



I feel your abdominal pain

Cheryl Blank, DO

Harry Davis Pediatric Center

Mercy Hospital

Abdominal Pain

- Apley defined recurrent abdominal pain
 - At least one episode of pain per month
 - 3 consecutive months
 - Pain interferes with normal activities
- Survey of 1000 kids found that 10.8% fit criteria for recurrent abdominal pain
- Girls > Boys (1.3:1)

Neurophysiology of Abdominal Pain

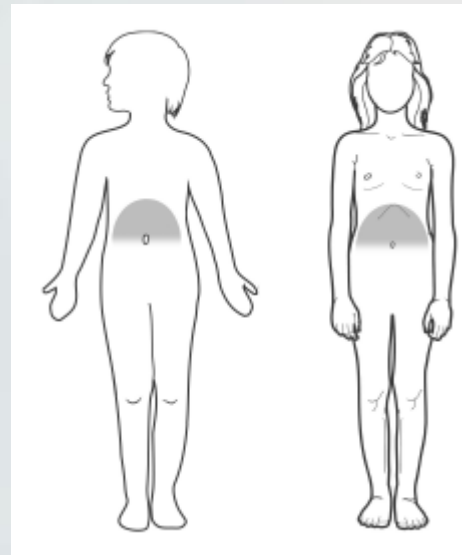
- Neuroreceptors AKA Nociceptors
- Located throughout the abdominal viscera and supporting structures
- Respond to noxious stimuli
- Different types of pain

Embryology

- Most abdominal viscera begin as midline structures and have bilateral, symmetric innervation
- Location of abdominal pain is determined by the level at which the afferent nerves from abdominal viscera enter the spinal cord

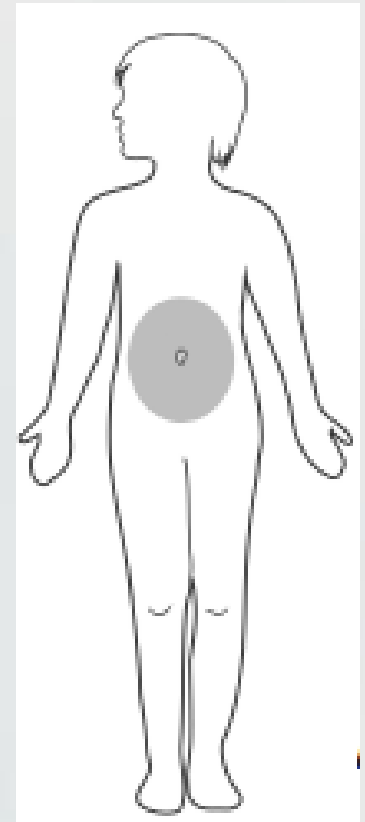
Foregut

- Innervated by nerves entering at T5 to T9
- Abdominal structures derived from the foregut
 - Distal esophagus
 - Stomach
 - Duodenum
 - Liver
 - Biliary tree
 - Pancreas
- Pain is perceived midline from the xiphod process to the umbilicus



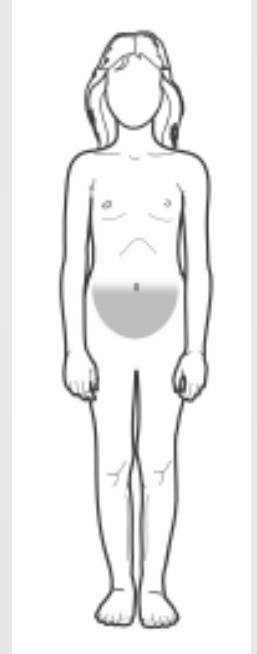
Midgut

- Innervated by nerves entering at T8 to L1
- Structures from the midgut
 - Majority of small intestine
 - Appendix
 - Ascending colon
 - Proximal two thirds of transverse colon
- Pain is perceived periumbilically



Hindgut

- Innervated by nerves entering at T11 to L1
- Structures from the hindgut
 - Distal one third of transverse colon
 - Descending colon
 - Recto sigmoid
- Pain is perceived between the umbilicus and symphysis pubis



Types of Pain

■ Visceral pain

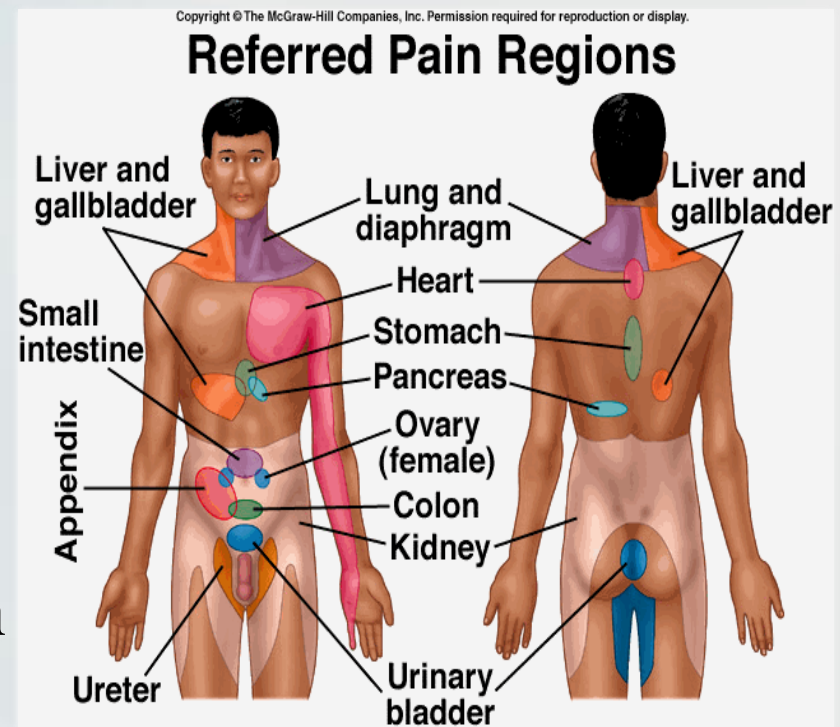
- Pain originates in afferent fibers in the walls or tissues of the abdominal viscera
- Conducted by small, unmyelinated, slow conducting C fibers and terminates over 4-5 segments of the spinal cord
- Pain is poorly localized
- Patients are often restless

■ Parietal Pain

- Pain originating from superficial structures
- Conducted by both small, unmyelinated C fibers and by large, thinly myelinated, rapid conducting A-delta fibers
- A-delta fibers respond to tactile, thermal and chemical stimulation and are more localized
- Pain increases with movement

Referred Pain

- Localized pain in an area remote from the abdominal pathology
- Referred pain is associated with skin hyperalgesia over the cutaneous dermatome supplied by the same neural segment as the injured organ



Summary

- Visceral pain is often accompanied by constitutional symptoms (nausea, vomiting, etc) and is poorly localized pain
- Parietal pain is intense, well localized, and aggravated by movement
- Referred pain occurs in a recognizable pattern away from the site of pathology.
- Abdominal pain
 - Visceral pain
 - Parietal pain
 - Referred pain
 - Combination of all three

Clinical Approach to Abdominal Pain

- History
 - Questions should be directed at the patient in a developmentally appropriate manner
 - Attempt to minimize parental influence
 - Ask the patient to localize the pain a single finger
- Focus on:
 - Quality
 - Intensity
 - Duration
 - Timing
 - Temporal correlation to food, activity, stress, vomit, diarrhea...
 - Sleep cycle
 - Eating

More History

- Medications

- Prescription (before and after the pain)
- Over the counter
- Supplements

- Allergy

- Medication
- Environmental

- Past History

- Family History

- Recent illnesses
- Migraines
- IBD
- Celiac

- Social History

- School
- Home Life
- Stressors

- Changes

Physical Examination

- Begins immediately
 - Facial expression
 - Body movement and position
 - Family interaction
- Growth Parameters
- Full examination
- Focused on Abdomen
 - Look
 - Listen
 - Feel
- Rectal Exam



The Red Flags



- Patient <5 years old
- Constitutional Symptoms: fever, weight loss, joint pain
- Persistent vomiting
 - Bilious
 - Bloody
- Gastrointestinal blood loss
- Family history (IBD, celiac disease, etc)
- Chronic medication use
- Nocturnal Symptoms
- Perianal disease
- Involuntary weight loss
- Deceleration of linear growth
- Dysphagia
- Delayed puberty
- Unexplained fever

Differential Diagnosis

- Over 100 causes of Abdominal pain have been identified
- Published list from 1976

Causes of recurrent abdominal pain (90-95% are psychosomatic)

Gastrointestinal tract

Recurrent pharyngitis
Peptic ulcer
Bezoar
Duplication
Intermittent volvulus
Meckel's diverticulum
Appendicitis
Mesenteric adenitis
Abdominal tuberculosis
Regional enteritis (Crohn's disease)
Ulcerative colitis
Milk protein intolerance
Other food intolerances
Lactose intolerance
Dietary indiscretion
Constipation

Drugs

Anticonvulsants
Antibiotics
Bronchodilators
etc

Neurological

Migraine
Epilepsy
Brain Tumour

Urogenital tract

Hydronephrosis
Pyelonephritis
Renal calculi
Renal and suprarenal neoplasms
Ovarian cyst
Dysmenorrhoea
Mittelschmerz
Endometriosis
Testicular torsion
Testicular neoplasm

} adolescents

Liver, spleen, and pancreas

Cholecystitis
Cholelithiasis
Familial and other pancreatitis
Cystic fibrosis
Massive splenomegaly

Metabolic

Hypoglycaemia
Porphyria
Lead poisoning
Hereditary angioneurotic oedema
Familial hyperlipidaemia type IV

Laboratory and Imaging

- Labs should be individualized
- Lab screening should include
 - CBC, CMP, CRP, UA, IgA, TTG
 - Stool Studies
- Abdominal US (?)
 - Prospective study of 93 children with recurrent abdominal pain
 - 3 had anatomic abnormalities
 - None account for the abdominal pain

Labs

- It has been suggested that:

Normal Physical Exam

+

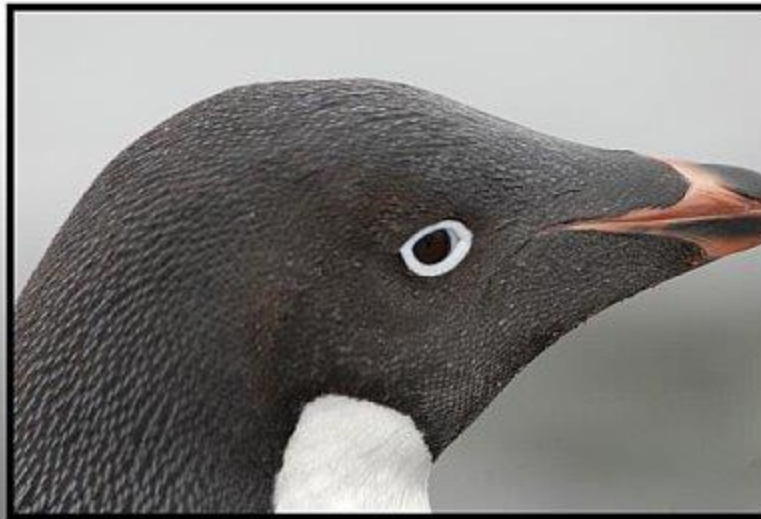
Normal Screen Labs

Rules out organic disease in 95% of Cases

Types of Abdominal Pain

- Organic abdominal pain - pain that is explained on the basis of a structural or biochemical abnormality
- Functional abdominal pain - episodic or continuous abdominal pain without evidence of inflammatory, anatomic, metabolic or neoplastic process that explains the symptoms

Why Should We Care?





of the problem

- 20% of middle and high school students are affected by functional gastrointestinal disorders
- 50% miss school
- 50% of their parents are affected
- \$25 billion in direct and indirect costs



- Functional Gastrointestinal Disorders
 - Defined as a combination of chronic or recurrent GI symptoms not explained by structural or biochemical abnormalities

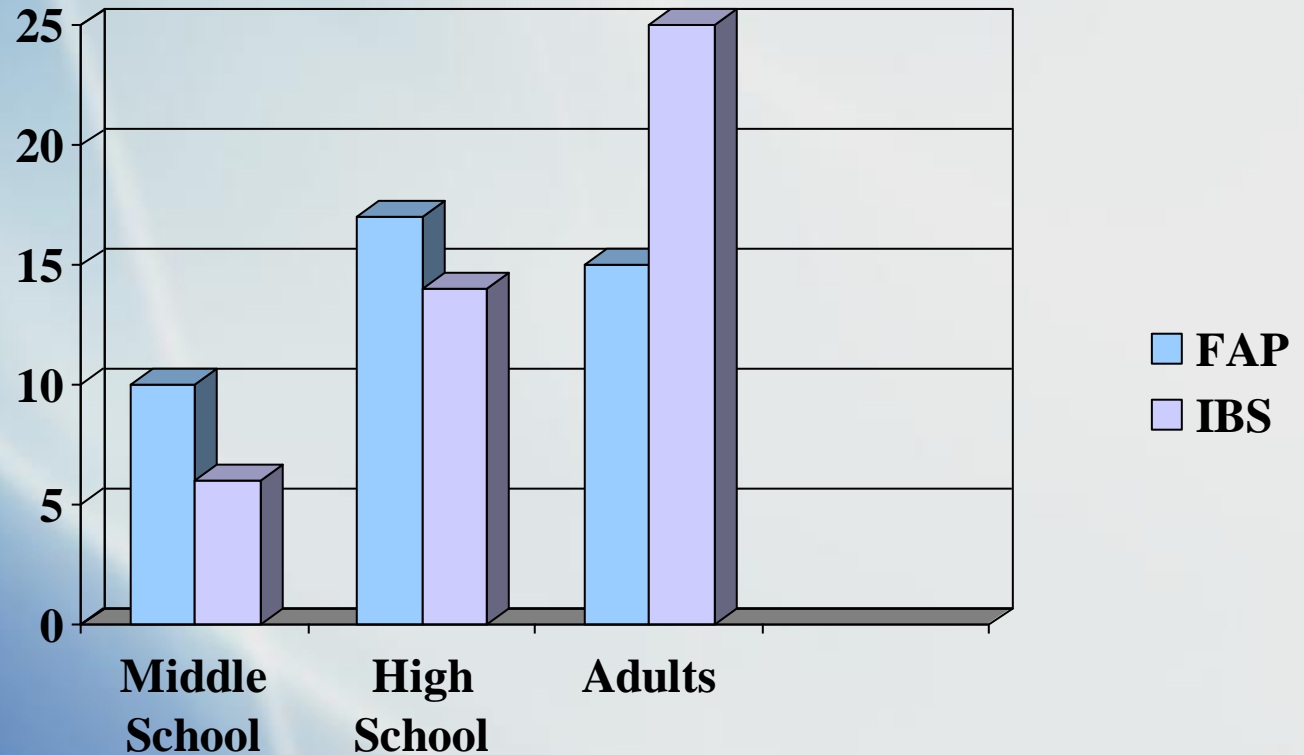
Some Definitions

- -Functional abdominal pain
 - Episodic or continuous abdominal pain without evidence of inflammatory, anatomic, metabolic or neoplastic process that explains the pts symptoms
- -Irritable bowel syndrome
 - Abdominal discomfort or pain without evidence of inflammation, etc and associated with at least 2 of the following:
 - Improves with defecation
 - Associated with a change in stool frequency
 - Associated with a change in stool form

- Recurrent abdominal pain
 - ≥ 3 episodes of abdominal pain
 - Pain sufficiently severe to affect activities
 - Episodes occur over a period of ≥ 3 months
 - No known organic cause
- Chronic abdominal pain
 - intermittent or constant abdominal pain that lasts at least 2 months or more

Prevalence

% of
affected
subjects



Hyams JS, et al. J Pediatr 1996; 129:220

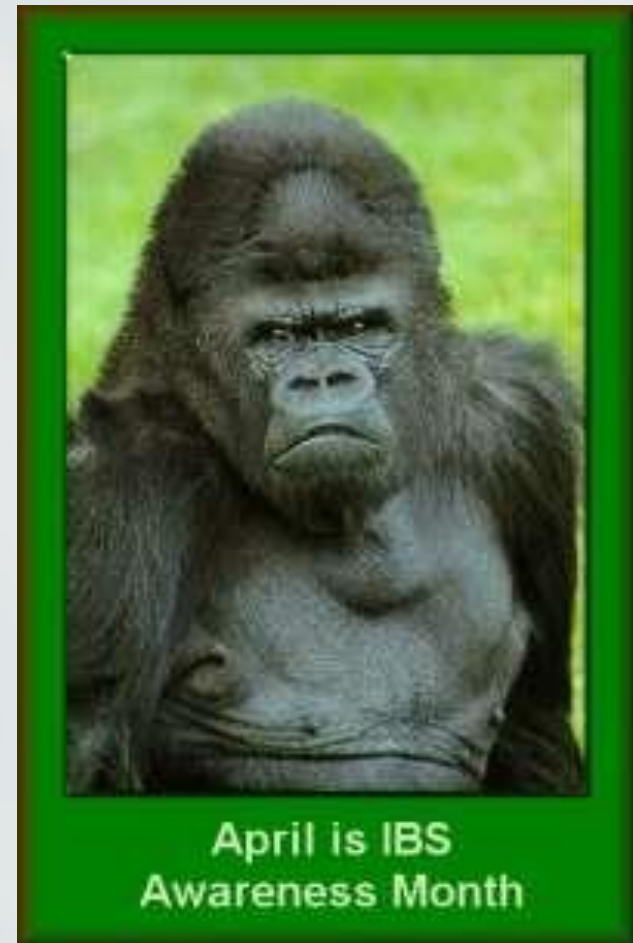
Table II. Abdominal pain and other gastrointestinal symptoms

	Middle school (n = 249)	High school (n = 258)
Abdominal pain in last year	73% \pm 6%	78% \pm 5%
\geq 6 times	32% \pm 6%	37% \pm 6%
\geq Weekly	13% \pm 4%	17% \pm 5%
Severe enough to affect activities	24% \pm 5%	17% \pm 5%
Location*		
Above navel	31% \pm 7%	23% \pm 6%
Below navel	28% \pm 7%	35% \pm 6%
Back	41% \pm 7%	42% \pm 7%
Nocturnal awakening from pain (ever)*	13% \pm 5%	15% \pm 5%
Duration \geq 30 min*	52% \pm 7%	51% \pm 7%
Nausea†	5% \pm 3%	8% \pm 3%
Heartburn†	6% \pm 3%	5% \pm 3%
Acid brash†	8% \pm 3%	10% \pm 4%

*Percentages refer to subjects reporting abdominal pain at any time during the past year (middle school n = 180, high school n = 210).

†At least once a week or more frequently.

- IBS more prevalent than:
hypertension
asthma
diabetes



Quality of life

- There is evidence for a decrease in HRQoL in IBS patients
- IBS patients had significantly worse HRQoL than patients with asthma, diabetes mellitus and end stage renal disease

Long term consequences

- Association between childhood FAP and:
 - Anxiety
 - Perceived susceptibility to physical impairment
 - Poorer social functioning
 - Current treatment with psychoactive medication

What are we doing wrong?



Typical Model for Abd Pain

- Child with abd pain goes to the ED or PCP
- Evaluated
- Treated for constipation with an enema or 2
- Referred to GI
- More investigations are done
- They get scoped
- They continue to have pain



Diagnostic Roller Coaster



“Traditional” Diagnosis

- Uses the “biomedical” model
- Rules out organic disease
- Do tests
- We give mixed messages (it’s nothing...but lets just do this one more test)

We are not meeting out patients needs

- Most pts encounter multiple diagnostic procedures and even surgery
- Even when a diagnosis is finally made, many continue to suffer for years
- Children are commonly placed on meds that have not been properly studied
- Despite our best efforts, kids with belly pain miss more than 2 weeks of school/yr



Rome Criteria

- Diagnostic instrument created to standardize clinical functional disorders
- Based on symptoms complaints by children or parents



Functional Gastrointestinal Disorders in Toddlers and Neonates



- Infant regurgitation
- Infant rumination syndrome
- Cyclic vomiting syndrome
- Infant colic
- Functional diarrhea
- Infant dyschezia
- Functional constipation

Functional Disorders in Children and Adolescents

- Vomiting and aerophagia
 - Adolescent rumination syndrome
 - Cyclic vomiting syndrome
 - Aerophagia
- Abdominal pain-related FGIDs
 - Functional dyspepsia
 - Irritable bowel syndrome
 - Abdominal migraine
 - Childhood functional abdominal pain
 - Childhood functional abdominal pain syndrome
- Constipation and incontinence
 - Functional constipation
 - Nonretentive fecal incontinence



Functional GI Disorders

- Physiology vs. Psychology
- Is the problem in your body or... your head?

Functional GI Disorders

- A motor problem?



Motor Disorder

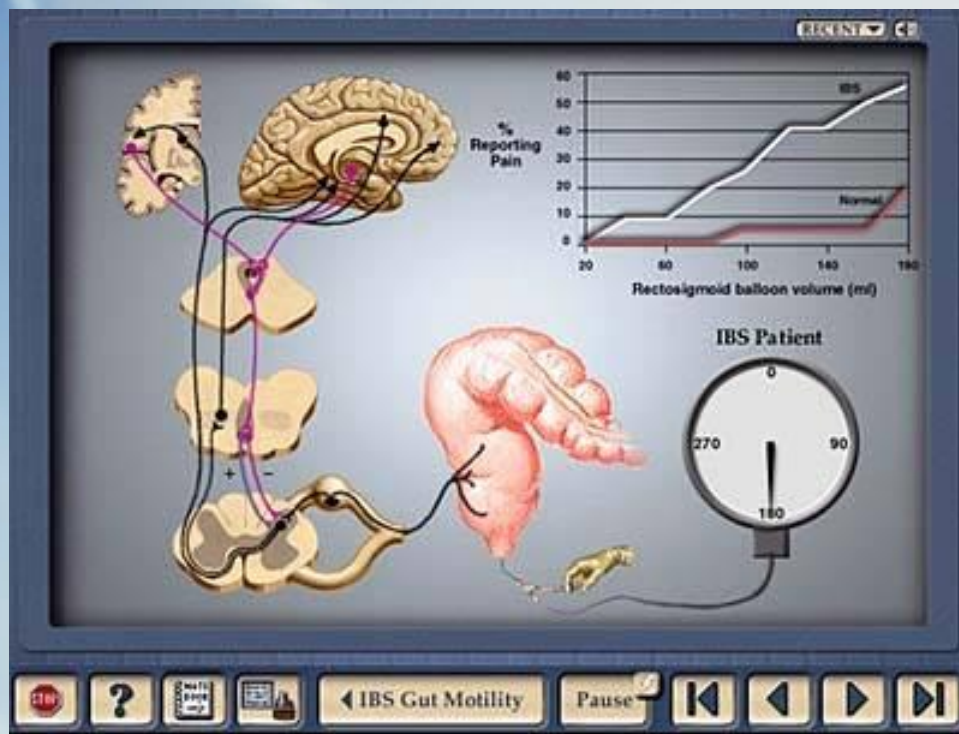
- Physiological studies: Differences in intestinal transit, tone, compliance, gut contractility and myoelectrical activity between IBS patients and controls

Motor Disorder

- However, increased contractility is present only in a minority of patients
- Hypercontractile episodes are not temporally related to abdominal pain

Functional GI Disorders

- A sensitive problem?



- ❖ IBS patients experience rectal discomfort at lower volumes or pressures of ileum and sigmoid colon distension

Trimble KC, et al. *Dig Dis Sci* (1995) **40**:1607–13

- ❖ Diminished tolerance to intestinal gas loads

Serra J, et al. *Gut* (2001) **48**:14-19 •

Functional GI Disorders

- An Infectious Problem?

Post-Infectious IBS

- 25% gastroenteritis patients develop post viral IBS
- IBS patients had signs of inflammation (increased mast cells in distal ileum and colonic mucosa)

Functional GI Disorders

A Psychological Problem?

Psychological?

- Psychological symptoms of anxiety and depression are more common in IBS patients than healthy volunteers or patients with organic GI diseases
- Depression and anxiety influences gut function leading to inflammatory changes

The background of the slide is an abstract design featuring diagonal lines in various shades of blue and white, creating a sense of depth and movement. The lines are soft and blurred, giving the background a dynamic, ethereal feel.

Psychological?

Stressors

- Life stress events
 - Small amount of evidence
 - Recent negative life events IS NOT useful in distinguishing functional abdominal pain and abdominal pain of other causes
- Daily Stressors
 - Limited evidence
 - Associated with the occurrence of pain episodes
 - Higher levels of negative life events are associated with increased likelihood of symptom persistence
- No evidence on stress influence on severity, course or treatment response

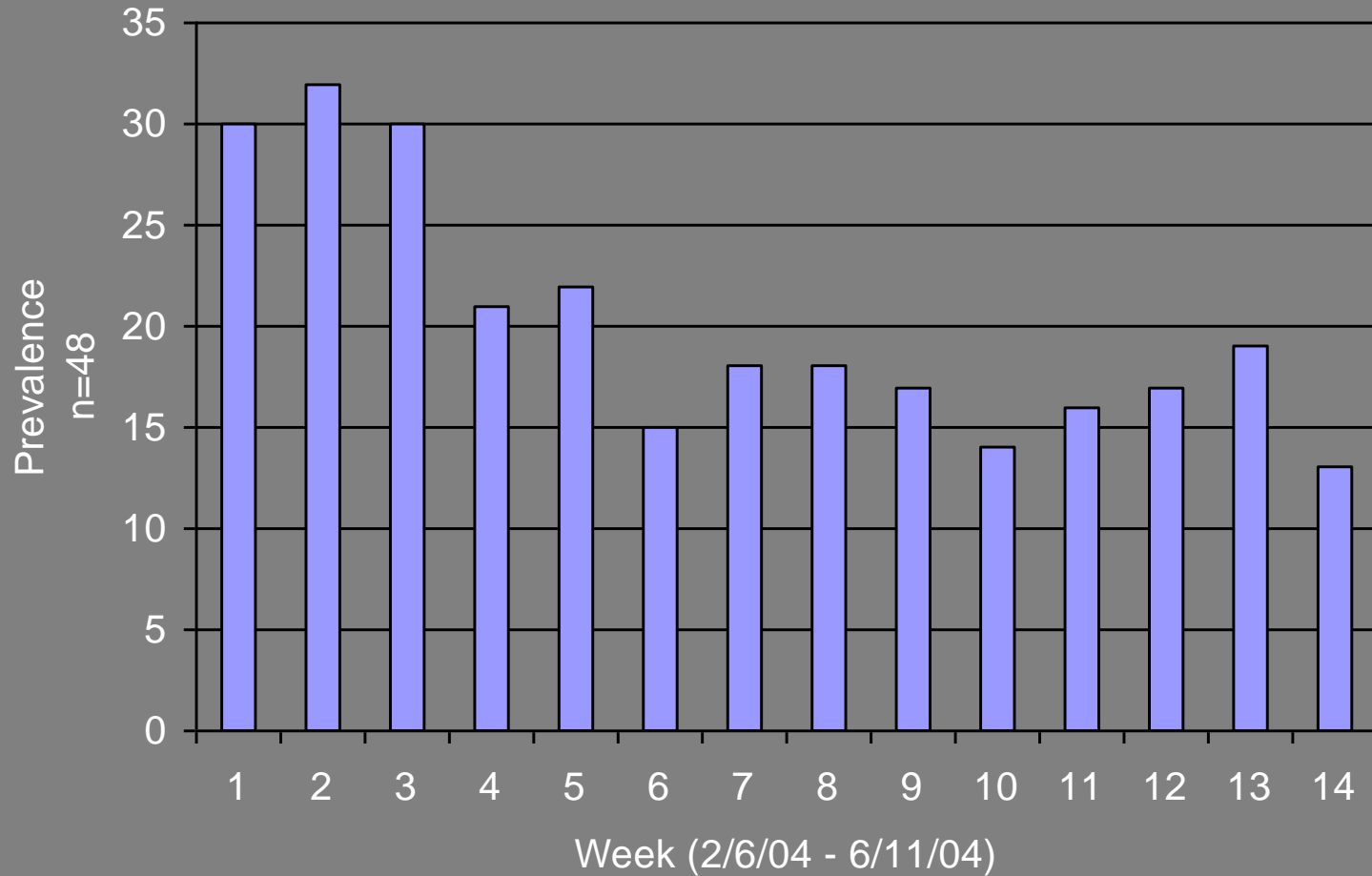
Functional GI Disorders

- A Seasonal Problem?



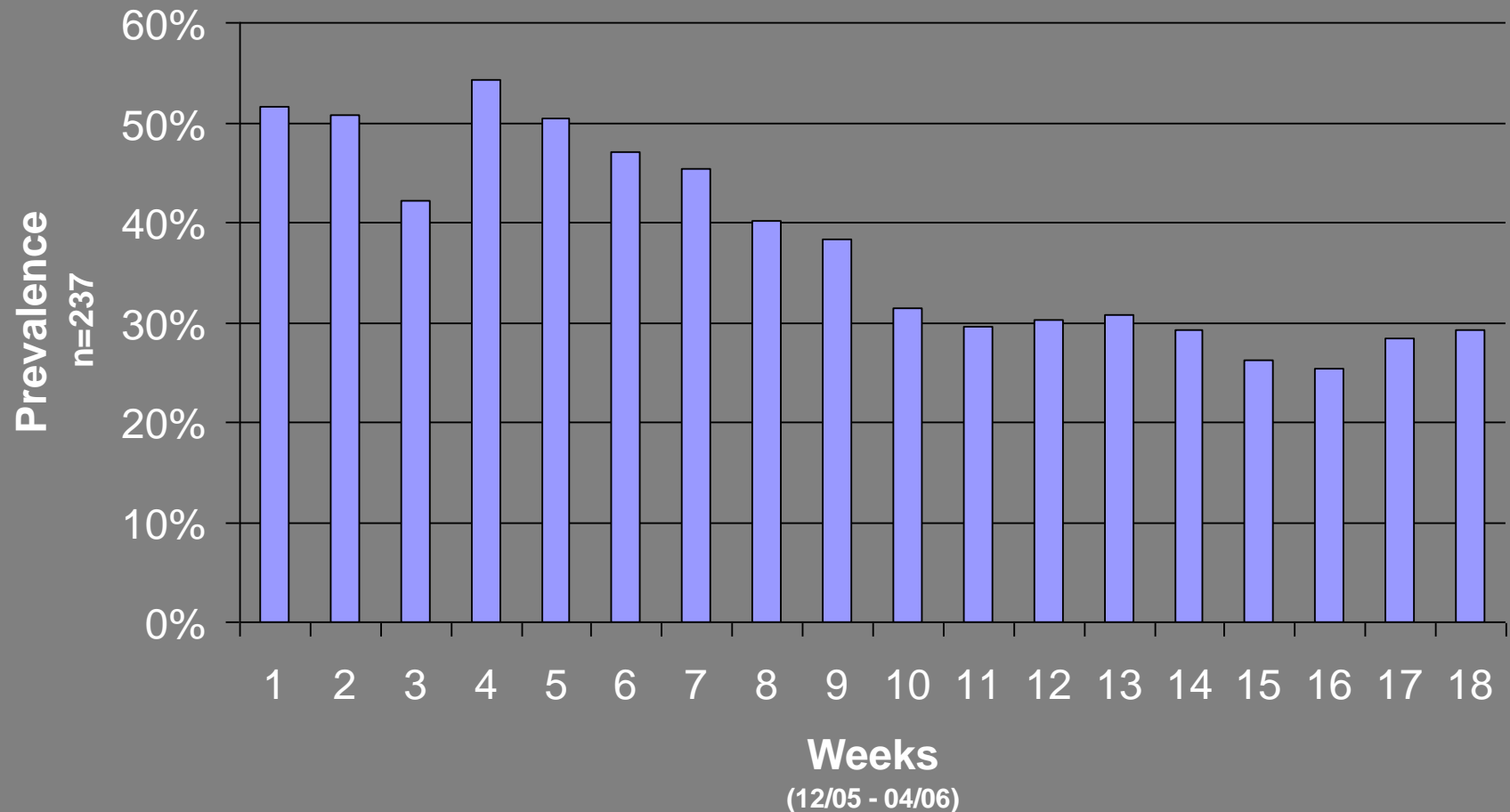
Abdominal Pain

Pittsburgh

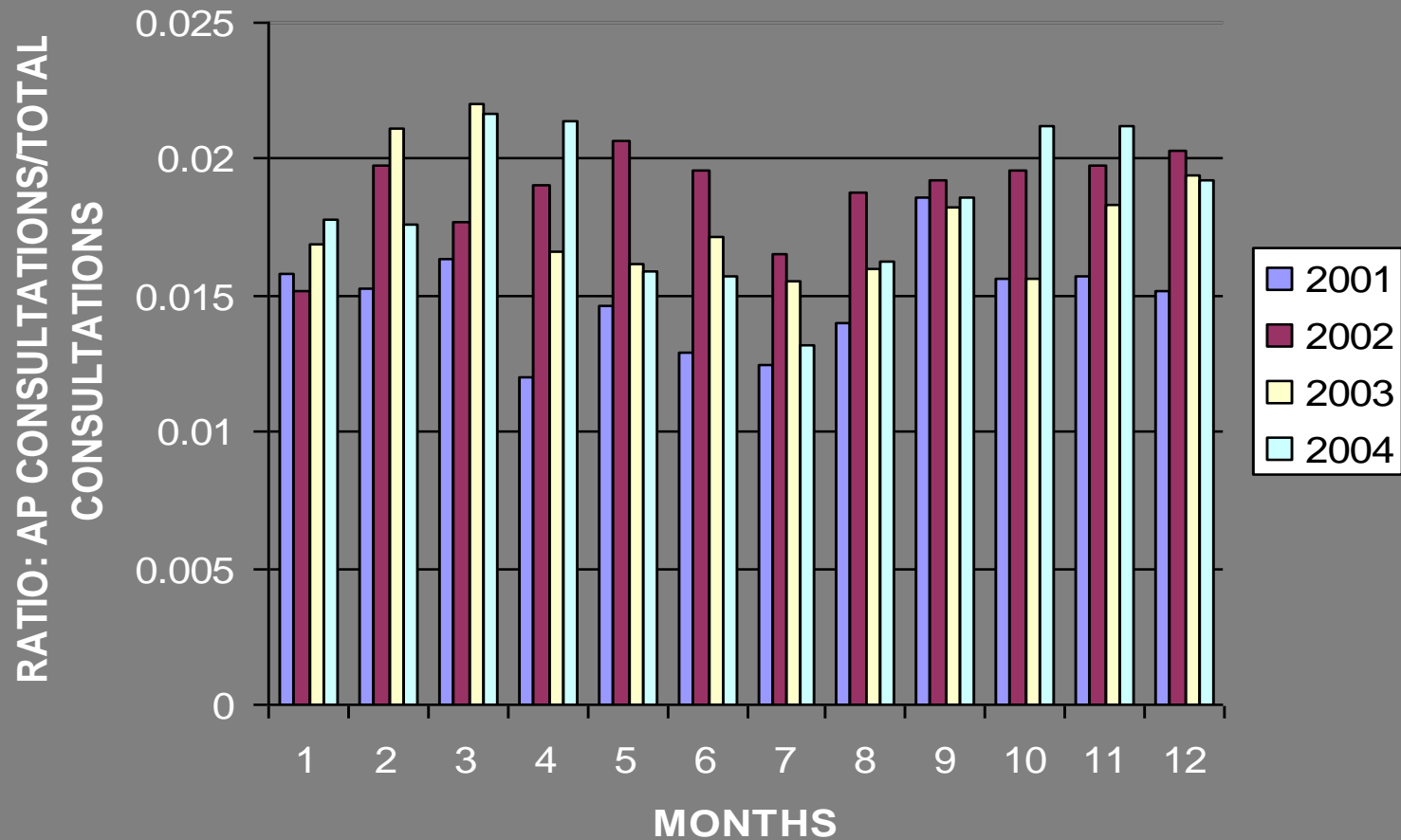


Abdominal Pain

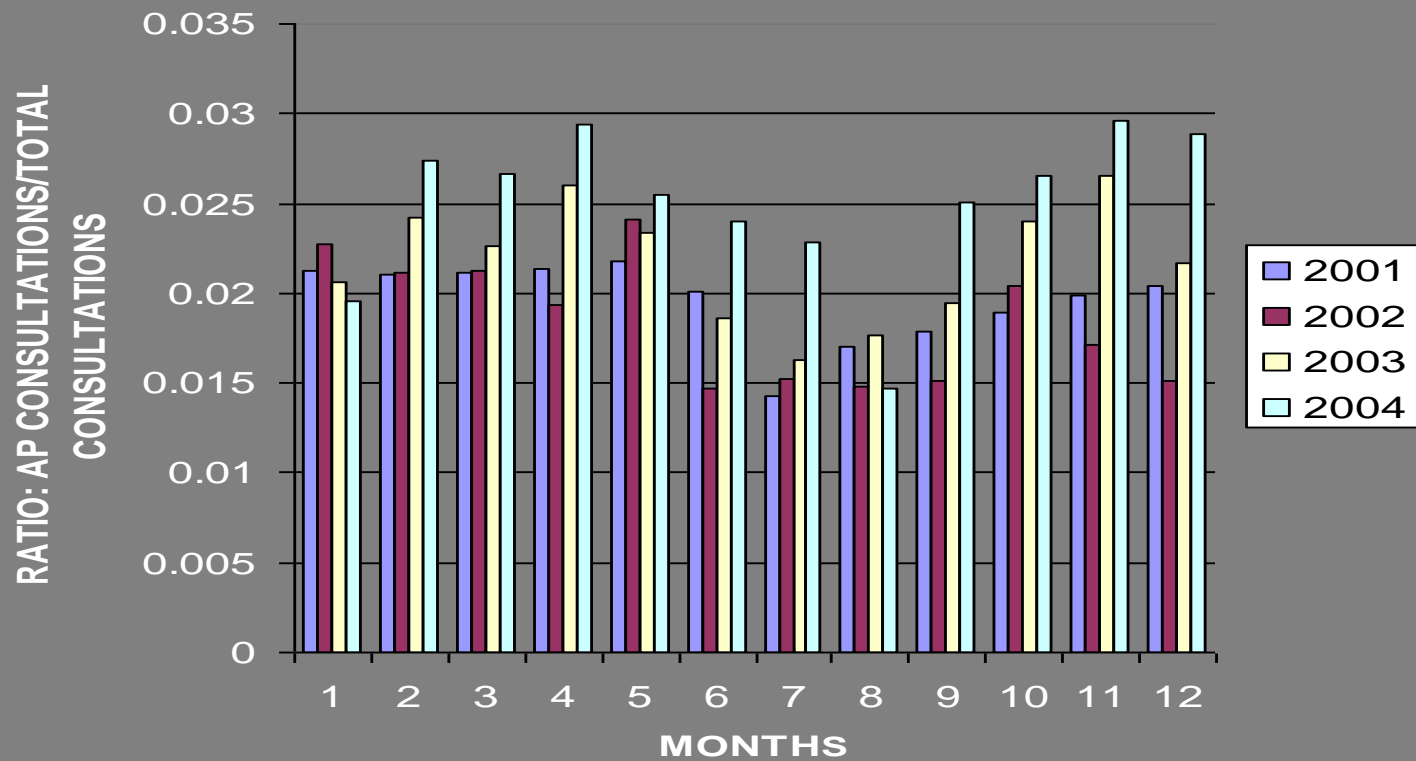
Chicago



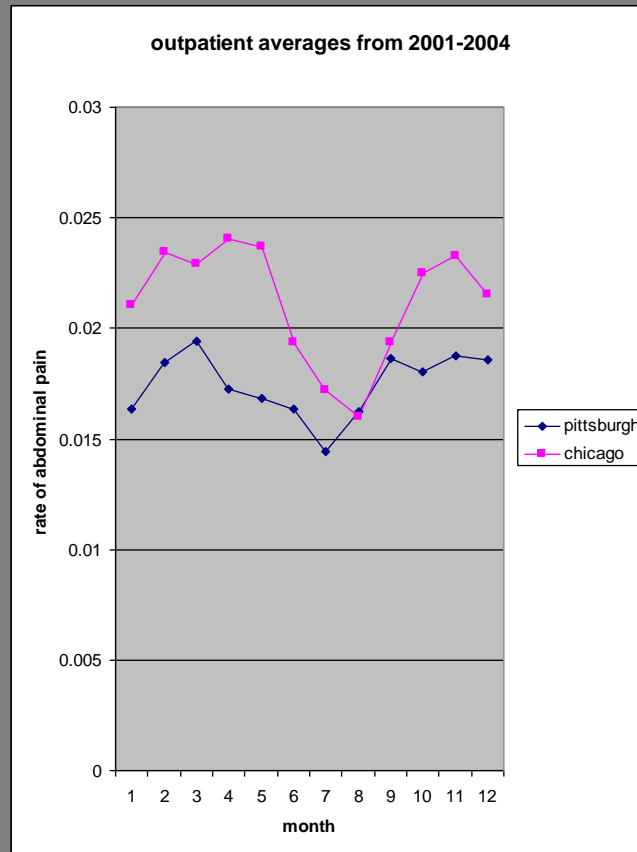
Consultation Pattern-Pittsburgh



Consultation Pattern - Chicago

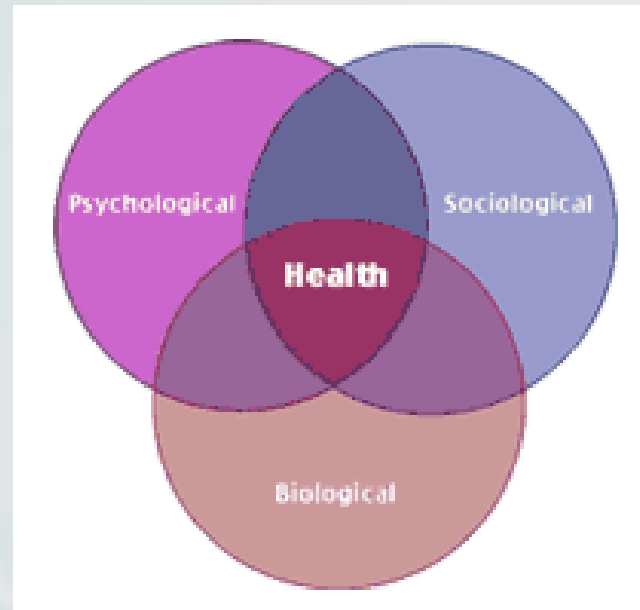


Outpatient Consultations



Functional GI Disorders

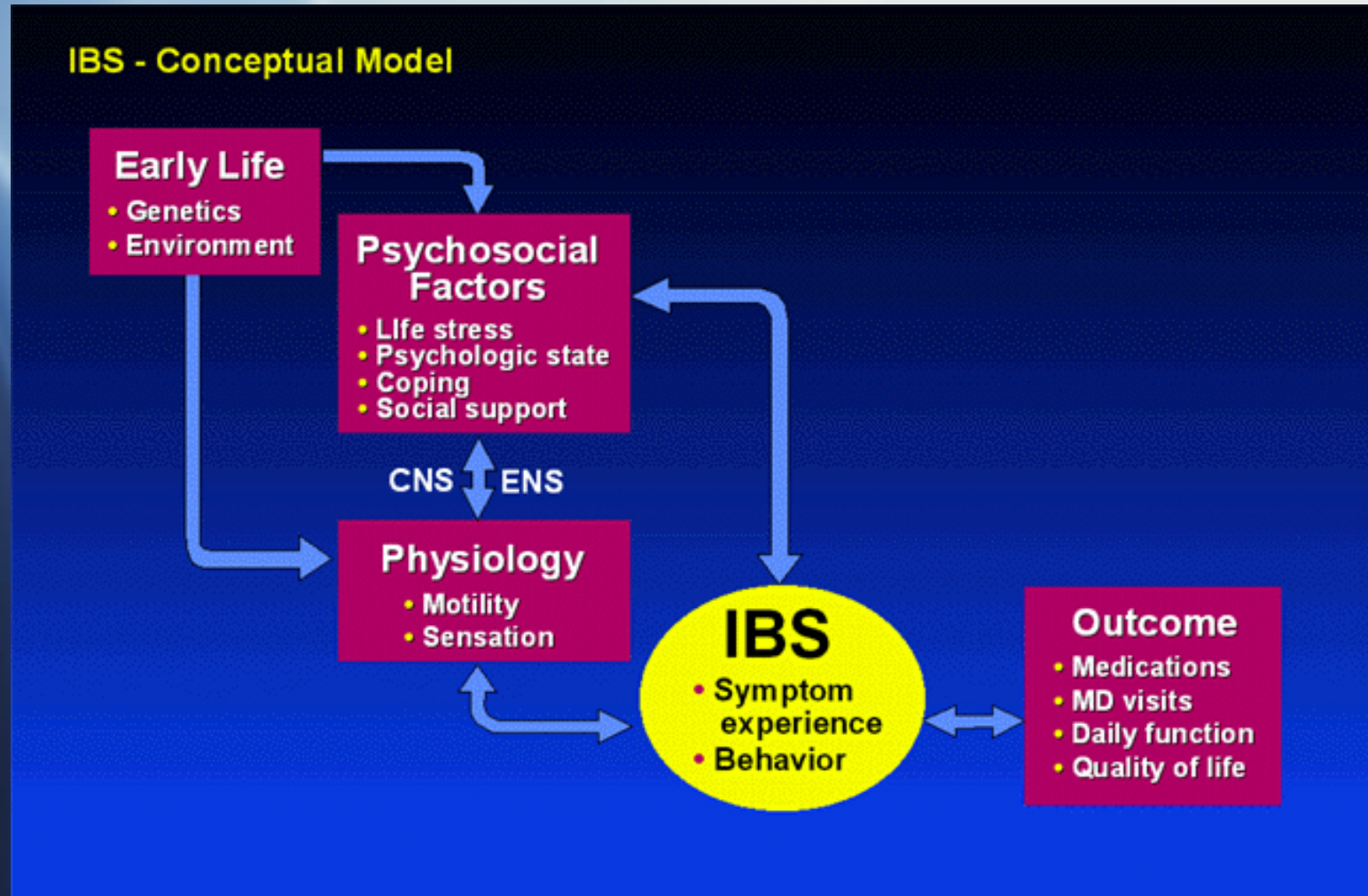
- A biopsychosocial problem?



Biopsychosocial Model

- The biopsychosocial model of IBS proposes that symptoms arise from the interaction of a host of biological, cultural, social, interpersonal, and psychological factors.

IBS Conceptual Model



Treatment

- Explain the diagnosis in a way the patient and their family can understand
 - Use headache as an example

The importance of a positive approach

	#	diagnosis	Dr. attitude	improved
positive	50	yes	“you will be better soon”	64%
Positive + pills	50	yes	“pills will help”	64%
Negative	50	no	“I do not know what you have”	36%
Negative + pills	50	no	“I do not know if pills will help”	42%

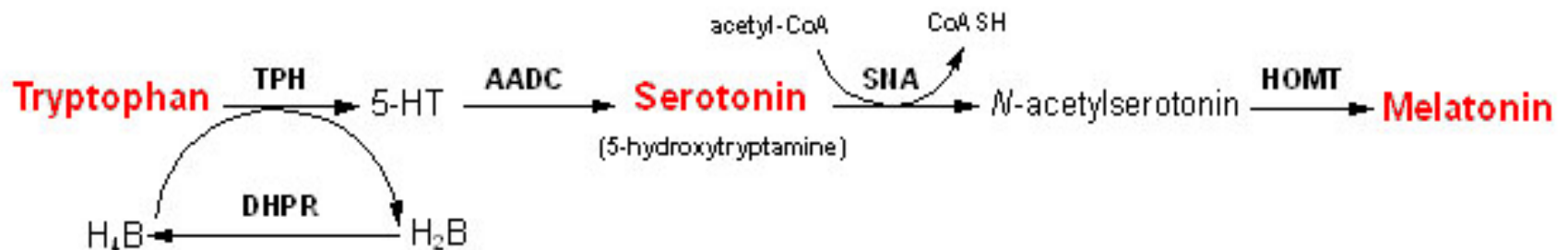
The Drugs

- We all know what's available
 - Levsin (hyoscyamine)
 - Bentyl (dicyclomine)
 - Periactin (cyproheptadine)
 - Elavil (amitriptyline)
- Let's talk about the experimental stuff.....

Serotonin

- Serotonin is a neurotransmitter present at highest concentrations in the **GI tract**
- Potential alterations in mucosal serotonin signaling have been explored as a **possible mechanism of altered function and sensation in irritable bowel syndrome**

Tryptophan is a precursor in the synthesis of **serotonin** and **melatonin**

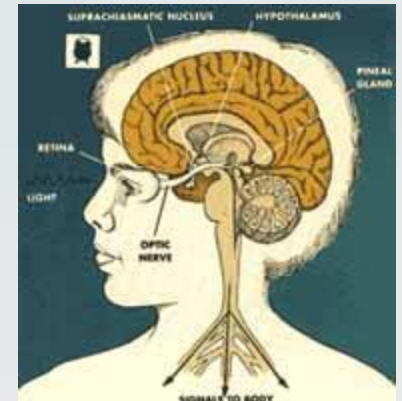


Melatonin

- Melatonin, originally discovered as a hormone of the pineal gland
- Compared to the pineal, the GI tract contains **several hundred times** more melatonin
- Binding sites have been identified in the gut
- Melatonin probably produced at the serotonin-rich enterochromaffin cells of the GI mucosa

Harderland R. Nutr Metab (Lond). 2005;2:22.

Melatonin



- Melatonin acts as a luminal hormone, synchronizing the sequential digestive processes
- GI tract: Regulation of intestinal motility, blood flow, immunomodulation, ion transport, cell proliferation and scavenging of free radicals
- Exogenous melatonin inhibits gastric motility in part by activating sympathetic neurons

Bubenik GA. Biological Signals and Receptors 2001;10:350-366

Kasimay O. J Physiol Pharmacol. 2005;56:543-53.

Melatonin

- Randomized placebo controlled study of females with IBS
- Melatonin: 8 weeks
- Improvements in IBS symptoms significantly greater with melatonin
- Therapeutic effect is independent of its effects on sleep, anxiety or depression

Lu WZ. Aliment Pharmacol Ther.2005;15;22:927-34

Song GH. Gut. 2005;54:1402-7.

Peppermint Oil

- May provide benefit in children with IBS
 - Causes intestinal relaxation by decreasing calcium influx in smooth muscles
- 42 children with IBS in randomized double blind control trial

Table II. Change in symptoms from day 1 to day 14*

Treatment		Much worse	Worse	No effect	Better	Much better
Peppermint oil	Frequency	0	0	6	6	9
	Percent	0	0	29	29	42
Placebo	Frequency	2	4	6	9	0
	Percent	10	19	28	43	0

* $P < .002$.

What about alternative medicine?

- Options
 - Psychotherapy - Cognitive behavioral therapy
 - Behavioral therapy - muscle relaxation, biofeedback, stress reduction
 - Hypnotherapy
 - Guided imagery

Alternative Therapies

- Cognitive-Behavioral Therapy
 - Teaching coping skills to patient and family
 - Higher rate of complete elimination of pain
 - Lower levels of relapse at 6 and 12 months
 - Lower level of interference with activities
 - Higher level of satisfaction with care

Alternative Therapy

- Relaxation Techniques
 - Yoga, Meditation, Progressive Muscle Relaxation
- Randomized study of yoga and IBS
 - 25 adolescents, age 11 to 18 years with IBS
 - 1 hour instructional session + daily home practice
 - Waiting list
 - After 4 weeks the waiting list was trained with yoga
 - Questionnaires at 0, 4 and 8 weeks
- Yoga group had less functional disability, less anxiety and lower scores for IBS symptoms

Alternative Therapy

- Hypnotherapy & IBS: Cochrane Review
 - Some evidence that suggests that hypnotherapy might be effective in treating IBS symptoms including abdominal pain
 - Hypnotherapy was well tolerated and no serious side effects were reported in the studies
 - Currently insufficient evidence
 - Long term efficacy unclear

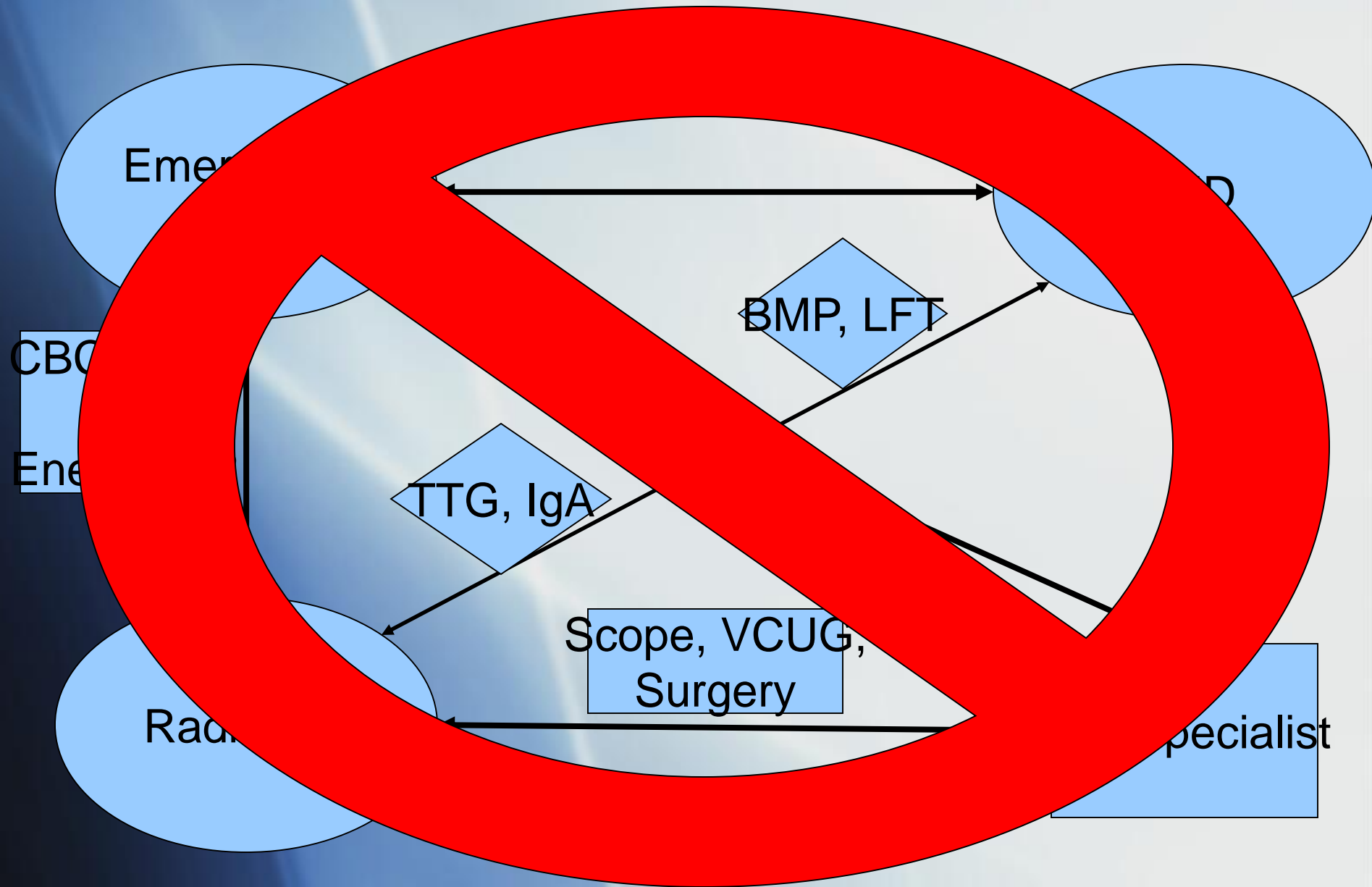
Factors influencing a successful referral for Behavioral Modification Treatment

- Willingness/motivation of both patient and parents
- Explanation of referral in terms of the diagnosis
- Local availability
- Insurance coverage or financial resources

Now What?



Abdominal Pain Flow Chart



Stop the Diagnostic Roller Coaster

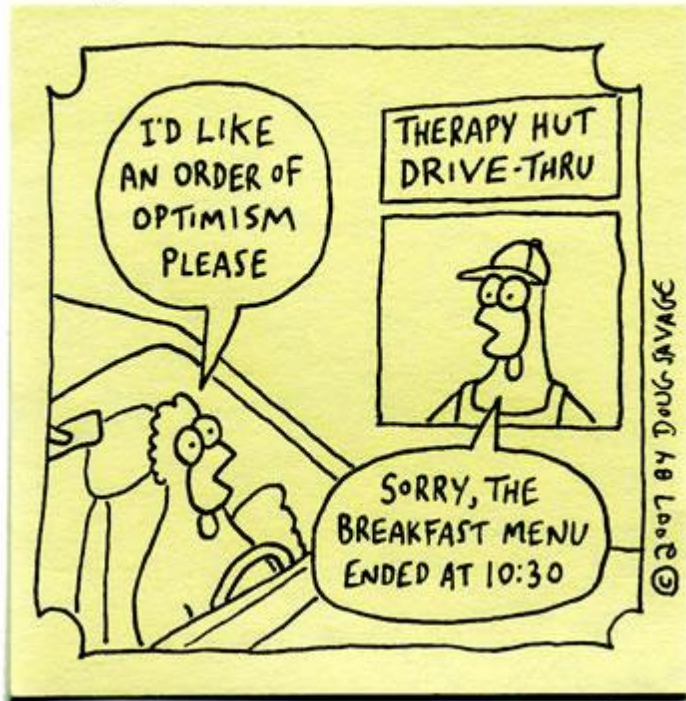


Conclusion

- Thorough history and physical exam
- Use thoughtful diagnostic tests
- Positive messages to patients are helpful
- Establish a therapeutic relationship with the family
- Consider medical and alternative therapies
- Many new drugs and therapies are being considered

Savage Chickens

by Doug Savage



www.savagechickens.com

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