared to the patient-physician model do not explicitly state what the patient-physician models included. Studies comparing different integrated care models were not found.

Another limitation of research on integrated models of care is that indirect cost reduction is underreported, and thus likely undervalued in the literature. More research is needed on the cost-effectiveness of integrated care models to support implementation, but indirect cost savings are difficult to quantify. Using outcome measures such as days lost from work or school is one way of determining indirect cost, but these have not been consistently reported in studies. This is of significance, as the greatest barrier to implementing a MDT to improve IBD care is the perceived financial burden.

Despite the improvements in IBD care over the last decade, gaps in care still exist and must be addressed (1). More research is needed to support long-term cost benefit to secure government funding to sustain these models (5). Future research should also compare different integrated care models offering different services or aspects of IBD care to determine which services are most effective for improving outcomes and decreasing costs.

Proposal for Physician Assistant Role in IBD Care

In the United States, PAs are utilized effectively in specialty care, with just over 70% of PAs working in medical specialties (24). Aside from cardiology, gastroenterology is the internal medicine subspecialty with the highest number of working PAs (24). The American Gastroenterological Association envisions mid-level providers, such as PAs and nurse practitioners, as members of integrated teams in the treatment of specific digestive diseases including IBD, and predicts that mid-level providers will provide the majority of routine care of patients with chronic gastrointestinal illnesses (25). The integration of the PA into specialty clinics is just now gaining traction in Canada and their roles may be similar to that of the nurse specialist in IBD care (25).

Based on the evidence obtained in this literature review regarding resources that optimize IBD care, incorporating a PA into the care of patients with IBD may be a cost effective approach for improving health outcomes (25). A PA is a medically educated clinician who practices within a formalized relationship with a physician, as an extension of his/her services (26,27). A PA's autonomy is negotiated with a supervising physician, and PAs can perform any task that is within the physician's scope of practice, making them well suited to fill gaps in the healthcare system.

PAs are trained under the same biomedical model as physicians, and have a solid foundation of knowledge regarding the pathophysiology, signs and symptoms, treatment, complications, and comorbidities of IBD (26). Although major and complex therapeutic decisions need the expertise of the gastroenterologist, PAs are equipped with the medical knowledge to investigate, diagnose, and treat common symptoms, comorbidities, and complications of IBD. As an example, the investigation,

diagnosis, and treatment of anemia, a common and multifactorial complication of IBD, is within a PA's scope of practice. Anemia is a major cause of decreased quality of life and increased hospital admissions, yet is reported to be frequently overlooked in the treatment of IBD (28). Thus, through the management of anemia, a PA can optimize care for patients with IBD and potentially decrease healthcare costs.

PAs could also be useful in the management of mental health issues seen in person with IBD, as they are trained in the assessment, diagnosis, and treatment of psychiatric illnesses. PAs are well equipped to recognize signs and symptoms, offer emotional support, prescribe first-line medication, and initiate referrals to the appropriate services. As psychological health appears to have a direct link to the IBD disease process, the psychological support offered by a PA has the potential to improve patient outcomes and quality of life. Other potential roles of a PA in IBD care may involve nutritional assessment and support, telephone follow-ups and urgent care lines, patient and family education, research duties, medication refills and monitoring, and bloodwork follow-ups.

Studies showed that mid-level providers have more effective, patient-centred communication styles, and more time to spend with patients compared to physicians, which may lead to better patient understanding of their condition and treatment, increased patient adherence, and improved health outcomes (25). Given the complexity and cost of IBD care, adding a PA to the IBD care team may be a logical, cost effective approach to improving access to quality care. The impact of a PA may be greatest in IBD centres that do not have all the recommended MDT members.

Limitations and Future Research

Although there is potential for the use of a PA in IBD care, several challenges for incorporating them into integrated care models exist. First, there is a lack of research to support the use of PAs in the treatment of gastrointestinal diseases, as well as lack of research on the use of PAs as part of MDTs (25). Another limitation is the lack of knowledge about PAs in the medical workforce, which may limit their use. Physicians may have a misperception of PAs as competitors rather than collaborators (25). Roles of PAs should be explicitly defined to prevent confusion and to maximize efficiency.

Future research should focus on quantifying the impact of a PA in specialty outpatient settings as part of an MDT, specifically in IBD care. Ideas for future PA research include assessing patient and physician satisfaction, disease outcomes, hospital admissions, and cost savings after incorporating a PA into an IBD clinic, or implementing a PA-run urgent IBD clinic.

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Table 1: Summary of recommendations for core and ancillary IBD MDT members.

Core Members	Ancillary Members
Gastroenterologist	heumatologist
IBD nurses	Ophthalmologist
Colorectal surgeon	Dermatologist
Psychologist or counsellor	Obstetrician
Registered dietitian	Psychiatrist
Endoscopist	Social worker
Radiologist	Physiotherapy
Pathologist	Nutritional support team
Pharmacist	

Table 2: Summary of advantages and disadvantages of specialist and integrated IBD care models.

	Advantages	Disadvantages
Specialist Model <ul style="list-style-type: none"> • Gastro-enterologist 	<ul style="list-style-type: none"> - Lower cost to the healthcare system in terms of outpatient cost - Less coordination of care required by healthcare professional 	<ul style="list-style-type: none"> - Disease-focused approach - Fragmented care - Variable across settings - Lower quality care - Higher overall cost due to inpatient treatment, surgeries, and productivity loss - Psychosocial concerns not adequately addressed - Gastroenterologist burnout
Integrated Models <ul style="list-style-type: none"> • IBD Centres • Medical Homes • Centres of Excellence 	<ul style="list-style-type: none"> - Patient-centred approach - Preventative, holistic care - Involves active monitoring - Better equipped to meet the needs of IBD patients - Improves patient outcomes and satisfaction - Lower overall direct and indirect costs - Opportunity for research and sharing best practices - Psychological health needs better addressed 	<ul style="list-style-type: none"> - Higher outpatient cost due to more resources required - More time required for interprofessional meetings, communication and collaboration