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Pediatric IBD: Making the Diagnosis

DEVELOPED BY THE CROHN'S & COLITIS FOUNDATION'S NURSE & ADVANCED PRACTICE COMMITTEE

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Instructions

To begin, please enter “Slide Show mode” to enable full interactivity of case and questions.

When you see words or phrases that are underlined, click on the underlined word and this will take you to the next screen.

To continue the presentation, make sure you click back or next in the bottom right corner.

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OBJECTIVES

By the end of this presentation, the participant will be able to:

- Define inflammatory bowel disease
  - Identify types of inflammatory bowel disease
  - Describe current theories of the cause of inflammatory bowel disease
  - Identify classifications of inflammatory bowel disease

- Describe the most common clinical presentation of inflammatory bowel disease in the pediatric population

- Identify recommendations for evaluation for a pediatric patient suspected to have inflammatory bowel disease

We will use a case study to review the evaluation for a pediatric patient suspected to have inflammatory bowel disease.

What Is Inflammatory Bowel Disease?

Inflammatory bowel disease (IBD) is a term used to describe a set of chronic immune mediated disorders that primarily affect the gastrointestinal tract.

IBD is characterized by chronic inflammation.

IBD often can have periods of quiescence and relapse. It can be treated; but to date, not cured.

Crohn's Disease and Ulcerative Colitis are the most common subtypes of IBD.

Crohn's disease (CD)

Ulcerative colitis (UC)

Other Subtypes of IBD include:

Indeterminate colitis (IBDU)

Very early onset IBD (VEO-IBD)

(Sherlock & Benchimol, 2017; Higuchi & Bousvaros, 2023; Peppercorn & Cheifetz, 2023)

PREVALENCE OF IBD: General Information

The incidence of inflammatory bowel disease is increasing globally.

There are approximately 6.8 million people worldwide with IBD.

Approximately 70,000 new cases are diagnosed each year in the United States.

There may be small differences in occurrence between males and females.

IBD can affect those from any ethnic background.

More prevalent in Jewish population than non-Jewish population. Less common in Black and Hispanic population when compared to Caucasians.

Some of these differences may be influenced by environmental and lifestyle factors as well as genetic factors.

(Peppercorn & Cheifetz, 2023)

PREVALENCE OF IBD: Pediatric Considerations

Approximately 5–10% of patients develop their IBD during childhood or adolescence.

15% <6 years of age; with 6% < 3 years of age

48% age 6 – 12 years

37% age 13 – 17 years

(Higuchi & Bousvaros, 2023).

The incidence of pediatric IBD appears to be increasing. (Higuchi & Bousvaros, 2023).

A recent Canadian study reports a 7.2% annual increase in children diagnosed before the age of 5. (Benchimol et al., 2017).

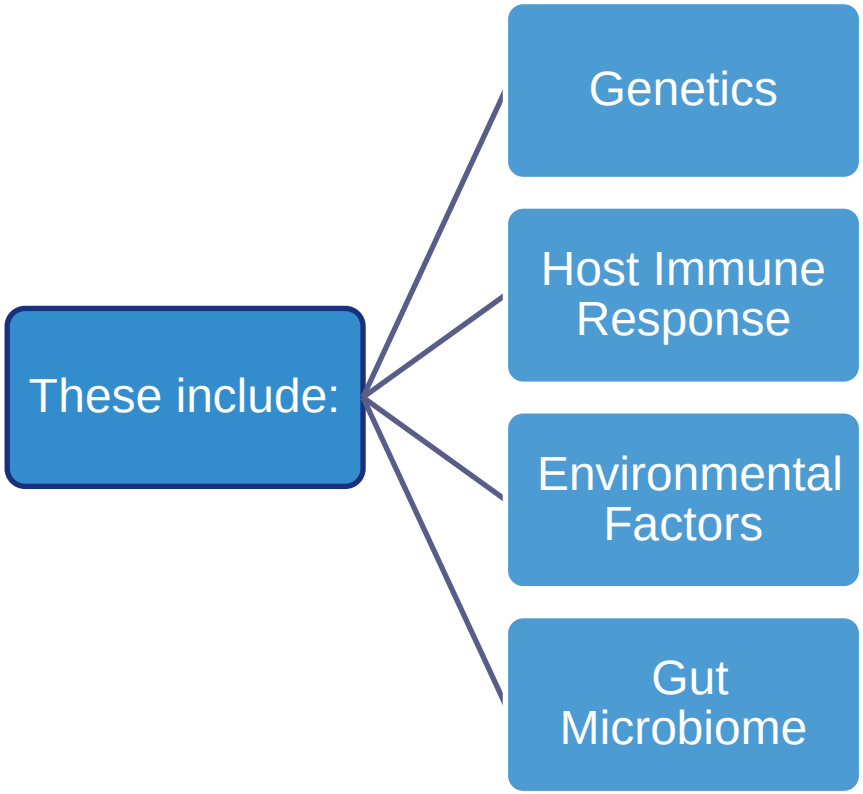
There is the suggestion of a stronger genetic association for IBD presenting in childhood, as children diagnosed with IBD are more likely to have a family history of IBD. (Higuchi & Bousvaros, 2023).

According to Higuchi & Bousvarous (2023),

> "Children with IBD are more likely to present with extensive intestinal involvement and have rapid clinical progression."(Higuchi & Bousvaros, 2023).

WHAT CAUSES IBD?

The exact cause of IBD is unknown. There are multiple factors that may contribute to developing IBD.



Causes of IBD

(Shapiro et al., 2016)

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EVALUATION OF PEDIATRIC IBD

The European Society of Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) recommends that evaluation for IBD be considered in pediatric patients who present with:

Symptoms	Duration of Symptoms
Abdominal pain	≥4 weeks duration
Diarrhea	
Blood in stools	AND/OR
Weight loss	≥2 recurrent episodes in 6 months

Consider evaluation for those with poor growth, pubertal delay, malnutrition, lethargy, anorexia, anemia, and extraintestinal manifestations.

(IBD Working Group ESPGHAN, 2005)

EVALUATION OF PEDIATRIC IBD: ESPGHAN Guidelines

The following are recommended when diagnosing IBD:

Physical examination

Skin abnormalities

Pallor

Extraintestinal manifestations

Abdominal examination for tenderness or mass
Perianal abnormalities

Assessment of height, weight, growth velocity, pubertal development

Screening labs

CBC

Serum urea and creatinine

Serum albumin

Transaminases

GGT

Use of at least 2 inflammatory markers (ESR and CRP)
Consideration for celiac testing
Stool studies to rule out infectious causes
Fecal calprotectin/lactoferrin

Consider serologic markers (ASCA and pAnca antibodies)

Additional testing may be required due to suspected extraintestinal manifestations (i.e., pancreatitis, sclerosing cholangitis, arthritis, etc.)

Consider immunologic evaluation for those with VEOIBD

Imaging studies

Small bowel imaging to determine extent of disease using new modalities to decrease radiation exposure:

Use of advanced diagnostic imaging

- U.S. is useful modality for imaging (particularly with CD
- MR enterography is the preferred imaging for SB
- Video capsule as an alternative to MR enterography

Endoscopic evaluation

Endoscopy

Colonoscopy

Original guidelines were developed (2005). Revisions were made (2014) due to advances in diagnostic imaging, fecal biomarkers, and serological testing.

(IBD Working Group ESPGHAN, 2005; Levine et al., 2014)

EVALUATION OF PEDIATRIC IBD: ImproveCareNow

In 2016, ImproveCareNow created **Model Care Guidelines t**o ensure consistent and reliable care for children and adolescents with IBD. Recent updates (2022) recommend:

- Initial screening laboratory studies
  - CBC, ESR, CRP, and serum albumin
- Esophagogastroduodenoscopy with biopsy and colonoscopy with biopsy
- Imaging of the small intestine
  - Upper GI and small bowel series*; or
  - CT scan with oral and IV contrast*; or
  - MR enterography; or
  - Capsule endoscopy

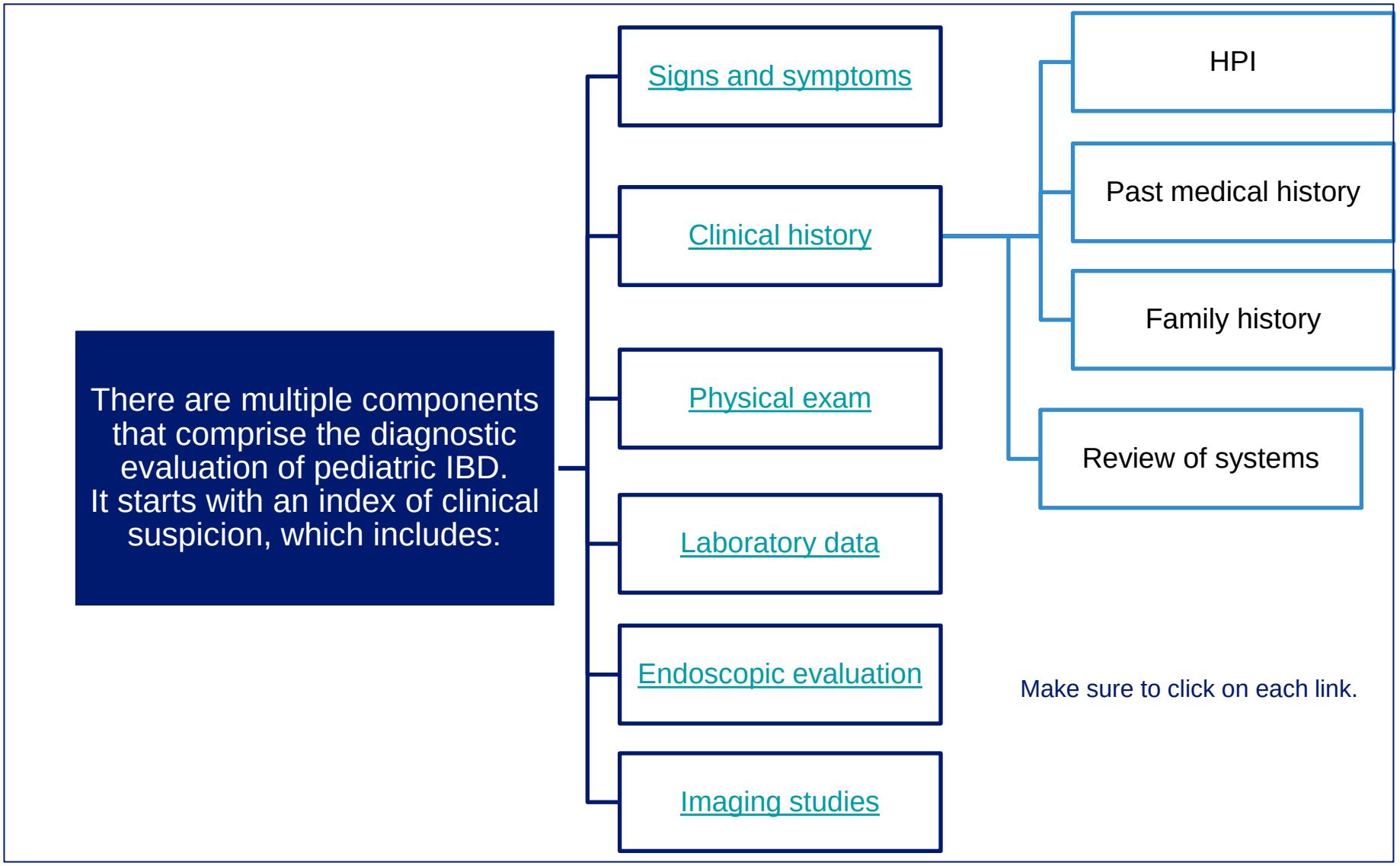
  *Minimize or avoid exposure to ionizing radiation.
- Consider fecal calprotectin to establish a baseline level
- Consider other studies as indicated, including stool samples to rule out enteric infection (ImproveCareNow, 2022)

In the following slides, we will discuss the current recommendations for initial evaluation in the pediatric patient presenting with concerns for inflammatory bowel disease.

MAKING THE DIAGNOSIS

In the following slides, we will walk you through the process of evaluating a pediatric patient with concerns for the diagnosis of IBD.

MAKING THE DIAGNOSIS



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Case Study

G.F. is an 8-year-old female who was referred to your clinic with a 6-month history of:

- Abdominal pain
- Change in stool pattern from baseline
- Intermittent hematochezia
- Weight loss
- Pyoderma gangrenosum

Screening laboratory studies performed by her primary care provider revealed:

- Hypoalbuminemia
- Anemia
- Occult positive stool

Her presenting signs and symptoms have you consider a diagnosis of inflammatory bowel disease.

What is your next step?

Get A More Detailed Clinical History

HPI
Past medical history
Family history
Review of systems

Review of HPI, PMH, FH, and ROS continues to raise concerns for IBD.

What is your next step?

Conduct a Physical Examination

Temperature	36.4 C (97.6 F)
Height	128.2 cm 8th %tile z score – 1.2
Weight	23.5 kg 2nd %tile z score – 2.08
BMI	14.33 kg/m^2
BSA	0.91m^2

Physical Exam

Constitutional:	She is active. Normal appearance. She is well developed, but thin.
HENT:	Normocephalic. No congestion or rhinorrhea. No oral lesions.
Cardiovascular:	Normal rate and regular rhythm. Normal heart sounds: No murmur heard.
Pulmonary:	Pulmonary effort is normal. No respiratory distress. Normal breath sounds. No wheezing.
Abdominal:	Abdomen is flat and soft. Bowel sounds are normal. There is no distension. Mild tenderness and **palpable stool** at LLQ. No rebound or guarding.
Perianal examination:	Non-erythematous and non-inflamed **perianal skin tag** at 6 o'clock.
Musculoskeletal:	Normal range of motion.
Skin:	Skin is warm and dry. Pale. No jaundice. No petechiae or rash. **Erythematous and tender 1 by 2 cm irregular-shaped lesion on right lower leg with a deep ulcerative defect. Mild edema. No purulent drainage.**
Neurological:	She is alert and interactive.
Psychiatric:	Mood normal. Behavior normal.

Do you have red flags/cause for concern based on physical exam and workup?

- No concern
- Only minimal concern
- Significant concern
- Major concern indicating need for admission

What is your next step?

Create a Differential Diagnosis

Consideration and exclusion of other illnesses with similar presentation

- Infection
- Ulcerative colitis
- Crohn's disease
- Celiac disease
- Immune deficiency
- Functional abdominal pain
- Irritable bowel syndrome

What is your next step?

Diagnostic Evaluation

What would be ordered for workup?

- Allergy testing
- Blood work
- Capsule endoscopy
- CT enterography or MR enterography
- pH probe
- Upper endoscopy and colonoscopy
- Stool studies
- Upper GI and/or barium enema

What is your next step?

Review of results of workup

Laboratory Results

Component	Latest Ref Rng & Units	
WBC	4.5 - 13.5 K/mcL	12.2
RBC	4.00 - 5.20 M/mcL	4.30
HGB	11.5 - 15.5 gm/dL	10.6 (L)
HCT	35.0 - 45.0 %	32.2 (L)
MCV LEVEL	77.0 - 95.0 fL	74.8 (L)
MCH LEVEL	25.0 - 33.0 pg	24.5 (L)
MCHC LEVEL	31.0 - 37.0 gm/dL	32.8
RDW	<=14.6 %	14.9 (H)
PLATELET	135 - 466 K/mcL	688 (H)

Component	Latest Ref Rng & Units	
SED RATE	0 - 10 mm/hr	68 (H)
CRP	<=0.30 mg/dL	7.31 (H)

Component	Latest Ref Rng & Units	
SODIUM LEVEL	136 - 145 mmol/L	138
POTASSIUM LEVEL	3.3 - 4.7 mmol/L	3.3
CHLORIDE LEVEL	100 - 112 mmol/L	102
CO2 LEVEL	17 - 31 mmol/L	27
ANION GAP	4 - 15 mmol/L	9
BUN	8 - 18 mg/dL	6 (L)
CREATININE LEVEL	0.32 - 0.64 mg/dL	0.33
B/C RATIO	<=25	18
GLUCOSE LEVEL	54 - 117 mg/dL	101
CALCIUM	8.5 - 10.1 mg/dL	8.1 (L)
BILIRUBIN TOTAL	0.1 - 1.1 mg/dL	0.1
BILI DIRECT	0.0 - 0.3 mg/dL	<0.1
TOTAL PROTEIN LEVEL	6.4 - 8.3 gm/dL	7.3
ALBUMIN LEVEL	3.5 - 4.7 gm/dL	2.8 (L)
GLOBULIN	gm/dL	4.5
A/G RATIO	1 - 2	1
AST	10 - 36 unit/L	13
ALT	12 - 49 unit/L	10 (L)
ALK PHOS	85 - 370 unit/L	99
GGT	6 - 26 unit/L	5 (L)
PHOSPHORUS (PHOSPHATE)	2.8 - 6.5 mg/dL	3.8

Stool testing negative for infections (culture & clostridium difficile) and parasites (ova & parasite screening for giardia and cryptosporidium). Stool Calprotectin 325 (normal <20)

Interpretation of results

CBC with hypochromic, microcytic anemia, and elevated platelets supporting inflammation

Inflammatory markers: ESR (sed rate) elevated at 68, CRP elevated at 7.31

Chemistry profile with normal liver enzymes and hypoalbuminemia (albumin 2.8)

Negative stool studies for infection, positive stool inflammatory markers

Based on her presenting symptoms, clinical history, physical findings, and laboratory studies, there continues to be concern for IBD.

She was recommended to undergo endoscopic evaluation.

Endoscopic evaluation

VISUAL FINDINGS

Endoscopy

- Normal esophagus. Small superficial gastric ulcer found in the gastric antrum. Normal duodenum.

Colonoscopy

- Diffuse and patchy moderate inflammation characterized by congestion, such as edema, erythema, friability, and loss of vascularity along with aphthous ulceration, was found in the rectum, sigmoid colon, descending colon, splenic flexure, and proximal transverse colon. The right colon and terminal ileum appeared grossly normal.

HISTOLOGIC FINDINGS

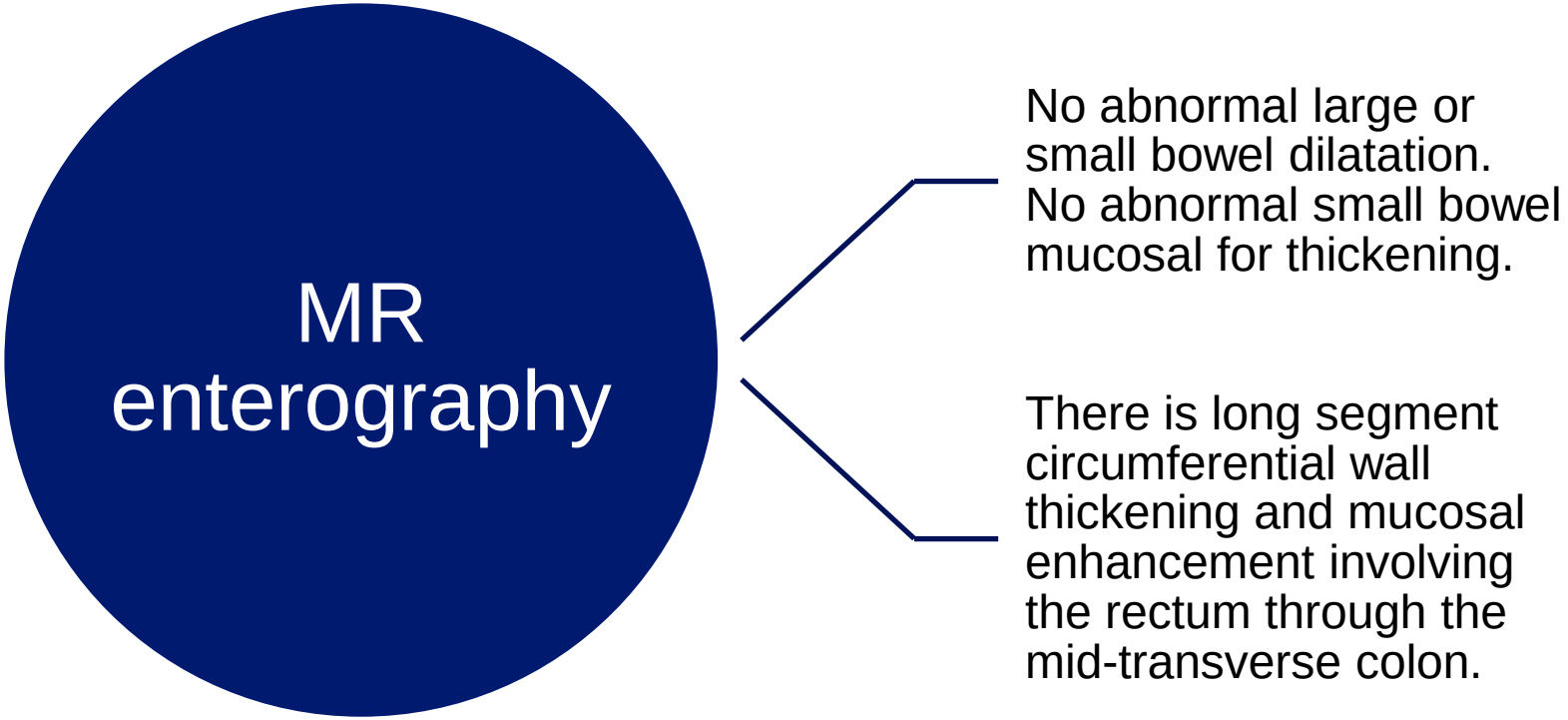
Endoscopy

- Esophagus – No diagnostic abnormality.
- Stomach – Chronic inactive gastritis. No helicobacter pylori organisms.
- Small bowel (duodenum) – Duodenal mucosa with no diagnostic abnormality. No villous blunting or intraepithelial lymphocytosis.

Colonoscopy

- Small bowel (terminal ileum) – Small bowel mucosa with no diagnostic abnormality. No active inflammation, architectural distortion, or granulomata.
- Colon (cecum) – Colonic mucosa with focal active inflammation. No chronic changes, granulomata, or dysplasia identified.
- Colon (ascending) – Colonic mucosa with no diagnostic abnormality.
- Colon (transverse) – Moderately active chronic colitis. No granulomata or dysplasia identified.
- Colon (descending) – Moderately active chronic colitis. No granulomata or dysplasia identified.
- Colon (sigmoid) – Severely active chronic colitis. No granulomata or dysplasia. No evidence of cytomegalovirus infection.
- Colon (rectum) – Moderately active chronic colitis. No granulomata or dysplasia.

Following her endoscopic evaluation, she underwent imaging studies for evaluation of her small bowel.



Case Study Diagnosis

Based on her presentation, physical examination, laboratory studies, endoscopic evaluation, and imaging studies …

using Paris Criteria, she was diagnosed with:

- Extensive ulcerative colitis (extending proximal to the transverse colon).
- She does not have severe disease (PUCAI <65).
- She has chronic gastritis.

CLINICAL CASE STUDY SUMMARY

- Inflammatory bowel disease is a chronic disease affecting the gastrointestinal tract. It includes Crohn's disease, ulcerative colitis, indeterminant or unclassified colitis, and very early onset IBD.

- Proposed causes of inflammatory bowel disease include genetic predisposition, immune dysregulation, environmental factors, and alterations in the microbiome.

- An index of suspicion of inflammatory bowel disease includes presenting symptoms, clinical history, physical findings, as well as preliminary screening laboratory and imaging study results.

- Recommendations for the initial evaluation for those suspected of having inflammatory bowel disease include screening laboratory studies, physical examination, endoscopic evaluation, and imaging studies.

- Once diagnosis of inflammatory bowel disease is confirmed, it should be classified based on Paris Criteria.

Thank you!

We hope you enjoyed this case.

Please complete a brief evaluation to provide us with feedback on this program: https://www.surveymonkey.com/s/ibdnurse

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LINKED MATERIAL

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CROHN'S DISEASE

- Crohn's disease can involve any part of the gastrointestinal (GI) tract from the mouth to the anus. (Setty et al., 2023).
- In children and adolescents, the distribution of Crohn's disease is frequently:
  - Small bowel and colon (59%)
  - Colon only (28%)
  - Small bowel only (16%)
  - A small percentage may have esophageal or stomach or orofacial disease. (Setty et al., 2023).
- Crohn's disease is patchy in distribution. Some bowel segments may appear normal interspersed with areas of active disease. (Setty et al., 2023).
- It is transmural - meaning that it can affect all layers of the bowel from the mucosa to the bowel wall which can lead to the development of strictures (scaring) and fistula formation. (Setty et al., 2023).
- Crohn's disease can have a perianal involvement which can present with perianal fistula and skin tags. (Setty et al., 2023).
- The presence of granulomas on biopsies are a strong indication of the diagnosis of Crohn's disease. (Setty et al., 2023).
- Crohn's disease is progressive. It starts as inflammatory; but can progress to penetrating and structuring disease. (Setty et al., 2023).

ULCERATIVE COLITIS

The inflammation of ulcerative colitis affects the mucosal layer of the rectum and colon. (Setty et al., 2023).

The inflammation is continuous in distribution. It starts at the rectum and can extend to more proximal portions of the colon in a continuous fashion until it stops.

Areas of extension include:

- Proctitis involves the rectum only
- Left sided colitis – extends to the splenic flexure
- Extensive colitis – extends to the hepatic flexure
- Pancolitis – extends past the hepatic colon (Right sided colitis) (Setty et al., 2023).

- Mild ileal inflammation (usually histologic, with mild ileal erythema and granularity, or “backwash ileitis”) can be seen in UC. (Setty et al., 2023).

- Granulomas are not a feature of ulcerative colitis. (Setty et al., 2023).

Back

INDETERMINATE COLITIS

The differentiation between CD and UC is based on a multitude of findings, which can include:

clinical presentation

biochemical studies

endoscopic findings

histology

luminal imaging

Although CD and UC have distinct pathologic and clinical features, it can sometimes be difficult to differentiate CD from UC in cases where there is no small bowel involvement.

When that differentiation is unclear, this inflammatory bowel disease is labeled as **indeterminate colitis** (IC) or **IBD unclassified** (IBDU).

(Higuchi & Bousvaros, 2022)

Back

Very Early Onset IBD (VEO-IBD)

Diagnosis of IBD in patients six years of age and younger

More likely to have severe disease

Often have family history of IBD and/or immunodeficiency

Often have history of recurrent infections or unexplained fevers

Often have associated autoimmune conditions

(Higuchi & Bousvaros, 2022)

Very Early Onset Inflammatory Bowel Disease Workup
https://www.crohnscolitisfoundation.org/sites/default/files/2021-04/VEO-IBD%20FINAL_March%202021.pdf

WHAT CAUSES IBD

Although the exact cause of IBD is unknown, it is believed to be related to a combination of factors that include:

Genetics	Multiple genes have been identified that are linked to IBD. There is a 25 percent increased risk of developing IBD if there is a first-degree relative with IBD.
Host Immune Response	Immune system comprises the innate and adaptive immunity that normally serves to protect the host. In IBD, there is dysregulation of the immune system, causing it to incorrectly respond to the GI system, causing inflammation.
Environmental Factors	Environmental factors can trigger immune system dysregulation. Several environmental factors thought to influence the development of IBD include: Westernized diet (high fat, high carbohydrate, processed foods), antibiotic use, aseptic environment, smoking, NSAID, and EOTH have been implicated.
Gut Microbiome	Changes in the microbiome can cause an imbalance between anti-inflammatory bacterial genotypes and the pro-inflammatory genotypes in the intestine to increase the development of IBD.

The combination of these factors is thought to cause changes in the body's immune response, which then promotes chronic inflammation and the development of inflammatory bowel disease.

(Shapiro et al., 2016)

Frequently seen presenting signs and symptoms of pediatric IBD include:

GI symptoms	Growth failure	Physical findings	Systemic symptoms	Extraintestinal manifestations
• Diarrhea • Bloody stools • Abdominal pain • Tenesmus	• Subnormal height velocity and/or weight velocity • Weight loss • Delayed puberty	• Pain with palpation • Palpable mass • Perianal fissures • Fistula • Abscess • Oral lesions	• Fevers • Fatigue	• Aphthous ulcers • Erythema nodosum • Pyoderma gangrenosum • Psoriasis • Joint swelling • Arthritis • Arthralgia

(Higuchi & Bousvaros, 2022)

Presenting symptoms may be different in Crohn's disease versus ulcerative colitis.

Signs and Symptoms of Inflammatory Bowel Disease

	Ulcerative Colitis	Crohn's Disease
Abdominal Pain	• Crampy • Lower quadrant • Improves after stooling • Varies in intensity	• Crampy to sharp • Can occur anywhere • Moderate to severe • Feelings of fullness or bloating • Associated nausea and or vomiting
Diarrhea	• Frequent and watery or unformed	• May be present during flares or due to malabsorption
Bloody Stools	• Often with bright red blood and mucous • Clots	• May have blood, particularly in Crohn's colitis
Anemia	• Anemia due to blood loss	• Anemia due to blood loss, nutritional deficits, malabsorption, and chronic illness
Fatigue	• Fatigue during flares due to blood loss and anemia	• Fatigue during flares due to blood loss, anemia, nutritional deficits, and malabsorption
Urgency/tenesmus	• Common with flares	• Can have urgency but not usually tenesmus

Signs and Symptoms of Inflammatory Bowel Disease
Continued

	Ulcerative Colitis	Crohn's Disease
Weight Loss	• Weight loss during severe disease and flares	• Common with small bowel disease • Common during flareup of CD regardless of location • With upper GI tract, weight loss and anorexia may be due to difficulty swallowing, gastritis, vomiting, or feelings of fullness
Poor Growth	• Poor growth and nutritional deficiencies not as common	• Poor growth and nutritional deficiencies are common
Delayed Puberty	• Delayed puberty is not common	• Delayed puberty is common
Nutritional Deficiencies	• Nutritional deficiencies not as common	• Nutritional deficiencies are common

HPI

When did your symptoms begin? How frequently do they occur?

How severe are they? How long do they last? Do they awaken you at night? Do they stop activities?

What makes them better or worse? Is there a relationship between meals and activities?

Abdominal Pain

When does the pain occur? How often does it occur? How long does it last? What type of pain (description)? Is there a relationship to stooling and to meals? What is the severity of pain?

Stooling Pattern

What is the stool frequency? What is the consistency of stools? Is there urgency and/or tenesmus? Is there night awakening to stool? Is there blood and/or mucus?

Growth and Development

Is there a history of weight loss, weight gain, growth delay and/or delay in pubertal development?

Extraintestinal Manifestations

Is there a history of recurrent fevers, oral ulcers, joint pain or swelling, rashes, eye issues, perianal complaints, etc.?

(Peck, 2015)

Past Medical History

What items in past medical history might be important?

There is an increased risk of the development of IBD in those with a history of:

Infectious gastroenteritis

- Salmonella and campylobacter

(Peppercorn & Cheifetz, 2023)

Other autoimmune disease

- Rheumatoid disease (i.e., rheumatoid arthritis, juvenile idiopathic arthritis, SLE, etc.)
- Celiac disease
- Thyroid disease
- Diabetes mellitus
- Psoriasis

(Peppercorn & Cheifetz, 2023)

Exposures

- Medications
  - Antibiotics: There may be some increase in incidence of CD with history of antibiotic use vs no antibiotic exposure. Increased risk in those with history of antibiotic use in early childhood.
  - NSAIDs: There may be some small risk.
  - Isotretinoin: There may be some increased risk of development of IBD.
  - OCP/hormone replacement therapy: There may be some small increase in risk.
- Smoking
  - There is increased risk of the development of Crohn's disease thought to be secondary to changes in mucosal permeability and immune response. May be a lower risk for development of ulcerative colitis.
  - Smoking may influence the course of IBD. May increase risk of complications in Crohn's disease. May lessen symptoms in UC.
- Diet
  - Low fiber, high fat (animal fat and polyunsaturated fats), and high intake of processed foods may increase risk of IBD.

(Peppercorn & Cheifetz, 2023)

Family History

What items in family history might be important?

Family history of inflammatory bowel disease (Crohn's or ulcerative colitis)

- First-degree relatives of patients with IBD are 3 to 20 times more likely to develop IBD than the general population.
- Children of 2 parents with IBD (CD or UC) have a 36% chance of developing IBD by age 28.
- Siblings of patients with Crohn's disease are 30 times more likely of developing CD compared to the general population.
- Two thirds of siblings will be diagnosed within ten years of each other.

(Snapper & McGovern, 2022)

Family history of autoimmune diseases

- Increased risk of development of inflammatory bowel disease in those with first-, second-, or third-degree relative with autoimmune disease.

(Peck, 2015)

Family history

Consider IBD in the differential for those with a family history of:

- Short stature
- Chronic abdominal pain
- Colitis
- Other GI disorders

(Peck, 2015)

Review of Systems (ROS) It is important to look for pertinent negatives

General:	No recent travel, no recent antibiotics. This is important to evaluate as we need to consider infectious etiologies to the presenting symptoms.
Skin:	No eczema, erythema nodosum, or pyoderma gangrenosum. These findings are supportive evidence for allergic vs. inflammatory or autoimmune diseases.
ENT:	Determine if there are any additional chronic disease processes or mouth sores that could support Crohn's disease.
Respiratory:	Any chronic cough, asthma, or pneumonias that would indicate aspiration or compromised immune system?
Cardiovascular:	Rule out chronic disease of heart, hypertension, etc.
GU:	Rule out anatomical issues or urinary reflux.
Muscular/Skeletal:	Is there hypotonia, developmental delay, or syndromic appearances?
Hematologic/Lymphatic:	Easy bruising/bleeding present (liver disease)? Any enlarged lymph nodes?
Neurologic:	Headaches or irritability present?
Endocrine:	Are there current autoimmune diseases present, increasing risk for GI autoimmune disease?

Physical examination findings can include:

General
- Pallor
- Growth failure
- Poor weight gain
- Delayed pubertal development

HEENT
- Oral ulcers
- Eye irritation
  - Uveitis
  - Episcleritis
  - Scleritis
  - Scleral icterus

Abdomen
- Abdominal pain
- Abdominal masses/ fullness/distention

Skin
- Skin lesions
  - Pyoderma gangrenosum
  - Erythema nodosum
  - Abscesses
  - Fistula

Perianal
- Irritation
- Rashes
- Skin tags
- Fissures
- Fistula
- Abscess
- Hemorrhoids

Musculoskeletal
- Joint pain
- Swelling
- Decreased ROM
- Clubbing

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Laboratory Studies

Complete blood count (CBC) is a test that looks at common blood cells. It includes an assessment of:

- White blood cells (WBCs) – Used by the body to fight off infections.
  - Differential count is used to look at the different types of WBCs that may be involved in infection or allergy.
- Red blood cells (RBCs) – Used by the body to carry oxygen to the cells of the body.
- Hemoglobin and hematocrit – An internal part of the red blood cells that binds to oxygen so that it can be carried to the cells of the body. Hemoglobin and hematocrit help to define if there is anemia.
  - Indices (MCV, MCH, MCHC, and RDW) help to determine factors that influence the hemoglobin and hematocrit. Can help to look at different types and causes of anemia.
- Platelets – Used by the body to help with clotting and stop bleeding.

Comprehensive metabolic panel (CMP) is a test that looks at some of the basic chemicals in the blood that keep the body in balance and measures the function of some vital organs. It includes:

- Electrolytes (sodium, potassium, chloride, carbon dioxide, glucose) – Chemicals that help to keep balance.
- BUN and creatinine – Measures kidney function.
- Liver enzymes (AST, ALT, alkaline phosphate) – Help to measure for injury to the liver.
- Alkaline phosphatase also indirectly helps understand bone metabolism/growth and vitamin D status.
- Other components help us to understand the acid-base balance in the bloodstream.

Laboratory Studies

ESR (Estimated Sedimentation Rate)

- Measures the time that it takes for blood to settle or separate into its different components. In the face of inflammation, the sedimentation rate is elevated. ESR is often an indicator of chronic inflammation.
- Nonspecific method for detecting illnesses associated with **chronic** or acute infection or inflammation. Remember, it is nonspecific and therefore not diagnostic for any particular organ disease or injury.

CRP (C Reactive Protein)

- An **acute** phase reactant protein used to indicate an inflammatory illness.
- Also can become elevated in the face of inflammation.
- CRP – A positive result indicates the presence but not the cause of an **acute** inflammatory reaction. Again, nonspecific.

Stool Studies

Stool culture

- Used to look for bacterial causes of symptoms. Used to screen for enteric bacteria, including salmonella, shigella, and campylobacter. These can cause diarrhea +/- blood.

Clostridium difficile

- Used to look for a toxin that is made by bacteria in the colon and can cause an infectious colitis, bloody stools and abdominal pain similar to those of IBD.

Hemoccult

- Stool Occult Blood – Looks for microscopic blood in the stool.
- Bloody stool is common in at least 80% of patients at the time of UC diagnosis and 40% with CD.
- If IBD is suspected, but no gross blood in stool, a hemoccult may be useful.

Fecal calprotectin or lactoferrin

- Derived from white blood cells. They are often elevated in the face of infection and inflammation of the GI tract helpful as a measure of acute (new) or chronic inflammation.
- Elevated calprotectin can help identify patients with a high likelihood of having IBD. Fecal lactoferrin is likely comparable but is less well studied than calprotectin.
- Can be useful in monitoring likely disease activity and response to treatment. However, due to limited sensitivity and specificity, it should always be used in conjunction with overall clinical picture, including other lab testing.

Fecal leukocytes

- Has markedly lower specificity and sensitivity for detecting inflammatory diarrhea as compared to fecal calprotectin and lactoferrin.

(Higuchi & Bousvaros, 2022)

Common Lab Findings

Anemia (i.e., hgb less than 11g/L)	Common in ~70% of patients at the time of IBD diagnosis.
Increased white blood cells	Not uncommon. May be due to inflammatory response or infection. Can be elevated with steroids.
Increased platelet count	Not uncommon. Response as an acute phase reactant.
Elevated ESR	Common in ~65–75% of patients at the time of IBD diagnosis.
Elevated CRP	Common in ~85% of patients at the time of IBD diagnosis.
Low albumin level	Common in approximately 40% of patients at the time of IBD diagnosis.
Occult blood	Useful in index of suspension for IBD, particularly in those without report of bloody stools.
Calprotectin and lactoferrin	Can correlate with disease activity in IBD; but not specific in differentiation from infectious or allergic causes.
It is important to note that normal lab results do not exclude the diagnosis of IBD. A study of 500 children who were ultimately diagnosed with IBD found that 19% of children with UC and 9% of children with CD had normal ESR, hemoglobin, platelet count, and albumin level.	
If there is a strong clinical suspicion of IBD, endoscopic and radiographic evaluation may be appropriate, even in the setting of normal lab work.	

(Higuchi & Bousvaros, 2022)

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Getting a More Detailed **Clinical History**

HPI	G.F. presents with:
Abdominal pain	Generalized crampy abdominal pain that is intermittent in occurrence. Ranks as 8 out of 10 on a pain scale. Non-radiating. Seems worst prior to stooling. Improves some after stool passage.
Change in stool pattern from baseline	Previously with history of constipation, she was passing firm stools once daily to every 2 days. Now stooling 4–5 times a day. Stools are loose in consistency. Not foul smelling. Moderate amount of bright red blood noted in stool and with wiping. Night awakening to stool. Urgency and tenesmus.
Weight loss	She has had unintentional 10-pound weight loss over the past 3 months.
Extraintestinal manifestations	She developed erythematous rash on her left lower leg. It started as 2 nodules but, over the past week, has become more pustular. She now has a new nodule on her right lower leg. Seen by her PMD, skin culture was negative.

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Getting a More Detailed **Clinical History**

PAST MEDICAL HISTORY	FT infant. No prenatal risk factors. SVD. Postnatal course unremarkable.
	Diagnosed with salmonella infection at 18 months of age. Did not require antibiotic therapy.
	History of recurrent OM. Treated with several courses of antibiotics. Underwent PET placement at 3 years of age.
	Tested positive for C. diff two times.

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Getting a more detailed **Clinical History**

FAMILY HISTORY	Mom is undergoing evaluation for Crohn's disease
	Maternal aunt with history of ulcerative colitis
	Paternal aunt with history of thyroid disease

Imaging studies

Should be done to evaluate the small intestines that are not reachable by endoscope or colonoscope (i.e., distal duodenum, jejunum, and proximal ileum).

Can also help to identify the presence or absence of strictures, fistula, and/or abscesses.

Can help to differentiate Crohn's disease from ulcerative colitis.

(Higuchi & Bousvaros, 2022)

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Endoscopic evaluation

- Endoscopic evaluation should include both endoscopy and colonoscopy. Colonoscopy should include intubation of the terminal ileum, if possible.
- Evaluation should document both visual findings (macroscopic) and histologic findings (biopsy).
- In pediatric patients, these are most often done under sedation or general anesthesia.

(Higuchi & Bousvaros, 2022)

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Paris Criteria

Paris Criteria is a classification tool for children and adolescents with inflammatory bowel disease.

It utilizes a standardized approach to categorize Crohn's disease and ulcerative colitis based on:

- Age of Diagnosis
- Extent or Location of Disease
- Phenotype or Severity of Disease
- Presence of Perianal Disease
- The Effects of IBD on Growth