**Paediatric inflammatory bowel disease- brief update on current practice**

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***Abstract***

Paediatric inflammatory bowel disease (PIBD), consisting of Crohn’s disease, ulcerative colitis and inflammatory bowel disease unclassified, is a chronic inflammatory condition associated with significant morbidity. The incidence of PIBD is increasing and disease phenotype remains more severe than adult onset disease. Diagnosis of PIBD is often slow and requires referral to specialist services; however, the emergence of faecal calprotectin as a tool for prioritising further investigation, alongside improved use of treatments (including anti-TNF monoclonal antibody therapy) is changing diagnosis and management. Whilst significant challenges remain in the longer-term treatment of PIBD, including growth, nutrition and management of refractory disease there remains a strong research focus on understanding underlying disease pathogenesis and a move towards personalised medicine. This review describes investigations, diagnosis and management of PIBD and presents the most up to date evidence on nutritional and medical management.

***Key Words***

Paediatric; inflammatory bowel disease; Crohn’s disease; ulcerative colitis

***Clinical Practice points***

* Paediatric inflammatory bowel disease can present at any age >1 year but is most common at between 13-15 years of age
* Classical symptoms (including diarrhoea, blood in stools, weight loss, lethargy etc.) may be absent and further investigation in patients with chronic symptoms or a family history of IBD is important (consider faecal calprotectin)
* Treatments are improving (anti-TNF and new classes of monoclonal antibodies), with personalised medicine a goal for future management, however PIBD patients often have significant morbidity and a multi-disciplinary approach looking after medical management, nutrition, psychological aspects of disease and the entire family is vital.

***Background***

Paediatric inflammatory bowel disease (PIBD) is a chronic, relapsing and remitting condition characterised by intestinal inflammation leading to abdominal pain, diarrhoea, bloody stools and a range of other intestinal and extra-intestinal symptoms and complication. PIBD is comprised of Crohn’s disease (CD), ulcerative colitis (UC) and inflammatory bowel disease unclassified (IBDU) and is defined as IBD presenting during childhood (before 16 or 18 years depending on country).

Around 25% of IBD cases will present before age 18 years, offering a distinct set of issues, management challenges and complications when compared to adult-onset disease. Characteristic of paediatric-onset disease is the relatively severe presenting phenotype, the challenges of growth (including nutrition) and, often, the rapid progression of disease requiring careful immunosuppression to avoid complications and maintain remission.

Significant progress has been made in the diagnosis and management over the last 25 years. Despite the challenges to patients, families and healthcare professionals disease outcomes have improved. There is a strong emphasis evidence-based medicine and research is providing scientific and clinical progress. Despite this there is much that remains poorly understood, including the exact disease pathogenesis, predictors of disease progression/response to medication and how best to manage patients with the current medications/surgeries available to us. This review provides a brief update on PIBD including clinical features, investigations, management and complications including discussion of disease epidemiology, the multi-disciplinary approach and future treatments for children with IBD.

***Disease incidence, prevalence, age of onset***

The incidence of PIBD is increasing. Over the last 20 years multiple studies from around the world have detailed the rise in the numbers of children being diagnosed. The main driver behind this increase appears to be higher numbers of CD cases, although UC has also increased during this period. Since 1999 the incidence of PIBD has increased by approximately 50% within the United Kingdom, with the incidence now standing at 9.37/100,000/year, similar to that seen in Canada (9.68/100,000/year), which has historically had amongst the highest IBD incidence worldwide. When considering the highest worldwide incidence of IBD in children a study from Finland in 2017 has reported incidence at up to 23/100,000/year.

The median age of disease onset is between 12-14 years, but some children will present much earlier. Very-early onset disease (<6 years) is rare and is a trigger for further investigation for a monogenic cause. Early-onset (6-10 years) and paediatric onset (10-17 years) IBD are less likely to represent single gene defects but presents their own distinct challenges in diagnosis and management, particularly related to puberty and growth.

**Clinical features and diagnosis**

Data from the last 20 years has consistently reported abdominal pain (>85%), diarrhoea (>75%) and weight loss (>55%) to be the most common presenting features of CD, whilst abdominal pain (>85%), bleeding per rectum (>90%) and diarrhoea (>90%) were the most common in UC. The paediatric IBD phenotype is characterised by extensive intestinal (endoscopic and histological) disease alongside rapid disease progression. The absence of all features should not preclude further investigation and patients may present with all, some or none of the common symptoms (table 1). Family history of IBD is a common feature in childhood (15-25%) and should trigger a lower threshold for referral and investigation. Diagnosis of another gastrointestinal disease such as coeliac disease or functional abdominal pain does not preclude a diagnosis of IBD.

It is important to consider other presentations of IBD in children including extraintestinal manifestations (including arthritis/arthopathy, extra-intestinal Crohn’s- genital/isolated orofacial, dermatological- erythema nodosum/pyoderma gangrenosum and eye disease- uveitis), growth failure (up to 20% of Crohn’s disease cases) and isolated perianal disease in Crohn’s.

The Porto criteria, and subsequently the modified Porto criteria, have been the diagnostic standard for PIBD since 2005. These publications detail the conditions that must be met for diagnosis to be made, including specific histological features.

**Disease pathogenesis**

The exact disease pathogenesis in PIBD is unclear. Compared to adult-onset disease there is a larger genetic component and studies have implicated over 200 genes to date, with other rare (individual) variation also playing a key role. Genes implicated in IBD pathogenesis are related to innate or adaptive immunity (including cell recruitment, regulation and immune tolerance, bacterial recognition and response); epithelial barrier function (such as tight junctions); intracellular downstream signalling; cellular death (apoptotic, autophagy) and antigen presentation (including dendritic cell activation. The best known IBD risk genes are *NOD2* and *IL10* (plus *IL10* receptors). Epigenetic modification of genes has a probable role in disease pathogenesis in some cases, and provide a way for the environment to interact with the genome. Additionally non-coding regulatory genomic regions are likely to contain areas of interest not yet discovered.

The role of the microbiome is of great interest, and studies have reported an altered gut flora (dysbiosis) at diagnosis in IBD (compared to controls). It seems to be unlikely that single bacterial species are responsible for disease, rather the entire community, including the functional role of the microbiome, play a more important role in disease pathogenesis. The direction of causality for the dysbiosis in IBD has not yet been established and further work is required on the interaction of the host (genetic-susceptibility) with environmental factors (such as the intestinal microbiome and nutrition).

The role of nutrition, including diet and overall nutritional status (at diagnosis and during recovery), may play a key role in shaping the intestinal microbiome seen in disease and gene-nutrition interaction has recently been discussed as having a role in cancer pathogenesis, with a potential role in IBD. The interaction between genes, the immune system and the microbial environment is important in the development and relapse of inflammation seen in IBD.

Monogenic IBD

A rare subset of around 50 single-gene conditions may present as IBD, most often in very early childhood. These monogenic conditions should be considered in those presenting with atypical features (such as frequent infections, < age of 5 years, skin manifestations etc.) and patients refractory to conventional treatment (even when older). These patients should be considered for further investigation including genetic testing with next-generation sequencing panels. Identification of these high-risk patients is important as many require need specific surveillance (for malignancy, infection etc.) and some may require specific treatments (such as bone marrow transplant).

**Investigations**

For general practitioners and general paediatricians, the vast majority of children presenting with diarrhoea or abdominal pain will not have IBD (figure 1). There is often a significant diagnostic delay for children with IBD, and improving diagnostic speed is important. Initial screening for children clinically suspected to have IBD should include the following investigations (table 2).

* Inflammatory markers (C-reactive protein, Erythrocyte sedimentation rate)
* Full blood count
* Renal function, Liver function (including albumin, transaminases)
* Faecal calprotectin
* Stool microscopy and culture or Stool pathogen PCR. C diff toxin

An abdominal ultrasound may be considered, a normal ultrasound does not exclude IBD and radiology should only be used in areas with suitable expertise to perform and interpret the results.

Faecal calprotectin has an emerging role for screening and decision making for progression to diagnostic endoscopy. The diagnostic accuracy of faecal calprotectin in older children, as assessed by systematic review and meta-analysis, is highly sensitive (0.978) but not specific (0.682). This enables the high negative predictive value of a normal faecal calprotectin (levels <50 micrograms/gm) to be utilised in risk stratification and screening of children with suspected IBD, excluding the need for endoscopy in almost all cases. A normal faecal calprotectin does not completely exclude IBD but in the context of normal bloods is very reassuring. The role of faecal calprotectin in younger patients (<5 years of age) is less certain and may be raised in normal children. Faecal calprotectin is also emerging (in conjunction with clinical and serological markers) as a tests for monitoring disease activity.

**Diagnostic testing**

PIBD diagnosis (based on the Porto criteria) requires all patients to undergo upper and lower gastrointestinal endoscopy with histological examination (to include oesophagus, stomach, duodenum, terminal ileum, colonic series and rectum). This should be under the care and guidance of a specialist paediatric gastroenterologist (figure 1). According to ECCO/ESPGHAN recommendations small bowel imaging (MRI, contrast study or ultrasound) is recommended in all suspected cases but may be deferred in ulcerative colitis depending on the clinical presentation. CT imaging is very rarely indicated as part of the diagnostic work up.

The diagnosis of IBD must be confirmed histologically by a paediatric histopathologist, in discussion with the clinical team. Features of disease include presence of inflammatory changes in the mucosa (acute or chronic gastritis/duodenitis/oesophagitis, cryptitis, crypt abscesses, and granulomas- in Crohn’s disease only), architectural abnormalities (crypt distortion, crypt branching, and crypt atrophy), and epithelial abnormalities such as mucin depletion and metaplasia, alongside surface irregularities (epithelial active/regenerative changes). Differentiation of Crohn’s disease and ulcerative colitis may sometimes be difficult and may require further imaging. A diagnosis of inflammatory bowel disease unclassified (IBDU), inflammatory bowel disease without specific features of Crohn’s disease or ulcerative colitis, should be made based on published guidance.

Grouping of disease by site of inflammation is through the Paris classification and is based on endoscopic and radiological disease extent. Due to more extensive histological disease (compared to endoscopic) modification of the classification to incorporate this has been discussed by several groups. There is an emerging role for capsule endoscopy in paediatric IBD for assessment of small bowel disease and IBDU.

Further specialist testing, including additional serology may be considered but tests are often not helpful in differentiation of disease subtype. Anti-Saccharomyces cerevisiae antibodies (ASCA) are common in Crohn’s disease (50-70%, perinuclear anti-neutrophil cytoplasmic antibodies (pANCA) are more common in ulcerative colitis (70%) but may exist in up to half of Crohn’s disease patients. Genetic panels (including next-generation sequencing), centred on the 52 genes described in monogenic IBD should be considered for patients presenting with infantile (<2 years) or very early-onset disease (<6 years), or for those with atypical features.

**Differential diagnoses**

Children presenting with features of IBD such as abdominal pain, diarrhoea and blood in stools may not have IBD. Many common conditions seen in the general paediatric clinic such as functional gastrointestinal disorders (abdominal pain, abdominal migraine etc), toddler’s diarrhoea, constipation and coeliac disease may be confused with IBD. Conversely it is important that the differential diagnosis of IBD is not excluded due to young age, atypical symptoms or co-existing pathology (such as neurodisability, coeliac disease etc.).

Excluding gastroenteritis as a cause for acute or chronic symptoms is very important as this is often easily treatable or in most cases requires no specific treatment.

There should be a low threshold for basic investigations (bloods, faecal calprotectin) in children who have chronic gut symptoms, but it is important to remember that red flag symptoms should not be ignored and urgent referral to tertiary care should not be delayed.

**Management strategies**

*Principles of treatment*

The disease runs a chronic relapsing course. Safe and quick induction of remission, optimisation of nutrition and maintenance of remission are priorities.

*Multi-disciplinary care*

Specialist nurses, dietitians, school teachers and psychological services should all be involved in the care of children with IBD. Impacting on long-term management through early intervention and involvement of professionals is important (maintaining good relationships, compliance with medication, family engagement and nutritional optimisation).

*Nutrition and Growth*

Nutritional care of patients with both newly diagnosed and established IBD is very important. Patients often present with poor nutritional status, and this may be related to poor nutrition absorption and/or poor intake (often related to symptom exacerbation), often seen in both Crohn’s disease and/or ulcerative colitis. Personalised management of diet and macro/micronutrient supplementation is important to avoid patients nutritionally impaired or overweight which may impact on the efficacy of medical treatment. Nutritional care should be considered in the acute phase, during recovery and subsequently in catch-up growth. Some Crohn’s disease patients will require ongoing maintenance nutritional supplementation to maintain growth, although the role of nutritional supplements in the prevention of relapse is controversial.

During induction therapy (see below for EEN) there should be careful consideration and assessment of nutritional status by a dietitian with an interest in IBD. This assessment should include:

* Anthropometric measures (weight, height, BMI etc.)
* Bloods for nutritional status
* Assessment of refeeding risk
* Calculation of protein and energy requirements
* Consideration of supplementation for children who are underweight for height in order to optimise the response to treatment, wellbeing and growth.

A repeat full nutritional assessment should be undertaken again at the end of the induction period, with reassessment at clinic appointment to assess the need for ongoing nutritional support. Ensuring paediatric IBD patients grow well and successfully go through puberty is an important priority of management and should be guided by good disease control, dietetic input and good nutrition.

The impact of over-nutrition should not be ignored and personalised nutritional advice is required to avoid patients becoming overweight or obese.

*Transition*

IBD is a lifelong condition requiring early planning for transition to adult care, general and bespoke services (such as the ready, steady, go program), alongside use of charity materials can be employed to help young people leave paediatric care. Use of specific transition clinics with adult and paediatric gastroenterologists in both specialist centres and district hospitals should be in place to help facilitate transition.

Specific treatments (table 3)

The treatment of paediatric IBD is discussed in multiple national and international guidelines. All treatments have potential side effects (except perhaps exclusive enteral nutrition) and require assessment of the risks alongside discussion with the child/young person and family prior to use.

*Induction of remission*

Inducing remission (at diagnosis or at relapse) requires a treatment choice based on disease severity, location, additional features (perianal disease etc.) and discussion with the child and family. ECCO/ESPGHAN guidelines on treatment of IBD (Crohn’s disease and ulcerative colitis) have been published within the last 6 years and provide a framework and some exact guidance for managing disease.

*Exclusive enteral nutrition (EEN)*

EEN can be divided into polymeric feeds (such as Modulen IBD ®, Nestle) or elemental feeds (such as E028®, Nutricia) and is taken in the form of a liquid drink for 6-8 weeks with complete exclusion of all other foods and drinks (typically apart from water, some flavourings and some sugar free sweets). EEN is the first line treatment in non-complicated paediatric Crohn’s disease, having a response rate of up to 80%,with appropriate case selection. There is no role for EEN in treatment of ulcerative colitis . There is currently no role for partial enteral nutrition as an induction agent for Crohn’s disease, although there is ongoing research on the role of exclusion diets in disease management.

No response to EEN within 2 weeks should trigger a switch to an alternative therapy.

There is significant evidence of efficacy from multiple studies in paediatric Crohn’s disease, summarised in a recent review and meta-analysis. Additionally EEN has the benefit of providing a complete nutrition feed to potentially malnourished children with Crohn’s disease. Motivation (patient, family, and healthcare professionals) is key and ongoing support is needed to maintain compliance. Food reintroduction after a period of enteral nutrition is staged and begins with low-residue foods, new food groups being added every few days over a period of 2–3 weeks. Enteral nutrition is weaned slowly during this period in order to ensure nutritional requirements are met.

*Corticosteroids*

In moderate/severe Crohn’s disease the second line agent is oral steroids (consider intravenous steroids in severe pan-enteric or severe perianal disease).

Oral steroids are recommended for induction of remission in ulcerative colitis presenting with moderate/severe disease (again consider intravenous steroids in severe disease), they have up to a 90% response rate and may be prescribed in combination with a 5-amino salicylic acid (5-ASA) preparation (mesalazine, asacol, sulphasalazine etc.) to induce remission. 5-ASA preparations are best avoided early in severe disease as can make symptoms (diarrhoea) worse. The dose of prednisolone should be 1mg/kg, up to 40mg, once daily for 2-4 weeks with the dose weaned over the next 10-12 weeks. Steroids should not be used for maintenance therapy and steroid dependence (disease requiring multiple steroid courses to maintain remission or unable to wean off steroids) should trigger escalation of maintenance therapy. Some disease will be refractory to steroid therapy and this should lead to escalation of immunosuppression with monoclonal therapy.

Oral budesonide (which has a high first-pass metabolism and therefore less toxicity) has been used with good effect in ileocaecal (right-sided) disease and may avoid some of the side effects of prednisolone.

Monitoring of patients with multiple steroid courses is important. DEXA scanning of bone mineral density is useful although needs to be interpreted in the context of height, weight, and pubertal status. Calcium and vitamin D supplements should be given to children at risk of deficiency, particularly during the adolescent growth spurt.

*Other induction agents*

5-ASA preparations can be used as first line induction therapy for mild/moderate ulcerative colitis only (not in Crohn’s disease). Most children will require an oral preparation and it is not typical for a topical agent to be used in children at disease onset because of tolerance and disease extent although local therapy is effective and well tolerated in a proportion of children and young people with ongoing disease. Antibiotics are recommended in the treatment of perianal fistulating Crohn’s disease as an additional therapy.

*Induction in refractory disease- Anti-TNF therapy*

In some cases early escalation to anti-TNF monoclonal therapy (infliximab, adalimumab) will be required. These include disease not responding to steroid induction, penetrating/fistulating disease and severe perianal disease. Anti-TNF medications effectively induce remission in Crohn’s disease (up to 88% response rate) and in ulcerative colitis (up to 73% response rate) resistant to initial therapy. In some centres there is a ‘top-down’ therapy approach for all patients regardless of disease severity, which began in adult IBD. This is not yet commonly used in paediatric-onset disease and the long term impact (good and bad) of the ‘top-down’ approach is not yet known. This is not recommended in the UK other than in the cases outlined above.

*Maintenance therapy*

The aim of maintenance therapy is to prevent relapse of active disease (maintain remission), safely and effectively, with the ultimate goal to achieve mucosal healing (or in Crohn’s disease, transmural healing) of the inflamed gut.

*5-ASA*

Maintenance therapy with 5-ASA is effective in mild/moderate paediatric ulcerative colitis and should be continued long term for the cancer protective effect. In Crohn’s disease there is very little evidence to suggest that they are useful in anything but mild colitis (rare in paediatric disease).

*Thiopurines*

Thiopurines (azathioprine and 6-mercaptopurine) are used for maintaining remission in both Crohn’s disease and ulcerative colitis with sustained remission rates of up to 60-90%. Thiopurines can/should be combined with other agents (such as 5-ASA and monoclonals) to maintain remission (and prevent loss of response in monoclonals). The typical dose is 2-2.5mg/kg for azathioprine and 1-1.5mg/kg for 6-mercaptopurine, but this can be increased based on drug metabolite blood levels and response. Regular monitoring of full blood count and liver function is necessary (more frequent during initial use) and it may take 8-14 weeks for the drugs to work.

There is some concern over the safety of thiopurine use, with some studies describing an increased long term malignancy risk (lymphoproliferative disorders, specifically hepatosplenic T-cell lymphoma), and some concerns over EBV infection in naïve patients. It is important to remember that the absolute risk of lymphoproliferative disorders remains small whilst the risk of malignancy with uncontrolled inflammation in IBD is increased.

*Anti-TNF (monoclonal antibody) therapy*

Use of monoclonal therapy in paediatric IBD (initially Crohn’s and then ulcerative colitis), especially in previously steroid refractory disease has revolutionised care, providing steroid-sparing and highly effective therapy for the last 10-15 years leading to prolonged remission, improved growth and mucosal healing. Anti-TNF therapy is recommended in chronic luminal Crohn’s disease not responding to immunomodulatory therapy (thiopurine etc.). Response rates for infliximab are typically good, with even previously refractory Crohn’s disease patients having up to 60% remission rates, although there is some loss of effect overtime (with some patients producing anti-TNF antibodies resulting in lower levels of active drug).

Anti-TNF therapy is recommended for steroid-dependant ulcerative colitis or disease refractory to immunomodulation. Remission rates are slightly less than in Crohn’s disease (38-64%) and long-term use is associated with antibody formation and loss of efficacy.

The dose of infliximab (given as an intravenous infusion) is 5mg/kg at 0, 2 and 6 weeks, followed by a maintenance dose every 8 weeks. Dosage can increase to 10mg/kg and dosing interval reduced to 4 weeks if required (guided by trough levels and presence or absence of antibodies to the medication). Adalimumab (given as a subcutaneous injection) induction therapy is 2.4 mg/kg (maximum 160 mg) at week 0, 1.2 mg/kg (maximum 80 mg) at week 2, followed by 0.6 mg/kg (maximum of 40 mg) every 2 weeks. Dosing can be increased to weekly if required.

In paediatrics, the recommendation is to use monoclonals as a combination therapy with an immunomodulator (thiopurine) rather than monotherapy. This reduces loss of response (decrease in immunogenicity and antibody production) and aids with long-term, stable, remission.

As with thiopurine use there is some concern that long-term anti-TNF therapy increases the risk of malignancy, specifically lymphoproliferative disorders. Whilst some recent data appears to contradict this any absolute risk is very small and must been seen in context.

*Methotrexate*

Methotrexate is a useful treatment alternative and can be given orally or via subcutaneous injection at 15mg/m2. It is used in children who are intolerant to or fail to respond to thiopurine derivatives. Oral administration of folate is essential. There are multiple retrospective paediatric cohort studies suggesting that MTX is effective in 50 to 80% of children who had failed to respond or had been intolerant to a thiopurine.

*Other treatment options*

In refractory disease several other agents such as tacrolimus and thalidomide may be considered. There is little safety data in paediatric patients for many additional immunomodulators and risk/benefit must been discussed with the child and family.

*Further management points*

At diagnosis (and if appropriate during follow-up) additional testing centred on future medication use and nutritional screening should be considered.

* Azathioprine- Thiopurine methyltransferase (TPMT) enzyme activity or genotype
* Anti-TNF monoclonals- Quantiferon to assess for exposure to/latent tuberculosis, hepatitis B serology in at risk patients and establishment of varicella status is important to guide management (including consideration of additional vaccinations)
* Epstein-Barr virus (EBV) serology- small risk of lymphoproliferative disease in naïve patients with some treatments
* Nutritional status- Bloods including iron indices, calcium, vitamin D, phosphate and magnesium should be considered in all patients, with replacement where indicated.. Anthropometric measures e.g. weight, height, BMI and body composition measures (skinfold thickness or mid upper arm circumference).

*Surgery*

The role of surgery in IBD appears to be decreasing (or is at least delayed), however, acute complications, (perianal) fistulae, strictures and disease refractory to medical therapy continue to require expert surgical intervention. Historical data appears to indicate that around 10% of ulcerative colitis patients will require colectomy during childhood, although with increasing monoclonal use this may also decrease. In Crohn’s disease surgery will be required for around 25% of patients during childhood, although this is likely to be reduce given increased options for medical management. In Crohn’s disease the most common procedures are hemicolectomy, perianal procedures (seton placement etc.), stoma formation and small bowel resections. Complications are common (20-40%) in IBD surgery and are reduced by planned elective, rather than emergency surgery and optimising nutrition and medical management prior to surgical intervention. Outcomes are variable but quality of life is often improved following surgery enabling a period of sustained remission and catch up growth if there is a deficit.

**Clinical nurse specialists (CNS) and the multi-disciplinary team (MDT)**

National and international recommendations for management of paediatric IBD discuss the key role that CNS and the wider MDT (including dietitians, psychologists, teachers, paediatric surgeons etc.) should play in the holistic management of disease. Access to advice and a link to clinicians, through IBD nurse specialists, should provide an important element to management. The psychological impact of IBD should not be underestimated, especially in teenagers, with low mood and anxiety a common feature. There with the need to maintain good school attendance, medication compliance and relationships with healthcare professionals in order to produce the best outcomes for patients, engagement with families and young people through charities (such as CiCRA, Crohn’s and Colitis UK) and local support groups is vital.

**New and future treatments**

Use of new therapy in paediatrics lags behind adults, due to safety concerns and drug trial evidence. Newer monoclonal therapies such as vedolizumab (an α4β7 integrin antibody, blocking immune cell migration into the intestine) has now shown efficacy (40-100% efficacy) in children for both ulcerative colitis and Crohn’s disease. Ustekinumab (anti-IL12/IL23) has previously been used in children with psoriasis but has started to demonstrate some utility in adult-onset Crohn’s disease. These medications are not yet routinely used in children but safety data is beginning to emerge and use is likely to increase over the next 5 years.

A newer potential class of medications, ‘small-molecule drugs’ have been under development and have targets such as JAK (Tofacitinib), S1P (Ozanimod) and anti-inflammatory pathways (Mongersen, Laquinimod), these would potentially provide additional oral therapeutic options for future treatment of IBD.

**Current priorities and research**

Increased disease incidence results in an increase in disease prevalence. The impact on services is clear, with these children being a large group of complex, chronic patients requiring personalised therapy and MDT management. Children diagnosed with PIBD will be spending an average of 4 years in paediatric services prior to transition, with early onset disease spending much longer in paediatric care. A current priority is continuing to provide the high standard of holistic care to patients despite the increase in patient numbers.

Research into the causes of IBD in children has increased over the last 10 years, focusing on the use of next-generation sequencing for genetic, transcriptomic and microbiome aspects of disease pathogenesis. Increased understanding of disease aetiology through big data has moved the understanding of disease classification and pathogenesis further forward, although there is still work to be done. Personalised therapy, through multi-omic and clinical data, is moving closer to reality, the use of machine learning (computational analysis allowing inclusion of multiple data types) to assist with classification and to guide treatment is not yet routine but may yield the most clinically useful progress in the next 5-10 years.

**Conclusions**

Incidence of paediatric-onset IBD is increasing resulting in more children presenting to general practitioners and general paediatricians, and more children under paediatric gastroenterology services. Early referral to tertiary care must be centred on correct interpretation of symptoms, prioritisation of investigations and understanding of results. Rapid diagnosis, alongside prompt, effective treatment (including utilising newer and current therapies) and MDT management is vital to provide good outcomes for this increasing group of patients.

**Tables and Figures**

Table 1- Clinical features and red flags

Table 2- Investigations

Table 3- Treatments

Figure 1- Referral flow chart

**Patient Support groups**

Children with Crohn’s and Colitis (Crohn’s in Childhood Research Association) <http://www.cicra.org/>

Crohn’s and Colitis UK <https://www.crohnsandcolitis.org.uk/>

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**Further reading**

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