

Introduction-mdm
Abdominal pain

In the Name of God

Medical Decision Making for Common Disease Presentations

BY

Mitra Ahmad Soltani

Table of Contents

Introduction-----

Priorities

The process of making a decision

Table I. Number and percent distribution of reasons of emergency department visits

Table II. Number and percent distribution of emergency department visits with corresponding standard errors, by primary diagnosis

Table III. Number and percent of drug mentions for the 20 most frequently occurring therapeutic drug classes at emergency department visits

The Case

Figure1- Approach to hemoptysis

Figure 2- Approach to eosinophilia

Figure 3- Approach to abdominal pain

Figure-4: Approach to abdominal mass (organomegaly)

Table IV- Yield and cost of individual common diagnostic tests performed for the clinical evaluation of patient's illness and the case finding among 540 new, symptomatic primary care outpatients

Table V- Comparing the three different ways to approach this case

HTN-----

Algorithm1-1- Approach to HTN

Algorithm1-2: Drug choice in cases of chronic HTN

Table1-1: Hypertension management

Table1-2: HTN drugs

Introduction-mdm

Abdominal pain

S3&S4-----

Algorithm 2-1: Differential Diagnosis of S3 and S4

Algorithm 2-2: Acute Pulmonary Edema Management

Table 2-1: Treatment of different causes of S3 and S4 gallop

Table2-2: Pulmonary edema drugs

Arrhythmia-----

Table3-2: Different ECG patterns with the counterpart laddergrams

Table3-3: Answers

Figure3-1: Algorithm to summarize the arrhythmia patterns

Table3-4: Anti-arrhythmia drugs

CAD-----

Table4-1: IHD management

Diagram4-1: ECG change after MI

Diagram4-2: Enzyme change after MI

Example #1: frontal plane leads with fully evolved inferior MI

Example #2: Old inferior MI

Example #3: Acute inferoposterior MI

Example #4: Old posterolateral MI

Example#5: Fully evolved anteroseptal MI

Example#6: Acute anterior or anterolateral MI

Example #7: Inferior MI + RBBB

Example #8: Anteroseptal MI with RBBB

Table4-2: Identifying Appropriate Patients For Thrombolytic Therapy

Table4-3: Contraindications for thrombolytic drugs.

Table4-4: Guidelines for the use of intravenous heparin with thrombolytic therapy.

Introduction-mdm

Abdominal pain

Table4-5: Heparin adjustment guideline

Diagram4-3: Approach to Hyperlipidemia

Table4-6: Determining Patient-Specific LDL Goals Through Risk Factors

Table4-7: HMG-CoA Reductase Inhibitors (Statins)

Table 4-8: Niacin (Nicotinic Acid)

Table 4-9: Fibric Acid Derivatives (Fibrates)

Table 4-10: Bile Acid Sequestrants

Trauma-----

Diagram5-1: Blunt abdominal trauma plus head trauma

Diagram5-2: Cervical Spine trauma

Diagram5-3: Fractured Pelvis

Table5-1: Glasgow Coma Score-GCS

Diagram5-4: Head Injury

Diagram5-5: Penetration injury

Table 5-2: Suitable Blood Replacement Regimes for Previously Healthy Adults

Table 5-3: Clinical Signs of Shock

Table 5-4: Protocol of certain trauma injuries management

Empirical Antibiotic Therapy-----

Table6-1: Genital Ulcer Antibiotic Therapy

Table 6-2: Meningitis and Sepsis Empirical Therapy

Table6-3: Endocarditis Empirical Therapy

Table 6-4: Endocarditis prophylaxis

Table6-5: Pneumonia Empirical therapy

Introduction-mdm

Abdominal pain

Table6-6: Empirical therapy of diarrhea.

Table6-7: Central Nervous System Infections

Table6-8: Gastrointestinal Infections

Table6-9: Skin and Soft Tissue Infections

Table6-10: Urinary tract infection

Table6-11: Respiratory Tract Infections

Altered Mental Status-----

Figure 7-1: Diagnosing the etiology of coma

Figure7-2: Algorithm for the treatment of cerebrovascular accident (stroke) or suspected stroke

Figure7-3: Algorithm for the management of acute poisoning.

Table7-1: Poisoning Specific therapy

Figure 7-4: Algorithm for the early management of meningococcal infection.

Figure7-5: Early management of adults with an uncomplicated first generalized seizure

Respiratory Aid-----

Table8-1: Protocol of respiratory management

Figure 8-1: Asthma management

Figure 8-2: The diagnostic protocol of chest pain

Figure 8-3: Algorithm of hypoxemia

Figure 8-4: Etiology of low Vital Capacity

Figure 8-5: Etiology of reduced chest movement

Figure 8-6: Etiology of hypoxemia without hypercarbia

Introduction-mdm

Abdominal pain

Table 8-2: Mechanical Ventilation variables that need adjustment

Figure8-7: Algorithm of weaning from mechanical ventilator

Table8-3: Criteria for intubation &/or and mechanical ventilation

Table8-4: Expected degrees of compensation in acid-base disorders

Figure8-8: Steps to proceed with an ABG test.

Introduction

Priorities

When facing a patient, a beginner doctor encounters a recall of his/her prior education about the subject matter. Both clinically relevant and irrelevant details pop up simultaneously leading to a thought block. To avoid this, he/she should employ some kind of text organizers (like tables or charts) about most common issues of his/her area of practice, and make protocols for a fast reference.

The aim of this handbook is to provide protocols of managing the emergency cases where the limited time allows just a single glance at a chart or a table.

Based on CDC's publication of the most prevalent diagnoses (table I,II), drugs (table III), and tests (table IV), this handbook is organized in seven chapters:

- Abdominal pain (explained in this chapter of introduction)
- Circulation (arrhythmia and Coronary Artery Disease)
- Trauma
- Empirical antibiotic therapy
- Altered mental Status(CNS and poisoning)
- Respiratory problems

The most frequently used drugs are also discussed.

The process of making a decision

There is a growing awareness that physicians' decisions too often result in suboptimal outcomes, which can lead to adverse consequences for a patient. The question is what constitutes a good decision?

There are two types of decisions: decisions based on fundamental references in any field (prescriptive), and decisions in experimental or real-world setting (descriptive).

A physician takes into account certain set of facts when making a decision.

Following list is an example:

1. patients characteristics

Introduction-mdm

Abdominal pain

2. references (like ICD-10 which is designed to both reflect the practices of a physician as well as to shape them)
3. technology
4. monitoring and feedback
5. group versus individual approach to a patient
6. cost effectiveness
7. considerations like predictive values of diagnostic tests he/she orders

Each of these criteria has a level of uncertainty expressed in terms of probabilities; the likelihood of a given event to occur in a particular situation. Some probabilities are calculated based on references and some are calculated off hand by the physician in his/her unique setting. The first part; abdominal pain, is explained in words to explain algorithms and tables. This is meant to help the reader grasp an understanding of the style of material presentations in this handbook. Other chapters are not filled up by redundant explanations.

Introduction-mdm
Abdominal pain

Principal reason for visit and RVC code ¹	Number of visits in thousands	Standard error in thousands	Percent distribution
All visits	110,155	4,416	100.0
Stomach pain, cramps, and spasmsS545	7,152	356	6.5
Chest pain and related symptomsS050	5,637	287	5.1
FeverS010	5,310	503	4.8
CoughS440	3,016	288	2.7
Shortness of breathS415	2,943	189	2.7
Headache, pain in headS210	2,844	165	2.6
Back symptoms.S905	2,713	176	2.5
Symptoms referable to throatS455	2,483	262	2.3
VomitingS530	2,422	214	2.2
Pain, site not referable to a specific body systemS055	2,176	134	2.0
Lacerations and cuts—upper extremityJ225	2,161	140	2.0
Motor vehicle accident, type of injury unspecifiedJ805	1,758	137	1.6
Earache or ear infectionS355	1,748	143	1.6
Accident, not otherwise stated.J810	1,729	142	1.6
Vertigo—dizzinessS225	1,578	102	1.4
Injury, other and unspecified type—head, neck, and faceJ505	1,468	115	1.3
Low back symptoms.S910	1,438	101	1.3
Labored or difficult breathing (dyspnea)S420	1,387	110	1.3
Skin rash.S860	1,376	104	1.2
Nausea.S525	1,355	107	1.2
All other reasons	57,462	2,232	52.2

Table I-Number and percent distribution of reasons of emergency department visits

Introduction-mdm
Abdominal pain

Major disease category and ICD-9-CM code range ¹	Number of visits in thousands	Standard error in thousands	Percent distribution
All visits	110,155	4,416	100.0
Infectious and parasitic diseases 001-139	3,422	240	3.1
Neoplasms 140-239	257	35	0.2
Endocrine, nutritional, metabolic diseases, and immunity disorders 240-279	1,637	122	1.5
Mental disorders 290-319	3,487	186	3.2
Diseases of the nervous system and sense organs 320-389	6,244	424	5.7
Diseases of the circulatory system 390-459	4,648	276	4.2
Diseases of the respiratory system 460-519	12,978	940	11.8
Diseases of the digestive system 520-579	6,657	318	6.0
Diseases of the genitourinary system 580-629	4,949	256	4.5
Diseases of the skin and subcutaneous tissue 680-709	3,166	210	2.9
Diseases of the musculoskeletal and connective tissue 710-739	5,939	336	5.4
Symptoms, signs, and ill-defined conditions 780-799	19,574	900	17.8
Injury and poisoning 800-999	28,749	1,145	26.1
Fractures 800-829	3,705	198	3.4
Sprains 840-848	6,164	286	5.6
Intracranial 850-854	293	45	0.3
Open wounds 870-897	6,507	318	5.9
Superficial 910-919	1,750	142	1.6
Contusions 920-924	4,692	239	4.3
Foreign bodies 930-939	538	65	0.5
Burns 940-943	164	27	0.1
Trauma complications and unspecified injuries 958-959	1,607	113	1.5
Poisoning and toxic effects 960-989	889	77	0.8
Surgical and medical complications 996-999	454	50	0.4
Other injuries	1,986	131	1.8
Supplementary classification V01-V82	2,973	193	2.7
All other diagnoses ²	3,744	258	3.4
Unknown ³	1,729	157	1.6

. . . Category not applicable.

0.0 Quantity more than zero but less than 0.05.

¹Based on the *International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) (13)*.

²Includes diseases of the blood and blood-forming organs (280-289); complications of pregnancy, childbirth, and the puerperium (630-677); congenital anomalies (740-749) originating in the perinatal period (760-779), and diagnoses that were uncodeable, patient left before being seen, patient was transferred to another facility, health main authorize treatment, or entries of 'none,' 'no diagnosis,' 'no disease,' or 'healthy.'

³Includes blank diagnoses, uncodeable diagnoses, and illegible diagnoses.

NOTE: Numbers may not add to totals because of rounding.

Table II. Number and percent distribution of emergency department visits with corresponding standard errors, by primary diagnosis

Introduction-mdm
Abdominal pain

Generic substance	Number of occurrences in thousands ¹	Standard error in thousands	Number of generic substances per 100 drug mentions ²
Acetaminophen	28,648	1,468	14.6
Ibuprofen	14,722	961	7.5
Hydrocodone bitartrate	11,100	719	5.7
Promethazine	8,291	449	4.2
Ketorolac tromethamine	5,890	339	3.0
Amoxicillin	5,453	529	2.8
Albuterol	5,234	340	2.7
Meperidine	3,875	314	2.0
Morphine	3,583	251	1.8
Cephalexin	3,242	248	1.7
Sodium chloride	3,201	380	1.6
Aspirin	3,139	245	1.6
Azithromycin	3,120	329	1.6
Oxycodone hydrochloride	2,994	337	1.5
Ceftriaxone	2,725	231	1.4
Codeine phosphate	2,696	243	1.4
Tetanus toxoid	2,601	181	1.3
Nitroglycerin	2,521	194	1.3
Diphenhydramine	2,466	146	1.3
Prednisone	2,287	164	1.2

Table III. Number and percent of drug mentions for the 20 most frequently occurring therapeutic drug classes at emergency department visits

A case:

A 38 year-old housewife is admitted for the Chief Complaint of diffuse abdominal pain with some accentuation in the LUQ. She states that the pain started some 5 years ago while it was diagnosed as colitis and was treated accordingly.

Last month she had an episode of chocolate-color sputum and severe chills, chest pain and fever.

Her Past History reveals that she has undergone two surgeries for a skin graft because of electrical shock injury and appendectomy. She also complains of palpitation and anxiety.

Introduction-mdm
Abdominal pain

Her Family History doesn't show any particular event except for her mother who died of heart attack.

In Review of Systems, she complains of weight loss, head-ache, change of skin color, sinusitis, chest pain, anorexia, nausea and vomiting, constipation, black stools, abdominal distention, muscular pain, weakness, claustrophobia, and excessive thirst.

The findings of her Physical Examination are as follows:

T=36.5 c

P=80 bpm

BP=100/60 mmHg

BMI=27 kg/(m²)

She has falling hair, a palpable tender spleen with some fluctuation. The muscular force is 4/5. The rest of the examination reveals no positive findings.

Lab Results shows a normal stool exam and urine analysis.

ESR=25

CBC is normal except for a 10% Eos.

QUESTION:

Which approach is the most effective approach to reach a diagnosis?

- a- Based on the woman's statement: chocolate-color sputum, abdominal pain
- b- Based on physical exam: splenomegaly
- c- Based on the lab results: eosinophilia .

In figure one an algorithm of hemoptysis can be found. Figure two shows the approach to eosinophilia and figure three is for organomegaly in the context of abdominal pain approach. The yield and cost-effectiveness of common diagnostic tests are presented in table-IV.

Introduction-mdm
Abdominal pain

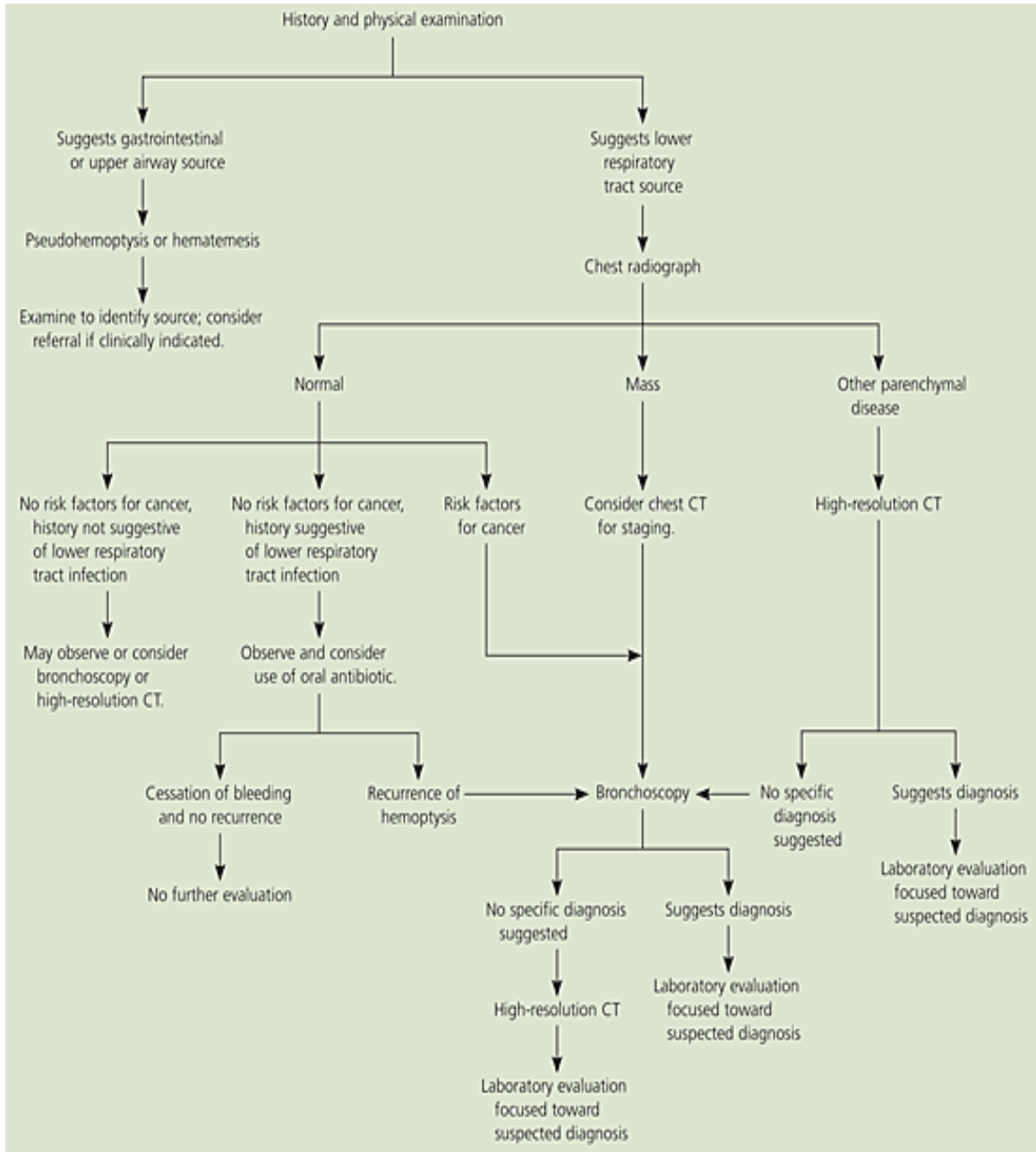


Figure1- Approach to hemoptysis

Introduction-mdm
Abdominal pain

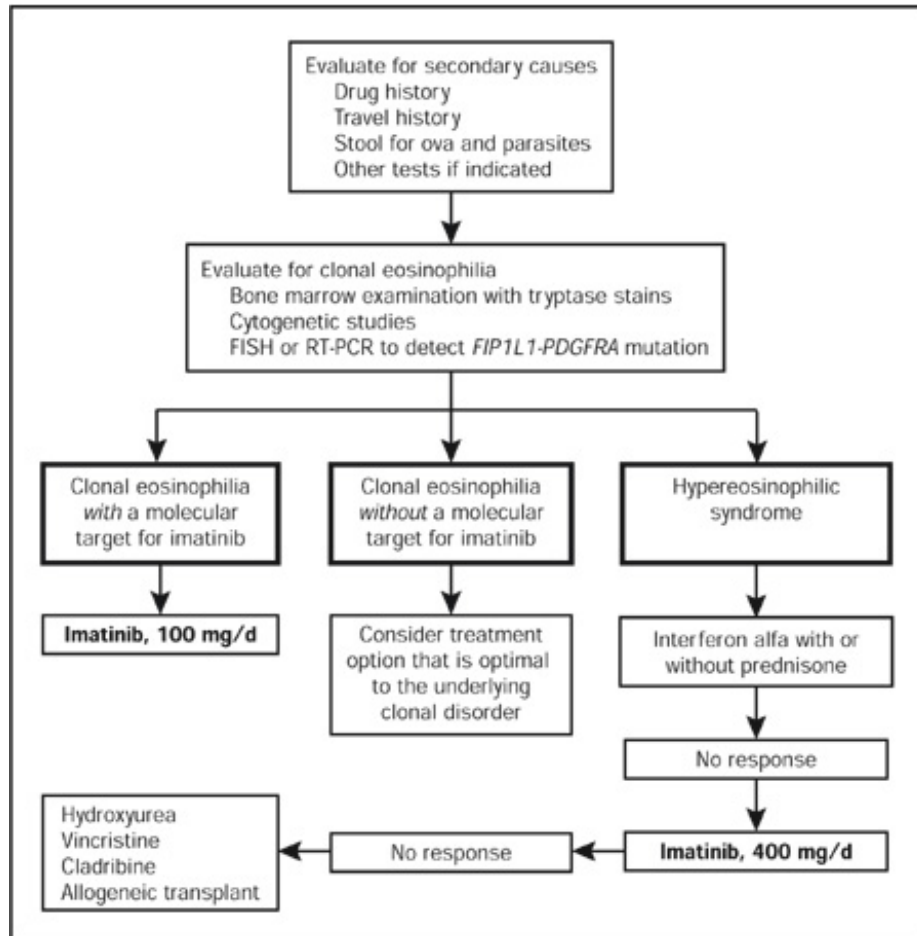


Figure 2- Approach to eosinophilia

Abdominal pain:

- RUQ/LLQ pain: ECG & CXR (to Rule out DX1)---->(If NL)
Sonography (DX2)(figure3) ---> (NL) Amylase, Lipase,
Aminotransferases (DX3)--->(NL) ERCP/CT(DX4)
- Epigastric: ECG & CXR(DX1)--->(NL) UGI SERIES/Endoscopy(DX5)
--> (NL)Sonography(DX6)---->(NL)DX7
- Generalized: Abdominal XR(DX8)-->(NL)CT Scan(9)--->
(NL) Angiography (DX10) --->(NL)DX11
- PERIUMBILICAL: Sonography (DX12)---> (NL)Contrast Enema (DX13)
---> (NL) DX14
- RLQ/LLQ: Digital Rectal Exam +Gravindex(♀) +CBC(DX15)--->(NL)
Contrast Enema(DX16)--->(NL)IVP(DX17)--->(NL) DX18
- Pelvic: DRE+ Gravindex +CBC(DX19)--->(NL)Bladder
Catheterization(DX20)--->(NL) Sigmoidoscopy(DX21)
---> (NL) IBS

Figure 3- Approach to abdominal pain

DX1=MI, pericarditis, pleuritis, basilar pneumonia, pleural effusion

DX2= perforated viscus, stone, organomegaly, intestinal infarct or obstruction

DX3= Acute pancreatitis, small intestine obstruction, cholecystitis, cholelithiasis,
perforated PU, viral hepatitis, perihepatitis, liver abscess, liver parenchymal
disease

DX4=Biliary disease, CBD strictures, carcinoma

DX5=PUD, reflux, tumor, gastritis

DX6=cholecystitis

DX7= acute pancreatitis, abdominal hernia, DES

DX8=perforation (of appendicitis, PU, cholecystitis, carcinoma, bowel ischemia,
diverticulum), peritonitis, kidney stone, obstruction

Introduction-mdm

Abdominal pain

DX9= ascites, pancreatitis, perforated abscess, aneurism

DX10=bowels ischemia

DX11=porphyria, lead, uremia, DKA

DX12=aneurism, infarct, obstruction

DX13=appendicitis, diverculitis

DX14=hyperperistalsis, diverticulitis

DX15=ectopic pregnancy, PID, ovary disease, rectal carcinoma, prostatitis

DX16=appendicitis, diverticulitis, IBD, ischemia, cancer, obstruction

DX17=Ureter carcinoma, stone

DX18=herpes zoster, IBS

DX19=prostatitis, rectal carcinoma, proctitis, PID, EP, endometriosis, uterine rupture, acute cervicitis, endometritis

DX20= Bulged bladder,

DX21= sigmoid carcinoma, crohn disease, ulcerative colitis, diverticulitis

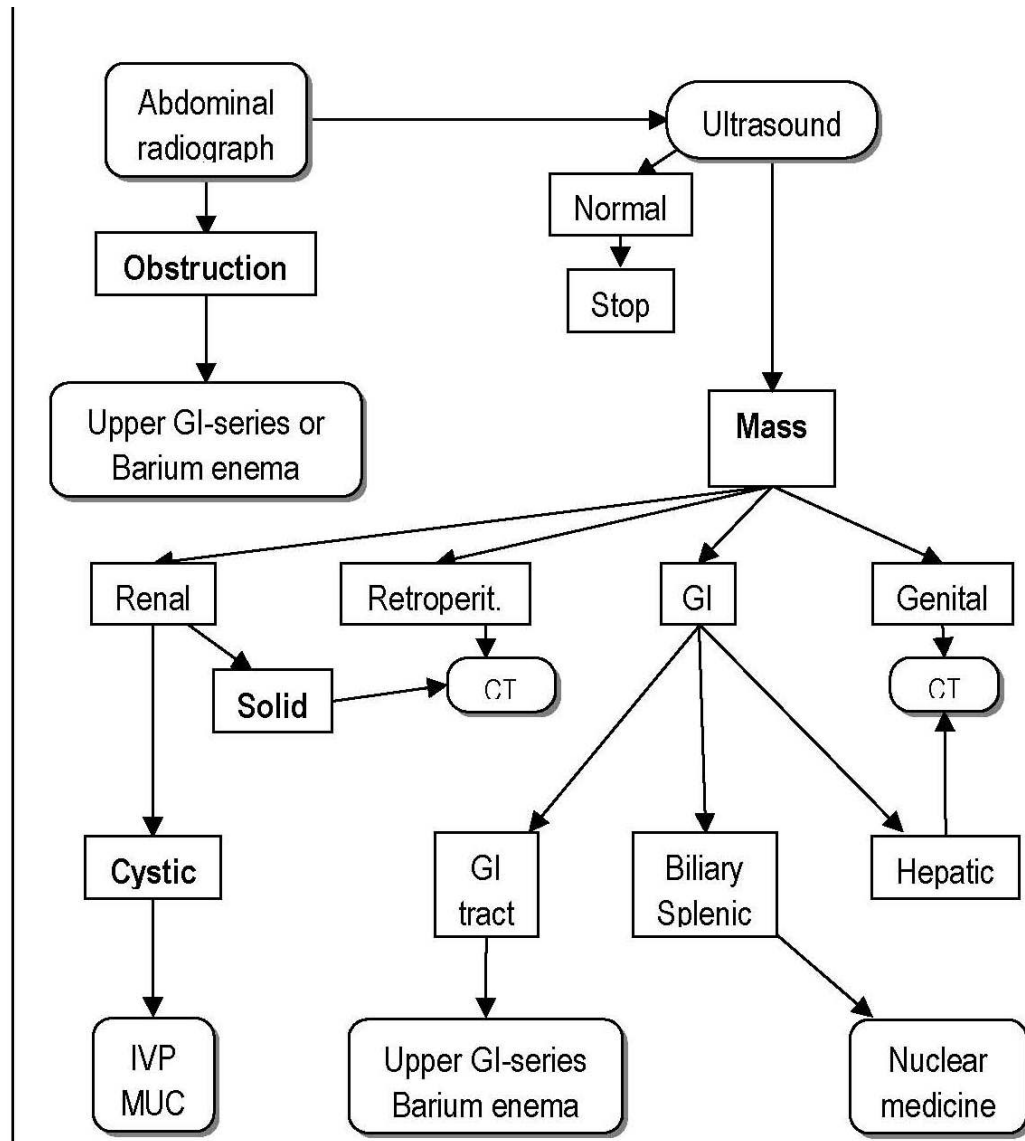


FIGURE-4: Approach to abdominal mass (organomegaly)

Introduction-mdm
Abdominal pain

	Contribution of test ¹ to UR-generation	Cost ² /Test yielding a UR
Dipstick urinalysis ³	0.044	6270
CRP ³	0.252	116
ESR ³	0.177	580
Hemoglobin ³	0.084	679
RBC indices ³⁴	0.072	789
WBC ³	0.204	278
Total protein ³	0.022	1027
Albumin ³	0.013	1732
A/G ³	0.118	381
Urine sediment	0.037	7731
Sialic acid	0.219	542
Platelet count	0.035	1622
LDC	0.231	205
Serum protein fraction profile	0.192	962
Total cholesterol	0.076	369
Glucose	0.019	1723
AST	0.089	280
ALT	0.086	293
LD	0.062	368
ALP	0.035	708
GGT	0.038	628
Cholinesterase	0.063	442
Serum urea nitrogen	0.014	1814
Creatinine	0.008	4399
Uric acid	0.006	4612
Fecal occult blood⁵ (n = 53)	0.057	1894
Chest x-ray⁵ (n = 198)	0.136	6430
Abdominal x-ray⁵ (n = 17)	0.353	2484
ECG ⁵ (n = 79)	0.177	3909
CBC ⁶	0.099	576
CBC + LDC	0.125	440
Chemistry profile ⁷	0.070	522

Table IV. Yield and cost of individual common diagnostic tests performed for the clinical evaluation of patient's illness and the case finding among 540 new, symptomatic primary care outpatients. (UR=useful Results)

¹ Contribution of the test is calculated as follows: the number of tests yielding a UR or contributing to case finding/total number of tests performed.

² Costs are indicated in Yen (¥)

³ Test components of the ELT(Essential Laboratory Tests) panel.

⁴ RBC, red blood cell; WBC, white blood cell count.

⁵ Optional test items ordered if necessary. Values in parentheses indicate the number of patients in whom each of these optional tests was performed. Fecal occult blood was considered as Stool Exam for ova.

⁶ Yield and cost of simultaneous measurement of hemoglobin + RBC indices + white blood cell count + platelet count on an automated blood cell counter

⁷ Yield and cost of simultaneous analysis of 16 test items, including chemistry tests, CRP, and sialic acid, on an automated multi channel analyzer.)

Introduction-mdm
Abdominal pain

Table-V summarizes these figures.

Problem list	The first diagnostic test	Cost/Test yielding a UR	Steps taken to "no further investigation"	Any limitations(time-money-patient's compliance-reliance on external resources	Level of invasiveness Of the diagnostic tests	Contribution of test to UR-generation
eosinophilia	Stool exam	1894 Yen (3570 Rls)	2	depends	NI-I	0.057
splenomegaly	Abdominal x ray or US	2484 Yen (24000 Rls)	3	depends	NI	0.353
hemoptysis	Chest x ray	6430 Yen (29000 Rls)	4	depends	NI -I	0.136

Table V-comparing the three different ways to approach this case.(UR=Useful Result /NI=noninvasive/I=invasive)

One point to be mentioned is that costs are indicated in Yen (¥) and can be converted to US dollars at a rate of \$1.00 = ¥115.00= 9100 Iran Rials on Jan, 26th 2006. The computation, however, should be adjusted according to the country. For example, the cost of a chest x-ray is 6430 Yen or 55.91 \$ or 508780 Rials. Yet, the actual cost is 29000 in Iran. As table-V shows, the approach to splenomegaly by an abdominal x-ray has the highest contribution of test to useful results (calculated as : the number of tests yielding a useful result or contributing to case finding/total number of tests performed). Its cost is moderate, it's non-invasive and it takes fewer steps to the "no further investigation is needed".

So the case was managed by splenomegaly approach.The abdominal imaging (x-ray followed by ultrasound) revealed multiple cystic lesions (30x25mm) in the right lobe of the liver and splenic cysts (one as big as 125x90 mm) in the spleen.

She had a surgery and the cysts proved to be hydatid.

This could explain the anaphylactoid reaction, chocolate-color sputum and eosinophilia.

Introduction-mdm
Abdominal pain

As deduced, what we find useful in real-world setting decision making is schematic comparisons and not isolated information of texts. That is the main reason the bulk of this book is written in figures, tables, algorithms and cases.

Each chapter begins with some questions about some medical cases. The cases are discussed by schematic presentations. The drugs are presented by the dosage, contraindications, and prices in a table for comparison. The chapter ends with answers to questions and suggested reading.

Acknowledgment:

I should like to thank Professor David J. Solomon the editor of Medical Education Online for his help in making this manuscript more eligible for archiving, Professor Lawrence Martin for the permission to use some of his ABG and mechanical ventilation problems in Respiratory Aid section, Professor Bruce Argyle for his permission to use MicroEKG Computer Program Manual.MadScientist Software of Alpine, Utah for arrhythmia management in Arrhythmia section, And Dr. Yuzuru Takemura for the permission to use his article on “yield and cost of common diagnostic tests” in the Introduction section. It should also be mentioned that ECG recordings are from Professor Frank Yanowitz’s ECG learning center , and sections on drugs and procedures are unchanged citations from the related references to avoid misunderstanding.

Mitra Ahmad Soltani,
MD, MS in Midwifery, MA in TEFL
Azad University-Tehran School of Medicine

References:

- 1- Ayalew Tefferi, Mayo Foundation for Medical Education And Research. (2005).**Blood Eosinophilia: A New Paradigm In Disease Classification, Diagnosis, And Treatment.**;80:75-83
- 2- Bidwell ,Jacob L. Pachner , Robert W. American Family Physician. (2005) **Hemoptysis: Diagnosis And Management.** University Of Wisconsin Medical School, Milwaukee, Wisconsin.Vol. 72/No. 7
www.aafp.org/afp/20051001/1253.html
- 3- Braunwald Eugene, et al. **Harrison's Principles of Internal Medicine.** 16th edition. McGrawHill; 2005
- 4- **CDC.Advance Data** No. 340 . March 18, 2004
- 5- Patel ,Vimla L. Kaufman ,David R And Arocha ,Jose F. Journal of Biomedical Informatics (2002), **Emerging Paradigms Of Cognition In Medical Decision Making,** Columbia University, New York, USA
- 6-Ringertz,Hans. **State of The Art Imaging Of Abdominal Masses In Childhood,** [Http://Www.Star-Program.Com/Data--Star-Program/Upload /Star_Abtracts_752_Ringertz1.Pdf](http://Www.Star-Program.Com/Data--Star-Program/Upload /Star_Abtracts_752_Ringertz1.Pdf)
- 7- Takemura,Yuzuru. Haku Ishida, Yuji Inoue And Beck J. Robert. Clinical Chemistry. (2002) .**Yield And Cost Of Individual Common Diagnostic Tests In New Primary Care Outpatients In Japan.**;48:42-54.
www.clinchem.org/cgi/content/full/48/1/42

Introduction-mdm
Abdominal pain