REVISITING RED FLAGS IN FAMILY PRACTICE

Dr Soh Soon Beng

INTRODUCTION

The hypothetico-deductive approach[1] to clinical problem solving is a practical approach suitable for use to deal with clinical problems presented at the ambulatory care context. This is a probabilistic approach, testing available clues from the patient's symptoms and signs against commonly encountered conditions before moving down to the rarer ones. There are limits to the use of this problem which must be recognized, namely, firstly, those situations where an inductive method is clearly needed e.g. pyrexia of unknown origin; and secondly, the risk of missing out on serious problems.

Towards the reduction of the risk of missing out on serious problems the use of red flags is one strategy. Red flags refer to warning features in the patient's history or clinical examination that should prompt one to reconsider one's initial diagnosis[3]; this is usually of a potentially serious nature that require immediate evaluation[4]. Two court cases involving family physicians showed that it is important to recognize 'red flags' (Jason C F v Dr Thng , 1998 - a case of compartment syndrome; Pai Lily v Dr Henry Yeo - a case of rare serious eye infection[2]). Both cases were successfully defended eventually.

This paper reviews the use of red flags in family practice. As there are innumerable red flags, this article will focus on red flags in the context of key abdominal symptoms.

METHODOLOGY AND MATERIAL

Searches for the relevant papers for this review were conducted of the following sources:

- Medline search using the terms 'red flags' and the five key abdominal symptoms to retrieve English language articles. Abstracts were reviewed and full text articles obtained wherever relevant.
- Specific Medline search for papers on the five key abdominal symptoms in the key family medicine journals (American Family Physician, Australian Family Physician, Postgraduate Medicine, and Journal of Family Practice, and Family Practice).
- Specific Medline search for papers on the five key abdominal symptoms in the key general medical journals (New England journal of Medicine, British Medical Journal, Annals of Internal Medicine, Journal of American Medical Association, Lancet).
- Reviews and cases from the Medical Protection Society Casebook on cases relevant to primary care practice.
- Searches from the reference list of the pertinent articles.

SOH SOON BENG, Family Physician, Fajar Family Clinic and Surgery

APPROACH TO KEY ABDOMINAL SYMPTOMS AND RED FLAGS

The paper from Wetzel et al[5], presented a clinical approach to red flags. Five key abdominal symptoms were chosen for review for this paper. For each of these five symptoms, the red flags, and the conditions alerted by the red flags are discussed in more detail, with emphasis on signs and symptoms that are relevant to the practising family physician.

ABDOMINAL PAIN

Table 1. Abdominal Pain and red flags

Abdominal pain	+ Associated clues/ symptom	= Red Flag (condition to exclude)
(1) Abdominal Pain by itself as a red flag. o Urinary tract infection o Diabetic ketoacidosis o Pneumonia	Infant (< 1year)	(2) Intussusception (3) Incarcerated hernia
	Paediatric age	(4) Appendicitis (5) Torsion of testis
	Female of reproductive age group + missed period/vaginal bleeding	(6) Ectopic Pregnancy
	Elderly (> 65years) o +severe symptom with little signs o +hypotension ± abdominal mass	(7) Mesenteric ischaemia (8) Abdominal aortic aneurysm

(1) Abdominal as a red flag by itself – being severe enough, in different age groups (Table 1)

(2) Intussuception[20-23]

Useful facts

- Male>female (2.2:1); onset 6-12 months (3 month to 2 years old).
- SUDDEN ONSET of severe pain with crying.
- Vomiting with pallor during attacks which comes at interval of about 15-30 minutes. This become bilious when intestinal obstruction occurred (30%).
- Periods of lethargy in between attacks of pain.
- Redcurrant jelly stools after 12 hours later (60%).
- Examination may reveal a sausage shaped mass in the RHC region with emptiness in the right lower quadrant (Dance sign).
- High index of suspicion required; classical symptoms and signs of abdominal pain, vomiting, abdominal mass and bloody stools occurred in less than half of such patients.

(3) Incacerated hernia[24, 25]

Useful facts

- Inguinal hernia: male:female 8:1. Newborn 0.5-1%
- Premature 5-10%. Right sided 60%, Left sided 40%, Bilateral 10%.
- Presents as soft non-tender reducible bulge in the inguinal canal, off the midline with possible extension to the scrotum.
- Usually present in the first 6 months to 1 year old.
- Incacerated hernia: tenderness, tenseness and discolouration of skin.

Therefore always remember to examine the hernia orifices.

(4) Appendicitis[6-19]

Useful facts

- Mean age of presentation in child 6-10 years old; maximal incidence in 20-30 years old.

Classical Presentation

- Epigastric/periumbilical, migrating to RIF pain may be present in up to 60-70% of cases.
- Anorexia is the first symptom in >95%, followed by epigastric/periumbilical abdominal pain and then vomiting in that sequence. If vomiting PRECEDES the onset of pain, the diagnosis should be questioned.
- The pain usually peak in around 4 hours, then diminishes and migrates to the RIF region. Many patients feel constipated and anticipate that defecation will relieve the discomfort; some may even use laxative! (refer to case discussed below).
- The 3 most predictive signs and symptoms of appendicitis are:
  - Right lower quadrant pain.
  - Abdominal rigidity (involuntary guarding).
  - Migration of pain from the periumbilical region to the right lower quadrant.

Atypical Presentation

- Retrocaecal and pelvic position of the appendix are present in 30% of patient. These patient may present instead with diarrhoea (18% of cases with appendicitis); or urinary symptoms. Stools in such cases are of small quantity, mucoid in nature, due to irritation of the adjacent colon. Performing the Psoas and Obturator tests may elicit the relevant findings. The Psoas test is done by passive extension of the right thigh with patient lying on the left side to elicit pain. This has a poor sensitivity of 16% but high specificity of 95%. The Obturator test (passive internal rotation of the flexed right thigh) would elicit pain with pelvic appendix.
- Risk of misdiagnosis is inversely related to age i.e. the younger the patient, the higher the risk of misdiagnosis. Also in these young patients, vomiting may actually precede (rather than follow) the onset of pain. In the elderly and women, misdiagnosis rate of 40% had been reported (compared to 20% in other patient's group). The negative laparotomy rate in most series ranges from 15-35%, conferring significant morbidity.

Careful history and good clinical examination remains the most effective and practical diagnostic approach. Do not diagnose gastroenteritis in the absence of typical diagnostic criteria of nausea, vomiting and diarrhoea. Ask for a review in 6 hours if necessary. If the abdominal pain has not improved, it is a red flag.

Associated features to elicit

- Fever is often absent or low-grade; high fever indicates perforation.
- A rectal examination should be performed in suspected cases of appendicitis. Tenderness high on the right side supports the diagnosis and can be helpful. Failure to do so was often cited in medical litigation suit in misdiagnosis.
- Following perforation, there maybe a transient subsidence of symptoms, followed by re-exacerbation of pain spreading throughout the abdomen. Physical findings immediately after perforation may be minimal.
- Total white count maybe elevated in 70-90% but is non-specific. A normal WBC CANNOT be used to exclude appendicitis. Urine FEME may show some pyuria; but presence of >20 WBCs suggest urinary tract infection.

Pregnant and Elderly Patient

- In pregnant patient care must be taken due to the shift in the anatomical position of the appendix during the different trimester of pregnancy:
  - T1 – Pain located in the RIF region (McBurney point).
  - T2 – Pain localized to the level of umbilicus laterally. This can be confused with ureteric colic.
  - T3 – Pain diffuse or in the RHC region, confusing with cholecystitis.

In addition, the following features of appendicitis in pregnancy deserved mention:

- Anorexia is present in only up to 2/3 of cases while it is almost present in all non-pregnant.
- Direct abdominal tenderness is most commonly observed in the appropriate site.
- Signs of peritonitis may not be elicited because of the lifting and stretching of the abdominal wall.
- The limited use of total white count as this can be seen in normal pregnancy (>15,000). Similarly pyuria can be observed in 10-20% of patient which may indicate co-existing asymptomatic UTI.
- In the elderly, symptoms are less specific; 30% do not have RIF pain, 25% do not have RIF tenderness, 50% do not have fever or raised Total White and only 20% presents with the classical RIF pain, anorexia and fever.

(6) Ectopic Pregnancy[13,15, 26-34]
Useful facts
- Classical triad of lower abdominal pain (>95%), abnormal vaginal bleeding (65-85%) and missed period (65-80%). This is present in 50% of cases only.
- 3 commonest symptom/signs are:
  Abdominal pain (97%)
  Abdominal tenderness (91%)
  Vaginal bleeding (79%).
- Therefore all female of child-bearing age presenting with lower abdominal pain and vaginal bleeding should have ectopic pregnancy excluded, regardless of presence/absence of missed period.
- Failure to look out for risk factors for ectopic pregnancy (previous ectopic pregnancy, IUCD insertion, previous history of PID, infertility treatment or tubal surgery) is cited as a common and significant reason for misdiagnosis (40-50% misdiagnosis rate). Presence of such risk factors should heighten one's suspicion of ectopic pregnancy.
- 36% have no adnexal tenderness and 9% of women who had an ectopic pregnancy had no abdominal pain.
- History of tubal ligation does not exclude ectopic pregnancy.
- Perform urine HCG in all such patients (sensitivity > 90%, specificity ~100%).

(7) Mesenteric ischaemia[13, 16, 35-38]
Useful facts
- Important to consider even though it account for < 1% of elderly with abdominal pain. This is because of the high mortality (70-90%) associated with delayed or missed diagnosis (resulting in gangrene of the bowels with perforation, peritonitis and septicaemia).
- The most common cause of mesenteric ischaemia is arterial embolism (40-50%), followed by arterial thrombosis (25-30%). Embolic occlusion of the superior mesenteric artery occurred commonly as the artery arises from the aorta in an acute angle. The acute occlusion coupled with lack of developed collateral accounts for the dramatic onset of symptoms.
- Presents with SUDDEN SEVERE UNRELENTING pain with nausea and vomiting. This is followed by watery diarrhoea which becomes bloody in one-third of cases. Mild cases (especially those due to thrombosis) may have previous history of postprandial pain and weight loss due to chronic ischaemia.
- Examination often revealed little tenderness, out of proportion to the symptom and general condition of the patient (which should alert the doctor to this possibility).
- Look out for risk factors:
  Age > 50 years
  Atrial fibrillation
  Congestive heart failure
  Valvular heart disease
  Old CVA (hemiplegia?)
  PVD (peripheral pulses?)
  Recent myocardial infarction.

(8) Abdominal Aortic Aneurysm (AAA)[13, 16, 39-41]
Useful facts
- Male: Female 2:1; 5-10% of elderly have AAA.
- Risk factors: Hypertension 40%
  Smoking: 8 times more likely to have AAA
  Hyperlipidaemia.
- Catastrophic with syncope, postural hypotension and progressing to shock and collapse.
- May present with flank pain, mimicking renal colic or muscular pain of the back.
- Elderly patient + hypotension + shock +/- mass = AAA must be excluded.
- Look for expansile mass (not pusatile) by placing fingers alongside the mass: Lateral deviation of the fingers is due to aneurysm. Presence of expansile mass is detected in 30-50% only.
- Once diagnosis suspected, do NOT repeat the abdominal palpation.

DIARRHOEA

Table 2. Diarrhoea and red flags

Diarrhoea	+ Associated clues/ symptom	= Red Flag (condition to exclude)
(1) Diarrhoea by itself as a red flag: o Diabetes Mellitus o Thyrotoxicosis	Bloody stools	(2) Infection (salmonella, shigella, campylobacter) (3) Inflammatory bowel disease (4) Colorectal carcinoma (5) Ischaemic colitis
	Anorexia or unexplained weight loss	Colorectal carcinoma
	Recent change of bowel habit	Colorectal carcinoma
	Failed empiric treatment	(6) Appendicitis (7) Gastroenteritis with dehydration

(3) Inflammatory Bowel Disease (IBD)[13, 42-47]
Useful Facts
- Almost all patients with IBD have bowel symptoms, namely abdominal pain and/or change of bowel habits (usually diarrhoea).
- When Irritable bowel syndrome is considered, always consider if it could be IBD.
- Suspect IBD in the following situations:
  - rectal bleeding
  - fever
  - weight loss
  - nocturnal symptom
  - pallor

- unexplained abdominal pain (intermittent or continuous)
- chronic diarrhoea.

- Beware of atypical presentation especially in the elderly; high index of suspicion is required.
- Importance of recognizing IBD cannot be over-emphasized; the risk of colorectal cancer is increased in patients with Ulcerative Colitis. The risk is related to the EXTENT and DURATION of the disease, not its activity. After 10 years of universal disease, the cancer risk is in the range of 0.5-1% per year. Patients with left-sided colitis reach similar risk after 30 years of the disease (30%).

(7) Gastroenteritis with dehydration[48-52]

Useful Facts

- One of the commonest conditions managed at the family practice level.
- Its significance lies in the prompt recognition of child who is clinically dehydrated.
- Majority are due to viruses; bacterial GE is usually characterized by presence of bloody diarrhoea, mucous in stools and a high fever.
- Clinical signs of dehydration are not present unless the child has lost > 4-5% of their body weight.

  Reliable signs of dehydration (> 4-5%) are the following:
  1. Decreased peripheral perfusion as seen by reduced capillary refill time (delay of > 2 sec of normal colour restoration after finger pressure on the palmar surface of the distal fingertip).
  2. Reduced skin turgor (pinched the skin on the lateral abdominal wall at level of umbilicus, which retract slowly in > 1.5-2 sec).
  3. Abnormal respiratory pattern (deep rapid acidotic breathing without signs of respiratory distress).
- Patients at high risk of dehydration includes those < 6 months old, high frequency of stools (> 8/day) or vomiting (> 4/day).
- Various models are used for assessing the degree of dehydration; most include the following variables, as in this table adapted from WHO below.
- The more features that a patient has, the more likely he/she is dehydrated. No single marker listed above alone is useful in assessing for dehydration. One useful and validated method used the following 4 such parameters (Gorelick et al):
  a. general condition of patient as in the WHO table
  b. capillary refill time (> 2 seconds)
  c. dry mucous membranes
  d. reduced tears

  Presence of 3 out of 4 parameters indicates 10% dehydration.

  Presence of 2 out of 4 parameters indicates 5% dehydration (sensitivity and specificity of 82%, similar to WHO criteria).

Table 3. Clinical Findings of Dehydration Assessed (Adapted From WHO)

Signs and Symptoms	Degree of Impairment		
	None or Mild (< 5%)	Moderate (5-10%)	Severe (10%)
General condition - Infants	Thirsty; alert; restless	Lethargic or drowsy	Limp; cold, cyanotic extremities; may be comatose
- Older children	Thirsty; alert; restless	Alert; postural dizziness	Apprehensive; cold, cyanotic extremities; muscle cramps
Quality of radial pulse	Normal	Thready or weak	Feeble or impalpable
Quality of respiration	Normal	Deep	Deep and rapid
Skin elasticity	Pinch retracts immediately	Pinch retracts slowly	Pinch retracts very slowly (> 2 sec)
Eyes	Normal	Sunken	Very sunken
Tears	Present	Absent (cries but no tears)	Absent
Mucous membranes	Moist	Dry	Very dry
Urine output (by report of parent)	Normal	Reduced	None passed in many hours (> 8 hours last urine)

NAUSEA/VOMITING

Table 4. Nausea/vomiting and red flags

Nausea/vomiting	+ Associated clues/ symptoms	= Red Flag (condition to exclude)
(1) Nausea/Vomiting as a red flag by itself:	Infant	(2) Pyloric stenosis (3) Intussuception
- Urinary tract infection - Diabetic ketoacidosis - Pneumonia - Otitis media	Head Injury	(4) Intracranial bleeding eg. subdural haematoma
	Bilious vomiting/ abdominal distension	(5) Intestinal Obstruction
	Lethargy and fever	(6) Meningitis (7) Gastroenteritis with dehydration
	Lower abdominal or groin pain	(8) Torsion of testis
	Failed initial treatment	- Acute abdomen - Consider red flag medical conditions

(1) Nausea and vomiting as a red flag by itself (Table 4)

(2) Pyloric Stenosis[13, 53, 54]

Useful Facts

- Male:Female 5:1
- First born; onset 3rd to 6th week old.
- Progressive, projectile, non-bilious vomiting.
- Test feeding may reveal peristaltic waves moving from the left hypochondrium to the right.
- Failure to thrive or gain weight (67% compared to normal).
- Palpable mass in the epigastrium (53%).

(8) Torsion of testis[55-60]

Useful Facts

- Up to a third of children with torsion of testes can present with lower abdominal pain only. Peak age 13-18 years old (56%), 3-12 year (18%) and > 20 years old (15%). Therefore high index of suspicion required.
- Present with SUDDEN SEVERE onset of pain and may even vomited (30%). Doctors need to be aware that an embarrassed child may state lower abdominal or inguinal pain rather than scrotal pain. There may be a history of similar self-limiting pain.
- No specific symptom and signs to differentiate torsion from epididymitis, the most common cause of misdiagnosis (61%). A history of dysuria, urethral discharge and tender spermatic cord in the groin tends to favour the latter. Examination may reveal a high-riding or horizontal testis though later the affected testis rapidly become enlarged and tender. The absence of the cremasteric reflex supports the diagnosis of torsion; its presence however DOES NOT exclude torsion.
- A history of trauma does not exclude torsion; pain that persists for more than 1 hour after an injury is not normal and merit evaluation.
- Important point to note is that time from start of symptom to surgery for testicular salvage is 6 hours (>90%) and by 24 hours the salvage rate is less than 10%.

(4) Subdural Haematoma[61]

Useful Facts

- Headache is the single most common symptom.
- Headache is often bitemporal or generalized.
- Common in elderly (> 65%).
- 60-70% have history of antecedent head trauma.
- Subtle features to look out for:
  - cognitive or personality changes
  - focal weakness, sensory/visual changes, seizures
  - lethargy and altered mental state.

(6) Meningitis[62-66]

Useful facts

- Rare but serious infection that can be misdiagnosed if a high index of suspicion is not maintained. Early recognition result in better patient outcome due to timely intervention.
- Triad of fever, neck stiffness and altered mental state are classical but present in less than two-third of the cases. This is especially so in children and the elderly.
- In children, they may present with nausea, vomiting, irritability, lethargy or poor feeding. Meningeal signs may not be present. Feel for bulging fontanelle, measure the head circumference and look out for purpuric skin rashes.
- Recent literature review and analysis by Attia et al showed that clinical history alone is NOT useful in establishing a diagnosis of meningitis. In contrast, physical examination has sensitivities that are clinically useful. The 3 signs are:
  - fever (pooled sensitivity 85%)
  - neck stiffness (pooled sensitivity 70%)
  - altered mental state (pooled sensitivity 67%).

  Thus the diagnosis of meningitis can be ruled out in adult patients who present without any of the above 3 signs.
- Kernig's sign is performed with patient lying supine and hip flexed to 90°; a positive sign is present when there is resistance or pain in the lower back or posterior thigh with extension of the knee.

  Brudzinki's sign is present when passive flexion of the neck in a supine patient result in flexion of the knees and hips.

  These two signs are highly specific but suffer from low sensitivity.

DYSPEPSIA

Table 5. Dyspepsia and red flags

Dyspepsia	+ Associated clues/ symptom	= Red Flag (condition to exclude)
(1) Dyspepsia by itself as a red flag: • Acute myocardial infarction	Risk Factors a) Ulcerogenic factors (smoking, NSAID) b) New onset after 45 years old c) Cancer risk • gastric adenoma • chronic atrophic gastritis • smoking • pernicious anaemia • history of subtotal gastrectomy > 20 years	(2) Peptic Ulcer disease (3) Gastric Cancer Gastric Cancer
	Anorexia or unexplained weight (> 3 kg)	Gastric Cancer
	Upper GIT bleeding (malaena/anaemia)	• Peptic Ulcer disease • Gastric Cancer
	Persistent symptom > 6-8 weeks of treatment	Gastric Cancer

(1) Acute Myocardial Infarction[67-72]

Useful Facts

- Look for cardiovascular risk factors e.g smoking, hypertension, diabetes, PVD and hyerlipidaemia.
- Previous history of AMI is present in only 30% of cases. In other words 70% of AMI cases do not have a preceding history of AMI.
- Symptoms most predictive of AMI are symptom related to exertion and radiation to the shoulder or arms (7 times more likely).
- Signs most predictive of AMI are hypotension, diaphoresis and third heart sound on auscultation (2-3 times more likely).

- Gastrointestinal symptoms account for 26% of claims by patients who had AMI but incorrectly diagnosed.
- Typical angina is defined as[7]
  1. Substernal chest discomfort with a characteristic quality and duration.
  2. Pain worsen with exertion or emotional stress.
  3. Pain relieved by rest or GTN.

Atypical pain – meet 2 out of 3 criteria above
Non-cardiac chest pain – </= 1 criteria above

The quality of pain is often described as tight, crushing or heavy sensation, often with radiation more to the left arm than the right arm, jaw and shoulder. According to the ACC/AHA/ACP-ASIM guideline for chronic angina, the followings patients are recommended for further testing to exclude CAD:

- Male > 40years old with atypical angina (51%) or typical angina (87%)* [70]
  Male < 40years old with typical angina (76%)* [70]
- Female > 50years old with atypical angina (31%) or typical angina (73%)* [71]
  Female < 50years old with typical angina (55%)* [71]

* *refer to the pretest likelihood of CAD according to age, sex and symptom.*

(3) Gastric Cancer[73-80]

Useful Facts

- Male:Female 3:1; accounts for 2-3% of patient presenting with dyspepsia.
- Presentation is often late (80%); hence high index of suspicion is required.
- Risk factors includes history of gastric adenoma, chronic atrophic gastritis, pernicious anaemia, subtotal gastrectomy > 20years and smoking.
- Alarm symptoms include:
  - new onset of dyspepsia > 40 years old (> 35 years old recommended by MOH-CPG'98)
  - recent change in the dyspeptic symptom.
  - recent weight loss (> 3kg).
  - dysphagia.
  - protracted vomiting.
  - refractory to treatment (6-8 weeks of empiric treatment)
  - anaemia.
  - malaena or haematemesis.

  The negative predictive value for any of the alarm symptoms for gastric cancer is 99%.

- Physical signs are usually late presentation.
  - epigastric mass (20%).
  - supraclavicular lymph node (Trosier's sign).
  - evidence of secondaries (e.g hepatomegaly, jaundice).
  - evidence of anaemia (palpebral and nail bed pallor).

CONSTIPATION

Table 6. Constipation and red flags

Constipation	Associated clues/ symptom	= Red Flag (condition to exclude)
(1) Constipation by itself as a red flag: • Hypothyroidism • Hypokalaemia (diuretic usage) • Hypercalcaemia (multiple myeloma)	Risk factor • family history of colorectal cancer • long standing ulcerative colitis	(2) Colorectal cancer
	Recent onset in patient > 45 years old	(2) Colorectal cancer
	Rectal Bleeding	(2) Colorectal cancer (3) Inflammatory bowel disease

(2) Colorectal Cancer[81-85]

Useful Facts

- Most common GIT malignancy.
- Risk increases with increasing age:
  a. Family history of colorectal cancer

General population risk	1:50
One 1st degree relative affected	1:17
One 1st degree relative affected < 45 yrs	1:10

  b. Age > 50 years old.
  c. History of longstanding ulcerative colitis (> 10 years) or adenomatous polyp.
- Alarm symptoms include:
  - rectal bleeding (predictive value for cancer of 2-10%).
  - recent change in bowel habit (constipation often; may alternate with diarrhoea).
  - tenesmus or sense of incomplete evacuation.
  - weight loss.
  - anaemia (especially right-sided colonic cancer).

DISCUSSION

The importance of red flags can be illustrated with a recent case seen in general practice as reported in the Straits Times on 26th July 2005. The case involved a 9-year-old boy who was seen for complaint of nausea/vomiting with abdominal colic and low grade fever for several days. The first doctor thought it was constipation and gave the patient laxatives. It did not improve. The father brought the son to see another doctor. A diagnosis of "gastroenteritis" was made by the second doctor and symptomatic treatment was given. The next day the patient presented in a collapsed state to the A/E Dept. Unfortunately the patient did not survive. The red flag here was an abdominal pain that has not resolved needed a detailed history to be taken. This would have uncovered the story that the boy had started with constipation; gastroenteritis cannot be correct, and a hunt for an underlying cause for the abdominal pain needs to be made. Red flags refer to warning features in the patient's history or clinical examination that should prompt one to reconsider one's initial diagnosis. The attempt to look for red flags in every consultation is necessary for us to be safer doctors.

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