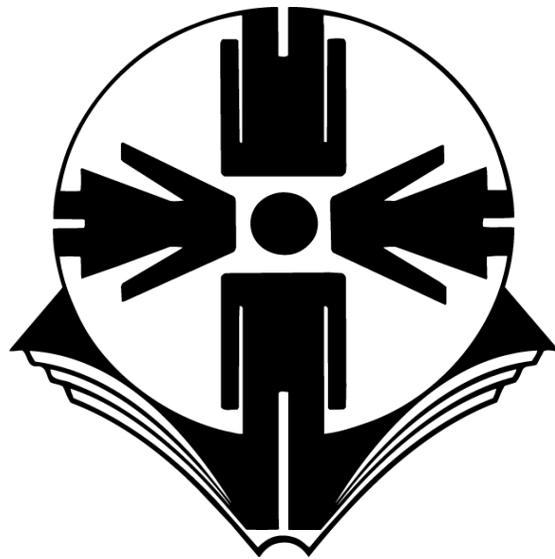


The Core Content Review of Family Medicine



A Guide for the
National Faculty

The Core Content Review of Family Medicine

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A Guide for the National Faculty of The Core Content Review of Family Medicine

The Core Content Review of Family Medicine is a self-administered, self-evaluating, continuing medical education program prepared under the direction of the Connecticut and Ohio Academies of Family Physicians. It has been published continuously since 1968. The material for The Core Content Review of Family Medicine is provided by a select national faculty composed of physicians in clinical practice, leading educators from medical schools and teaching hospitals and other healthcare leaders.

We appreciate your interest in joining our distinguished national faculty. This guide will provide you with much of the information you will need to prepare and submit your questions/discussions and/or clinical set problems.

Since its inception, The Core Content Review of Family Medicine has achieved national recognition as a leader in providing high-quality, continuing medical education for family physicians, not only in the United States and Canada, but also throughout many parts of the world. The national faculty of The Core Content Review of Family Medicine contributes to the goal of providing convenient, economical and effective continuing medical education for family physicians and other primary care physicians.

The Core Content Review of Family Medicine is designed so that physicians can evaluate and expand their knowledge of key disciplines of family practice. The philosophy of The Core Content Review of Family Medicine is one of self-evaluation. Full length discussions are provided with each question so that the participant can evaluate their progress and score their own answers.

Although a question and discussion format is used, The Core Content Review of Family Medicine is not a testing vehicle. Educationally, the most important component of The Core Content Review of Family Medicine is the discussion for each question. Each question is considered an introduction to the discussion.

Documenting Your Participation as a National Faculty Member

Writing for The Core Content Review of Family Medicine is a scholarly endeavor. We encourage all of our national faculty members to include The Core Content Review in their curriculum vitae. Writing for The Core Content Review can also be submitted to the American Academy of Family Physicians (AAFP) for up to 30 prescribed continuing medical education hours annually. Published material can be documented as follows:

Smith AB. Medical topic. Core Content Review 35(4):12-13.

The following is a statement that can be used by our faculty to explain what The Core Content Review is to persons or organizations that may not be familiar with it.

“The Core Content Review of Family Medicine is a self-administered, self-evaluating, continuing medical education program prepared under the direction of the Connecticut and Ohio Academies of Family Physicians. It has been published continuously since 1968. The original material for The Core Content Review of Family Medicine is provided by a select National Faculty composed of physicians in clinical practice, leading educators from medical schools and teaching hospitals and other healthcare leaders.

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Members of the National Faculty submit material for review prior to publication. Material is accepted only if it is of the highest quality based on its scholarly research of the topic, use of current references and effective presentation of the material. Based on these criteria, not all submissions are accepted for publication. The Core Content Review is a peer-reviewed publication. Writing acceptable questions and discussions for The Core Content Review takes significant time and effort and should most certainly be considered a scholarly endeavor equivalent to the presentation of a paper or lecture.

The editorial board of The Core Content Review has been asked by academic institutions to write letters of support for promotion for members of its National Faculty in recognition of their scholarly efforts for the publication.

The original meaning of the word “physician” is teacher. Central to our role as physicians is our role as teachers to our patients and to our fellow physicians. Authorship in a publication such as The Core Content Review of Family Medicine is a testimonial to a mission of teaching and professionalism.

I. Question/answer/discussion format

In six issues annually, The Core Content Review of Family Medicine uses a questions/answer/discussion format. There are two types of questions used as introductions to the discussions – single-best-response questions and multiple-matching-series questions.

Single-Best-Response Question

This type of question consists of a question stem and five options labeled A through E. Only one option is correct. The remaining four options must be plausible but clearly incorrect. **Each question must have exactly five answer options.** All options must be unique and not simply combinations of other options. Discussion length should be between 350 and 400 words. The discussion should include an explanation of why the other options are not correct.

EXAMPLE

DIRECTIONS: Each of the following questions or incomplete statements is followed by suggested answers or completions. Select the one best answer for each question or incomplete sentence.

A 10-year-old girl presents for her fourth evaluation of daytime recurrent abdominal pain (RAP) in the last 3 months. Symptoms are periumbilical, last 1-2 hours and are unrelated to meals, activity or to stool pattern. An extensive workup has failed to identify organic pathology. Which of the following statements is TRUE?

- A. Research supports a trial of gluten-free diet in children with RAP.
- B. Up to 80% of children who present with RAP have an anxiety disorder.
- C. Lactose malabsorption is the most common cause of RAP.
- D. Probiotics have recently been shown to be an effective treatment for RAP.
- E. An empiric trial of treatment for abdominal migraine with amitriptyline (generic, Elavil) should be instituted.

B DISCUSSION

Recurrent abdominal pain (RAP) is defined as 3 or more episodes of abdominal pain over the last 3 months time for which no organic cause has been identified. The episodes must be severe enough to affect the child's activities significantly. The American Academy of Pediatrics advocates transition to the term "functional abdominal pain" and away from the term "RAP".

RAP affects 4-25% of children according to several school- and community-based samples. A psychological cause or "functional" explanation is more likely than an occult organic etiology, particularly in the absence of alarm signs such as weight loss, gastrointestinal bleeding, systemic symptoms, anemia, laboratory findings of inflammation, persistent vomiting or frequent night awakenings from pain. Postulated mechanisms involve visceral hyperalgesia.

Overall, studies show 50-80% of children with RAP have coexisting anxiety disorders (SOR A; Ref. 2). One study showed 43% had separation anxiety disorder (SAD – to be differentiated from seasonal affective disorder), 31% had generalized anxiety disorder (GAD) and 21% had social phobia. Additionally, a depressive disorder was diagnosed in 43% of the children; 31% met criteria for major depressive disorder and 10% met criteria for dysthymic disorder.

The cited study is consistent with other findings that separation anxiety disorder is a common type of anxiety disorder of preschool and school-age children. Prevalence of SAD is estimated to be 3.2% to 4.1%. SAD is characterized by a developmentally inappropriate anxiety associated with separation from a parent or caregiver in which the anxiety interferes with the child's ability to participate in typical educational, social and other activities. Diagnostic and Statistical Manual (DSM-IV) criteria require 3 examples of worries associated with separation from parents that are developmentally inappropriate and excessive. GAD is characterized by persistent and generalized worries rather than specific concerns; DSM-IV criteria require that a child demonstrate at least 1 somatic symptom in addition to persistent worries. It is not uncommon for children to meet criteria for more than one anxiety-related diagnosis.

There are no large randomized trials to guide therapy in children with functional RAP. A Cochrane review failed to show any benefit for gluten or lactose restriction, probiotic use or fiber supplements as dietary treatment for RAP. Although peppermint oil has weak evidence of benefit in one small study, tricyclic antidepressants have none. A Cochrane review of 6 small, methodologically weak studies found cognitive behavioral therapy (CBT) to be potentially useful, consistent with evidence linking anxiety to RAP.

Selected references:

1. American Academy of Pediatrics Subcommittee on Chronic Abdominal Pain. Chronic abdominal pain in children. *Pediatrics* 2005;115(3):812-5.
<http://pediatrics.aappublications.org/cgi/content/full/115/3/812> Accessed June 2009.
2. Campo JV, Bridge J, Ehmann M, *et al.* Recurrent abdominal pain, anxiety, and depression in primary care. *Pediatrics* 2004;113:817-824.
<http://pediatrics.aappublications.org/cgi/content/full/113/4/817> Accessed June 2009.
3. Hanna GL, Fisher DJ, Fluent TE. Separation anxiety disorder and school refusal in children and adolescents. *Pediatr Rev* 2006;27:56-63.
4. Huertas-Ceballos A, Logan S, Bennett C, *et al.* Dietary interventions for recurrent abdominal pain (RAP) and irritable bowel syndrome (IBS) in childhood. *Cochrane Database Syst Rev* 2008;(2)CD003019.
<http://www.cochrane.org/reviews/en/ab003019.html> Accessed June 2009

Multiple Matching Series of Questions

The multiple matching series of questions consist of five options, labeled A through E, and a series of three or more numbered questions. **Each numbered question must have only one correct option**, but each lettered option may be associated with one, more than one or none of the numbered questions. Discussion length will vary depending on the number of questions and options. Generally, each numbered question will require approximately 250 words of discussion.

EXAMPLE

DIRECTIONS: The following series of questions deals with medications used to promote abstinence from alcohol. For questions 1-4, selected the *lettered* description that is most closely associated with the *numbered* medication. Each *lettered* description is used only once.

- A. Blocks glutaminergic N-methyl-D-aspartate (NMDA) receptors and activates gamma-aminobutyric acid (GABA) type A receptors, helping to reduce alcohol cravings; may cause diarrhea
 - B. Inhibits the metabolism of alcohol, resulting in a toxic response
 - C. An opioid-receptor antagonist that reduces alcohol craving; available in a long-acting injectable form
 - D. Inhibits the release of dopamine, helping to reduce alcohol cravings; may cause sedation and dizziness
-
- 1. Naltrexone (generic, ReVia)
 - 2. Acamprosate (Campral)
 - 3. Disulfiram (generic, Antabuse)
 - 4. Topiramate (Topamax)

C

A

B

D DISCUSSION

Alcohol potentiates the effect of gamma-aminobutyric acid (GABA) and blocks N-methyl-D-aspartate (NMDA) receptors in the brain, leading to inhibition of brain excitability. In alcohol withdrawal syndrome, stimulation of NMDA receptors and loss of GABA inhibition leads to brain hyperexcitability that then leads to anxiety, hallucinations, seizures and delirium tremens. With chronic alcohol use, the GABA receptors become increasingly unresponsive to GABA and NMDA receptors become increasingly sensitive to glutamate, resulting in a “craving” for alcohol. A number of medications are used to promote abstinence from alcohol. In general, these medications fall into one of two categories: (1) agents that produce a toxic response to alcohol, serving to provide as negative feedback to alcohol ingestion, and (2) medications that reduce cravings for alcohol in the brain.

Both disulfiram (generic, Antabuse) and metronidazole (generic, Flagyl) inhibit the metabolism of alcohol and can cause a toxic reaction when it is ingested. Symptoms of the toxic reaction can include headache, nausea, flushing and palpitations. In rare cases, myocardial infarction can occur. This toxic response is a strong deterrent to continued alcohol use. With the advent of newer agents that suppress cravings centrally without causing toxic signs and symptoms, disulfiram and metronidazole are no longer routinely recommended for long-term alcohol abstinence.

Naltrexone is an opioid receptor antagonist that has been used successfully to suppress alcohol cravings. Initially it was only available in a short-acting, injectable formulation. With the development of oral naltrexone (generic, ReVia) and a once-a-month injectable form (Vivitrol), it is used more commonly to enhance abstinence. **In a Cochrane Review, short-term treatment with naltrexone significantly decreased the relapse rate (relative risk [RR], 0.64; 95% confidence interval [CI], 0.51 to 0.82) and decreased the return to drinking (RR, 0.87; 95% CI, 0.76 to 1.00). Additionally, naltrexone significantly diminished withdrawal symptoms from alcohol (RR 0.82; 95% CI, 0.70 to 0.97) when compared to placebo (SOR A; Ref. 3).** Potential adverse reactions include elevated liver enzymes, hepatitis and liver failure. In addition, naltrexone cannot be used in patients on long-term narcotic therapy because it may lead to opiate withdrawal.

Acamprosate (Campral) blocks NMDA receptors and activates GABA type A receptors, simulating some of the brain inhibition properties of alcohol. In doing so, it reduces the desire for alcohol, particularly in patients who have gone through repeated abstinence episodes during which these receptors become more sensitive to alcohol. Diarrhea is a common initial side effect, leading many to begin with low-dose therapy followed by

dose titration as tolerated. Although this medication has proven to be effective in abstinence, cost and three-times-daily dosing can be obstacles to adherence. It is contraindicated in patients with a creatinine clearance <30 mL/min.

Anticonvulsants have been used as adjunctive therapy in the management of alcohol withdrawal. Topiramate (Topamax) has been shown to inhibit the release of dopamine that in turn has been shown to help reduce alcohol cravings. Clinical studies show topiramate to be effective in the long-term management of alcohol dependence in addition to adjunctive treatment of alcohol withdrawal. It can cause sedation and dizziness and may interact with other anticonvulsant therapy.

Baclofen (generic, Lioresal), a muscle relaxant used to treat spasticity, has also been shown to be effective in promoting alcohol abstinence. It is a GABA B receptor antagonist. **In a randomized controlled trial, baclofen caused a higher percentage of subjects to remain totally abstinent from alcohol and a higher number of cumulative abstinence days compared to the placebo group (SOR B; Ref. 1).** Additionally, a decrease in the obsessive and compulsive components of craving was found in the baclofen group; alcohol intake and anxiety state were also reduced in the baclofen group. It can be used safely in patients with liver disease, but must be used with caution in patients with renal disease.

Selective serotonin reuptake inhibitors (SSRIs) do not reduce craving for alcohol unless there is a concurrent anxiety or depressive disorder. **SSRIs should only be used to treat these mood disorders, and other medications should be prescribed to maintain abstinence from alcohol.**

It is recommended that all medications used to promote abstinence be used in conjunction with a support program such as Alcoholics Anonymous. This is especially true of the centrally acting agents like naltrexone, acamprostate, topiramate and baclofen. Although these agents can reduce the craving for alcohol, they do not address social and behavioral issues that contribute to alcoholism. In addition, patients can continue to drink alcohol on these medications, as they do not cause a toxic reaction. Therefore, support groups and even periodic alcohol urine testing maybe needed to assure complete abstinence.

Selected references:

1. Addolorato G, Caputo F, Capristo E, *et al.* Baclofen efficacy in reducing alcohol craving and intake: a preliminary double-blind randomized controlled study. *Alcohol Alcohol* 2002; 37(5):504-8. <http://alcalc.oxfordjournals.org/cgi/content/full/37/5/504> Accessed August 2009.
2. Pharmacotherapy for Alcohol Dependence. Summary, Evidence Report/Technology Assessment: Number 3, January 1999. Agency for Health Care Policy and Research, Rockville, MD. <http://www.ahrq.gov/clinic/epcsums/alcosumm.htm> Accessed August 2009.
3. Srisurapanont M, Jarusuraisin N. Opioid antagonists for alcohol dependence. *Cochrane Database Syst Rev* 2005; (1):CD001867. <http://www.cochrane.org/reviews/en/ab001867.html> Accessed August 2009.
4. Williams SH. Medications for treating alcohol dependence. *Am Fam Physician* 2006; 74(11):1836. <http://www.aafp.org/afp/20051101/1775.html> Accessed August 2009.

Approach to Writing Question/Answer/Discussion Material

National faculty members may choose to approach question/discussion writing in different ways. We suggest that new writers consider the following steps:

1. Select the subject area. We suggest that you access the Core Content Review Author's site at authors.corecontent.com to view a list of available topics. We maintain a list of topics that have not been covered in recent issues or that are current "hot topics." We try not to repeat topics within a two-year period. Since the field of family medicine is broad, do not feel that your topic selection must be limited to only those on the author site. You may select other topics. To do so, simply go to the "Open Topics" page to submit a topic request to an editor. All requested topics will be reviewed for relevance and need. You will be contacted regarding your request within a week.
2. Research current references on your selected topic. To assist authors, The Core Content editors have broken down desired sources into tiers. First tier references must be searched for every question/discussion; second tier searches are highly recommended. While using sources like UpToDate and Stat Ref is an option for reviewing a topic prior to writing a question, please cite only primary sources for your references when available. A list of first and second tier references is provided below.

First Tier

1. Agency for Healthcare Research and Quality Clinical Guidelines and Evidence Reports (AHRQ) <http://www.ahrq.gov/clinic/>
2. Cochrane Database of Systematic Reviews <http://www.cochrane.org/index.htm>
3. Institute for Clinical Systems Improvement
<http://www.icsi.org/templates/documents.aspx?catID=12>
4. National Guideline Clearinghouse <http://www.guideline.gov/>
5. National Institute for Health and Clinical Excellence <http://guidance.nice.org.uk/>

Second Tier

1. AAFP Monographs or CME bulletins <http://www.aafp.org/online/en/home/cme.html>
2. Bandolier <http://www.ir2.ox.ac.uk/bandolier/bformHJ.html>
3. Chapters in the most current edition of standard textbooks
4. Journal of the American Medical Association <http://jama.ama-assn.org/>
5. Lancet <http://www.thelancet.com/>
6. Mayo Clinic Proceedings <http://www.mayoclinicproceedings.com/pastissues.asp>
7. National Library of Medicine <http://www.ncbi.nlm.nih.gov/sites/entrez?db=PubMed>
8. New England Journal of Medicine <http://content.nejm.org>
9. British Medical Journal <http://www.bmj.com>
10. Trip Database <http://www.tripdatabase.com/index.html>

3. Decide the teaching points that will be the focus of the discussion. The primary teaching point should be emphasized with bold font and include a strength of recommendation rating plus the related reference. Please use the standard SORT terminology common in Family Medicine literature. (See Appendix A.) (<http://www.aafp.org/online/en/home/publications/journals/afp/afpsort.html>)

Example: **Levodopa is the most effective medication for motor complications (40-50 percent symptom reduction) (SOR A; Ref. 3).**

4. Begin to formulate the discussion by drafting salient points.

5. Decide on the type of question that is most appropriate for the material that you wish to present. Single-topic discussions (e.g., use of beta-blockers after myocardial infarction) are often best presented with single answer questions. Discussions involving a number of clinically related subjects (e.g., presentation of several different tick-borne diseases) may be best presented with multiple matching series questions.

6. Formulate the question and the answer options. Each single answer question should have 5 possible answers. Please use the positive voice when asking questions; do not ask negative questions that ask for “Which of the following EXCEPT” or “Which of the following is FALSE?”

Example: Which of the following is the BEST treatment for new onset diabetes mellitus?

7. Write the discussion. Discussions for single answer questions should be 350-400 words. If a longer discussion is necessary to cover the topic, a second question may be added.

8. Cite all of the selected references as noted in the reference section.

II. Clinical Set Problems

The Core Content Review uses clinical set problems in two issues annually. This type of material uses a scenario that develops over time to present a clinical problem. Within the clinical scenario are question banks. These question banks present options of diagnoses or interventions at specific points in the clinical presentation. The participant is asked to determine which of the question options should be selected, avoided or is optional (i.e., to select would not be incorrect, but the option is not necessarily the best choice).

Example:

I. Frank Martin

Frank Martin, a 56-year-old Caucasian male, comes to your office for the first time accompanied by his wife. He has not seen a physician for 1½ years. His primary complaint is that his “asthma seems to be getting worse.” He states he was an avid hunter and fisherman until recently but had to give it up due to shortness of breath. Walking through the woods or fishing has been almost impossible, especially in colder weather. He quit smoking cigarettes in 2004 after 32 pack-years. His history is also significant for work exposure to silicon dioxide dust at a steel manufacturing plant for many years. He admits to a cough, especially in the morning, that occasionally produces whitish sputum. His last doctor gave him an albuterol inhaler (generic, Proventil HFA) 2 puffs 4 times daily for his asthma, but it doesn’t seem to help him much now. He denies any chest pain or palpitations. His wife reminds him to discuss his diminished ability to have sexual relations due to the shortness of breath.

Past Medical History: Mr. Martin has had hyper- tension for 12 years but has not taken medication since last refilling it approximately 2 years ago. He states his blood pressure had been well controlled on hydrochlorothiazide 12.5 mg daily. He denies a personal history of heart disease, cancer or diabetes mellitus. He was initially diagnosed with asthma at approximately age 44. He was hospitalized 2 years ago for an exacerbation of his asthma and states that he was treated with antibiotics, corticosteroids and inhalers. He also has had one or two episodes of asthma that have been treated on an outpatient basis, occasionally with antibiotics. He takes no over-the-counter medications or herbal products. Surgeries include tonsillectomy as a child and a repair of his right rotator cuff at age 28. He denies any drug allergies.

Family History: His father died of heart failure at age 73 years. His 77-year-old mother has a history of hypertension and suffered a stroke 3 years ago. His younger sister, age 49, is alive and well, but a younger brother, age 51, has

hypertension and hyperlipidemia. Mr. Martin denies any family history of diabetes, cancer or heart disease.

Social History: Mr. Martin has been married for 24 years and has two children, both in college, a son, age 21, and a daughter, age 19. He has lived in Ohio for his entire life and has worked in a steel manufacturing plant for 27 years, although for the past 14 years, he has had an office-based job. Upon further questioning, Mr. Martin admits to occasionally smoking a cigarette or 2 with friends when engaging in his hunting and fishing activities, although this has been rare lately due to his shortness of breath. He denies smoking a pipe or cigars. He currently consumes 2 or 3 beers per week and up to 3 ounces of liquor in a 2-week period. He does not exercise regularly, primarily because of his shortness of breath as well as leg fatigue. His weight has decreased by approximately 7 pounds over the past 1½ years despite eating what he describes as a “regular” diet. He has refused flu shots in the past because he states, “they give me the flu.” He has never had a pneumococcal immunization.

Review of Systems: In addition to his chief complaint, he admits to frequent “colds” but denies any hemoptysis. He denies chest pain, edema or palpitations. He has a bowel movement every 1 or 2 days, and the characteristics of his stool have not changed. His last physician sent him for a colonoscopy in 2003, which he states was normal. He denies abdominal pain, nausea or heartburn. He also denies headaches, history of seizures or weakness. His urinary stream still seems normal with no hesitancy or nocturia. He states his erections are still “fairly” strong, although they have lessened somewhat in frequency. He does admit to having decreased frequency of sexual relations, not due to a decrease in his libido, but due to the shortness of breath.

Physical Examination: In general, Mr. Martin is a male of medium build who appears well. Weight, 187 lbs; height, 71 inches; BMI, 26.1; blood pressure, 148/92 mm/Hg; pulse, regular and 84/min; respirations, 16/min and unlabored at rest. He is afebrile. HEENT: unremarkable, except for an increase in perioral facial creases. Funduscopic exam is normal. Neck: no masses, adenopathy, jugular venous distension or bruits. Chest: unlabored breathing, with hyperresonance to percussion and diminished breath sounds; a few high-pitched wheezes on expiration, but no crackles. His expiratory phase is slightly prolonged. Heart: regular rate and rhythm without murmurs, rubs or gallops. Examination of the abdomen, rectum and genitalia is unremarkable. Extremities: distal pulses are normal; slight dependent cyanosis in the feet but no clubbing or edema. Quadriceps muscles bilaterally appear somewhat atrophic. Neuromuscular exam: full range of motion in joints; normal cranial nerves II - XII; deep tendon reflexes and sensation are normal. Skin: warm and dry.

Based upon his history and physical examination, conditions to be included in your differential diagnosis include:

- A1 – Asthma
 - A2 – Essential hypertension
 - A3 – Sexual dysfunction
 - A4 – COPD
 - A5 – Peripheral artery disease
 - A6 – Lung cancer
 - A7 – Pulmonary silicosis
 - A8 – Heart failure
 - A9 – Coronary artery disease
 - A10 – Bronchiectasis
 - A11 – Tuberculosis
 - A12 – Obstructive bronchiolitis
 - A13 – Pulmonary fibrosis
-

Which of the following tests would you order at this time?

- B1 – Spirometry (pre- and postbronchodilator)
 - B2 – Complete pulmonary function tests
 - B3 – Chest x-ray (PA/lateral)
 - B4 – Serum α_1 -antitrypsin level
 - B5 – Electrocardiogram
 - B6 – Echocardiogram
 - B7 – Treadmill stress testing
 - B8 – Arterial Doppler studies of lower extremities
 - B9 – Chest computed tomography (CT) B10 – Complete blood count (CBC)
 - B11 – Serum fasting lipid profile
 - B12 – Serum basic metabolic panel (electrolytes, blood urea nitrogen [BUN], creatinine, glucose and calcium)
 - B13 – Serum prostate-specific antigen (PSA)
 - B14 – Arterial blood gases (ABGs) B15 – Pleural biopsy (needle)
 - B16 – Bronchodilator reversibility testing
-

Assume Mr. Martin's laboratory and radiologic findings if ordered are as follows:

- CBC – WBC, 8,200/ μ L (normal, 3,800-10,800/ μ L) with a normal differential; hemoglobin, 14.3 g/dL (normal, male 13.5-18.0 g/dL); hematocrit, 44% (normal, male 42-52%); platelets, 348,000/ μ L (normal, 140,000-450,000/ μ L)
- Basic metabolic panel – normal
- Serum PSA – 1.8 ng/mL (normal, 0.0-4.0 ng/mL)
- Fasting lipid profile – total cholesterol, 161 mg/dL (normal, <200 mg/dL); high-density cholesterol, 45 mg/dL (normal, >40 mg/dL); low-density cholesterol, 96 mg/dL (normal, <130 mg/dL); triglycerides, 101 mg/dL (normal, 25-175 mg/dL)
- Serum α_1 -antitrypsin level – 184 mg/dL (normal, 85-213 mg/dL)
- Arterial blood gases – pH, 7.396 (normal, 7.350-7.450); pCO₂, 45 mmHg (normal, 36.0-46.0 mmHg); pO₂, 81.0 mmHg (normal, 85.0-96.0 mmHg); bicarbonate (HCO₃⁻), 25 mEq/L (normal, 22.0-26.0 mEq/L); O₂ saturation, 94.5% (normal, 94.0-96.0%); base excess, 1.0 mEq/L (normal, -2.5 -- +2.5 mEq/L)

Chest radiograph shows hyperinflation with flattening of the diaphragm bilaterally; no infiltrates, pneumothorax, blebs or bullae are seen. Chest computed tomography (CT) shows hyperinflation and flattening of the diaphragm, but no masses or adenopathy. Pleural biopsy is normal.

Electrocardiogram is normal. Echocardiogram is normal with an ejection fraction of 55 percent. Treadmill stress testing is normal, without findings of ischemia. Arterial Doppler studies of the lower extremities are normal.

Office spirometry (pre-bronchodilator) – forced expiratory volume in 1 second (FEV₁), 2.30 L (59% predicted for age); forced vital capacity (FVC), 3.54 L (70% predicted for age; FEV₁/FVC ratio is 65%. There is no significant change postbronchodilator. Complete pulmonary function testing confirms these values. In addition, measurements of lung volumes show a normal total lung capacity but significantly increased residual volume (110% predicted) and decreased inspiratory capacity. The maximal voluntary ventilation is reduced (74 percent predicted), as is the diffusion capacity by single-breath carbon monoxide (DLCO) (80 percent predicted).

Based on Mr. Martin's test results, your working diagnoses include:

- C1 – Asthma
 - C2 – Heart failure
 - C3 – COPD, GOLD stage 1
 - C4 – COPD, GOLD stage 2
 - C5 – COPD, GOLD stage 3
 - C6 – Bronchiectasis
 - C7 – Erectile dysfunction
-

Management options include:

- D1 – Continue albuterol inhaler 4 times daily
- D2 – Continue albuterol; add theophylline 200 mg daily
- D3 – Add lisinopril (generic, Prinivil) 10 mg daily and furosemide (generic, Lasix) 20 mg daily
- D4 – Add digoxin (generic, Lanoxin) 0.25 mg daily
- D5 – Continue albuterol inhaler 4 times daily as needed and add long-acting β_2 agonist, e.g., salmeterol (Serevent Diskus) 50 mcg inhaled every 12 hours
- D6 – Continue albuterol inhaler 4 times daily as needed and add a long-acting anticholinergic, e.g., tiotropium (Spiriva Handihaler) 18 mcg inhaled daily
- D7 – Continue albuterol inhaler 4 times daily as needed and add a short-acting anticholinergic, e.g., ipratropium (generic, Atrovent HFA) 2 puffs inhaled 4 times daily
- D8 – Continue albuterol inhaler 4 times daily as needed and add fluticasone/salmeterol 250/50 mcg (Advair Diskus) inhaled every 12 hours
- D9 – Continue albuterol inhaler 4 times daily as needed and add prednisone 10 mg daily
- D10 – Advise him to have a pneumococcal vaccine
- D11 – Advise him to have an annual influenza vaccine
- D12 – Advise total tobacco abstinence and provide him with medication if needed for tobacco cessation
- D13 – Refer him for pulmonary rehabilitation
- D14 – Advise bronchoscopy and consult a pulmonologist immediately
- D15 – Add a phosphodiesterase type 5 inhibitor (e.g., Viagra, Cialis, Levitra)

Risk factors for COPD include which of the following?

- E1 – Cigarette smoking
 - E2 – Occupational dust and chemicals
 - E3 – Environmental tobacco smoke E4 – Indoor and outdoor air pollution E5 – α_1 -antitrypsin deficiency
 - E6 – Male gender
 - E7 – History of frequent or severe childhood respiratory infections
 - E8 – Lower socioeconomic status
-

Mr. Martin follows up regularly over the next 6 months. He has ceased all tobacco use and has started his third phase of pulmonary rehabilitation. In the late fall of the next year (8 months after his first visit), he complains of a 3-day history of mildly increased dyspnea associated with a cough productive of yellow sputum and a low-grade fever (99.8° F, 37.7° C). Examination reveals increased expiratory wheezes throughout his chest and a respiratory rate of 18/min. There is no use of his accessory respiratory muscles. His pulse oximetry in the office is 91% on room air. You advise the following:

- F1 – Immediate hospitalization with pulmonary consultation
 - F2 – Continue current outpatient therapy
 - F3 – Oral broad-spectrum antibiotics
 - F4 – A short course of prednisone 40 mg daily for 5 days
 - F5 – Long-term prednisone beginning with 60 mg daily and tapering the dose over 1 month
 - F6 – Referral for home oxygen therapy
 - F7 – Obtain an electrocardiogram
 - F8 – Obtain a chest radiograph
 - F9 – Obtain a CBC
 - F10 – Immediate spirometry
 - F11 – Arterial blood gas analysis
-

Mr. Martin calls 3 days later to say that he is some-what better and returns for follow-up after 7 days, feeling much improved. His dyspnea has diminished, and his sputum production has decreased significantly. Ongoing monitoring and evaluation should include:

- G1 – Discussion of symptoms
- G2 – A periodic physical examination
- G3 – Annual pulmonary function testing
- G4 – Annual arterial blood gas analysis
- G5 – Discussion of inhaler techniques
- G6 – Monitoring of exacerbation history
- G7 – Management of comorbidities
- G8 – Evaluation of occupational and environmental exposures
- G9 – Continued discussion regarding tobacco avoidance
- G10 – Discussion of end-of-life issues

I. Discussion: Frank Martin

Chronic obstructive pulmonary disease (COPD) is both preventable and treatable. It is characterized by airflow obstruction that is not fully reversible and is usually progressive. It is associated with an inflammatory response to inhaled noxious gases or particles, most commonly tobacco smoke. It not only affects the lungs, but commonly causes systemic problems as well.

In the United States, it is the fourth most common cause of mortality, and the prevalence and mortality from COPD continue to increase. In 2000, women outnumbered men in mortality from COPD, the number of women doubling over the past 20 years. Many patients are either undiagnosed or are misdiagnosed as "asthma." Data from the Third National Health and Nutrition Examination Survey (NHANES) suggest that 70 percent of patients with COPD are under age 65. Estimates of the number of smokers who have clinically significant airflow limitation range from 15-50%. The economic effects of COPD were estimated in 2004 to be about \$37.2 billion, including the direct medical costs and the indirect costs associated with disability and premature mortality.

Risk factors for COPD include:

- Cigarette smoking and environmental tobacco smoke (account for at least 80% of COPD)
- Occupational dust and chemicals (account for 10-20 % of COPD)
- Indoor and outdoor air pollution
- Genetics (e.g., α_1 -antitrypsin deficiency, which accounts for approximately 1-2% of COPD)
- A history of frequent or severe childhood respiratory infections
- Low socioeconomic status

COPD should be considered in any patient with symptoms of cough, sputum production, dyspnea or a history of exposure to risk factors for the disease. The dyspnea is usually progressive, persistent, and worsened by exertion or respiratory infection. Cough may be non-productive. Many patients, due to their disease, actually become very sedentary and are quite unaware of their dyspnea due to unintentionally limiting their activities. COPD patients tend to spend less time in more vigorous activities and body positions like walking and standing and more time in passive positions such as sitting and lying down. As their activity level lessens, they also tend to develop muscle atrophy (especially noted in the quadriceps) that contributes to further deconditioning and inactivity.

The differential diagnosis in COPD may include asthma, heart failure, bronchiectasis, tuberculosis, pulmonary fibrosis and obliterative bronchiolitis. COPD usually begins in midlife and is associated with long-term smoking. Symptoms are generally progressive, and the airflow limitation is largely irreversible or only partially reversible.

Asthma usually begins earlier in life, and symptoms vary from day to day, mainly

occurring at night. It may be associated with allergies or eczema, and a family history may be present. Although findings on pulmonary function testing (PFT) are very similar to COPD, airflow limitation is largely reversible, which can be demonstrated by spirometry before and after inhaled bronchodilators.

Heart failure usually produces restrictive changes on PFTs, and the chest radiograph shows a dilated heart and pulmonary edema. There may be rales on auscultation.

Bronchiectasis presents with large volumes of purulent sputum and is commonly associated with a bacterial infection. Chest x-rays show bronchial dilation and bronchial wall thickening. Tuberculosis (TB) may occur at any age. A chest x-ray often shows lung infiltrates and scarring.

Onset of obliterative bronchiolitis is at a young age, and it usually occurs in nonsmokers. There may be a history of rheumatoid arthritis or fume exposure, and chest CT in expiration often shows hypodense areas. Pulmonary fibrosis, usually idiopathic, generally begins after age 50. It is characterized by dyspnea, and PFT shows restrictive changes.

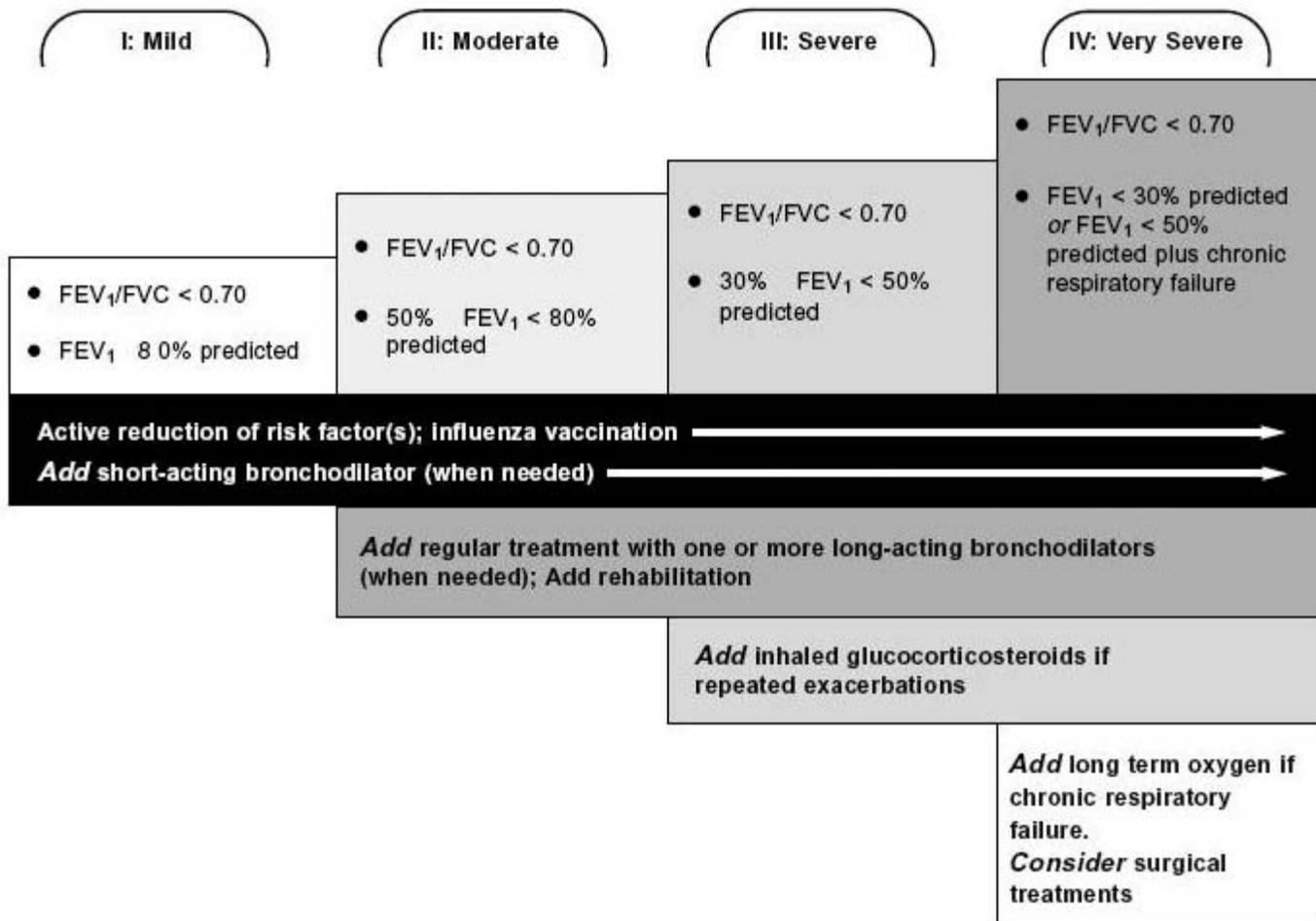
In our patient, other diagnoses to be considered include essential hypertension, erectile dysfunction, pulmonary silicosis, coronary artery disease and peripheral artery disease of the lower extremities. Lung cancer should always be considered in a patient with a smoking history, although few other signs or symptoms suggest it in this patient.

The cornerstone of diagnosis is PFT. **Once the diagnosis is considered, pre- and postbronchodilator (i.e., albuterol MDI) spirometry should be done (SOR C; Ref. 1).** This testing can be performed easily in the physician's office and is reimbursable by most insurers. The forced expiratory volume in one second (FEV_1) and its ratio (FEV_1/FVC) to the forced vital capacity (FVC) are among the most important measurements used to assess both the actual diagnosis and severity of disease. An FEV_1/FVC ratio <0.70 indicates airway obstruction. The FEV_1 , expressed as a percentage of predicted, is used to stage disease severity. (See Table 1.)

The evidence-based Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD) guidelines recommend spirometry in all patients who are over age 40 with a history of smoking or who have other significant risk factors, irrespective of whether they have symptoms.

Complete pulmonary-function testing (pre- and post- bronchodilator) may be performed as an alternative to spirometry. Complete PFTs give additional information, including lung volumes, flow loop diagrams, maximal voluntary ventilation (MVV) and single-breath carbon monoxide diffusion capacity (DLCO). Typical pulmonary-function findings in a patient with COPD are shown in Table 2.

Table 1 – Stepwise Therapy at Each Stage of COPD Based on Disease Severity



**Postbronchodilator FEV₁ is recommended for the diagnosis and assessment of severity of COPD.*

Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD) Web site.
<http://www.goldcopd.org/Guidelineitem.asp?l1=2&l2=1&intId=989>. Accessed 26 December 2007.

No blood tests can establish the diagnosis of COPD. As Mr. Martin had not been seen for a prolonged period and has a history of hypertension, it is appropriate to obtain a basic metabolic panel, fasting lipid profile and a baseline electrocardiogram. Prostate-specific antigen (PSA) testing should be discussed with the patient as part of preventive maintenance. If a Caucasian patient with COPD presents at an early age (i.e. < age 40) or has a family history of COPD, especially unassociated with tobacco use, a serum α_1 -antitrypsin level should be ordered.

Radiologic testing may be supportive but not diagnostic and is not required for the diagnosis of COPD. A chest x-ray may be used to exclude other diseases but seldom helps to establish a diagnosis of COPD. A chest CT scan is seldom needed but may be useful in patients with normal spirometry and a diminished DLCO. These patients

may have emphysema that is only detectable by high-resolution CT scanning. Arterial blood gas measurement (on room air) should be used in patients with an $FEV_1 < 50\%$ predicted or with signs of respiratory failure.

Table 2 – Pulmonary Function Findings in Patients with COPD

TLC	Total lung capacity	Increased
FRC	Functional residual capacity	Increased
RV	Residual volume	Increased
VC	Vital Capacity	Decreased
IC	Inspiratory capacity	Decreased
MVV	Maximum voluntary ventilation	Decreased
DLCO	Diffusion capacity of CO	Decreased

Since cardiac disease is not a likely cause of the presenting symptoms in this patient, an echocardiogram and treadmill stress test are unlikely to assist in the diagnosis and are not indicated initially. **The GOLD guidelines suggest that clinicians may want to consider bronchodilator reversibility testing of patients with an atypical history of asthma in childhood or who exhibit regular waking with cough or wheezing at night (SOR C; Ref. 12).** Doppler arterial studies may be an optional test in the future, but there is no immediate need for it. There is no indication for a pleural biopsy in this patient.

Since COPD also causes extrapulmonary manifestations, the multidimensional BODE index addresses 4 additional factors:

- Weight (body mass index [BMI])
- Airway obstruction
- Dyspnea (using the Medical Research Council dyspnea score)
- Exercise capacity (6-minute walk distance)

http://www.icumedicus.com/clinical_criteria/bode.php

This index has been shown to have a better prognostic value than the FEV_1 alone. It may be used to assess a patient's risk of death and has been shown to be a predictor of the need for hospitalization. As an example, BMI is an independent risk factor in COPD, i.e., de-creasing BMI is associated with increasing mortality.

The prevention of COPD is the ultimate goal. The diagnosis of COPD should be made as early as possible. It is estimated that only about 20 percent of family physicians utilize spirometry, so many patients are not correctly identified until they are in a later stage of COPD. However, once the diagnosis has been established, managing COPD includes the reduction of risk factors, most notably tobacco cessation, managing stable disease and managing exacerbations. Patients must be educated about their

disease and encouraged to become partners in its management. In addition, comorbidities (e.g., osteoporosis, coronary artery disease and peripheral artery disease) are seen commonly with COPD. Unlike asthma, reduction of therapy is usually not possible, even if symptoms are controlled.

Smoking cessation is the most effective way to reduce risk for COPD and is cost effective. All smokers must be educated and offered cessation intervention (SOR A; Ref. 3). This should be ongoing and discussed at every visit. Occupational exposures and exposure to smoke from biomass fuel from cooking and heating should also be reduced. Patients should stay indoors when air quality is poor.

Management of stable COPD should be individualized, with the goal of decreasing symptoms and improving the patient's quality of life. Although there are several ongoing studies with current medications evaluating the possibility of reducing the decline in lung function, pharmacotherapy is used more to decrease symptoms than to delay this decline. **Bronchodilators (BDs) are the mainstay of therapy (SOR A; Ref.3).** Short-acting β_2 agonists (e.g., albuterol) should be used in all stages of COPD as rescue (as-needed) medication. When inhaled medications are used, attention to educating the patient is imperative, especially since there are several types of inhalers on the market. In stage 2 COPD, one should add a long-acting BD from one of the following classes: a long-acting anticholinergic (e.g., tiotropium), a long-acting β_2 agonist (e.g., salmeterol or formoterol), or a methylxanthine (e.g., theophylline). Long-acting BDs (LABDs) are more convenient and effective than short-acting BDs and improve health status. Long-acting anticholinergics have been found to reduce the rate of exacerbations. Inhaled BDs are preferred over theophylline because of theophylline's potential toxicity. Combining LABDs produces more sustained improvement in FEV₁ by acting synergistically and reduces the chance of tachyphylaxis. Nebulizer therapy has not been shown to be helpful in stable disease.

The inflammation in COPD is quite different from that in asthma. In asthma, the major inflammatory cells include eosinophils, mast cells and CD4⁺ cells; in COPD, chronic inflammation is due in part to neutrophils, macrophages and CD8⁺ lymphocytes in addition to oxidative stress. **Whereas inhaled glucocorticosteroid (ICS) therapy is indicated early in asthma, it should be reserved for COPD patients with stage 3 or 4 disease or those patients with repeated exacerbations (SOR A; Ref .9).** Regular ICS therapy has been shown to reduce exacerbations in these patients. Recent meta-analysis studies have hinted that this therapy reduces all-cause mortality, but this still needs to be confirmed. Long-term use of oral glucocorticosteroids is not recommended in COPD.

Annual influenza vaccine is strongly recommended for COPD patients, as is the pneumococcal vaccine (SOR A; Ref. 12). The pneumococcal vaccine has been shown to reduce the incidence of community-acquired pneumonia in younger patients with an FEV₁ < 40% predicted. Prophylactic, continuous antibiotics have not shown a proven benefit in COPD and have not been found to reduce exacerbations. **The use of long-term oxygen therapy has been shown to increase survival and is reserved for**

patients with GOLD stage 4 COPD who have an O₂ saturation < 88% or have signs of pulmonary hypertension, heart failure or polycythemia (SOR A; Ref. 12). In general, mucolytic agents, antioxidants (e.g., N-acetylcysteine), narcotics (e.g., morphine), leukotriene modifiers, nedocromil, and the regular use of antitussives are not recommended for COPD. Surgical treatments (e.g., bullectomy, lung volume-reduction surgery, lung transplantation) are reserved for patients with very advanced COPD.

Pulmonary rehabilitation is recommended for all patients in stages 2 to 4 (SOR C; Ref. 8). The goal of this therapy is to reduce symptoms and to increase physical and emotional participation in activities of daily living, thus, improving the patient's quality of life. All COPD patients benefit from exercise training to reduce or prevent the deconditioning and weight loss seen in these patients. Rehabilitation programs may be used in inpatient, outpatient or home settings and involve many types of health professionals. These programs provide exercise training, nutritional counseling and patient education, but they have been under prescribed by physicians to date.

In this patient's case, a pulmonary consultation is not necessary because the family physician should be well trained to provide Mr. Martin with the therapies described. In addition, to improve this patient's erectile dysfunction, a trial of a type 5 phosphodiesterase inhibitor (e.g., Viagra, Cialis, Levitra) may be beneficial and is not contraindicated.

COPD exacerbations are characterized by an acute increase in a patient's dyspnea, cough and/or sputum production. Symptoms of exacerbations may also include chest tightness, wheezing, malaise, insomnia, depression, confusion and fever. Air pollution and infection are the most common causes for exacerbations, but no cause may be found for up to one third of patients. Inhaled β_2 agonists and anticholinergics, plus the use of an oral glucocorticosteroid, have been shown to be effective for exacerbations in both outpatient and inpatient settings. Empiric antibiotic treatment may be beneficial if the sputum is purulent and should cover the most common respiratory pathogens seen locally.

Arterial blood gas analysis is beneficial if the patient requires hospitalization. Pulse oximetry in the office setting may be beneficial. A chest x-ray is useful if the diagnosis is in question. Electrocardiograms are useful if arrhythmias or signs of right heart failure are noted on the examination in patients requiring hospitalization. A CBC is only useful in diagnosing polycythemia. The white blood cell count is usually not informative when treating the patient as an outpatient. Sputum cultures may be performed if the patient does not respond to empiric antibiotics. Spirometry at the time of an acute exacerbation is not useful and is not recommended.

Systemic glucocorticosteroids reduce recovery time, improve lung function and improve hypoxemia. Oral prednisone 30-40 mg daily for up to 10 days is

recommended for exacerbations (SOR A; Ref. 12). Prednisone may be stopped without weaning for a treatment course of 10 days or less. In hospitalized patients, intravenous corticosteroids may be an alternative. Oxygen therapy is beneficial in hospitalized patients to keep the $pO_2 > 60$ mmHg and the O_2 saturation $> 90\%$, but caution is advised to avoid CO_2 retention. Patients with hypoxemia at the time of hospital discharge may need short-term home oxygen therapy, which should be periodically reassessed. Mr. Martin does not meet the criteria for inpatient therapy and does not require an electrocardiogram or a CBC at this time, although a chest radiograph is an option. Antibiotics and a short course of oral glucocorticosteroids should be provided.

All patients with COPD require ongoing follow-up. At these visits, a discussion of the patient's symptoms and exacerbation history should be reviewed, in addition to evaluation of occupational and environmental exposures. Periodic physical examinations should be performed, and management of comorbidities should be optimized. Discussion should be undertaken regarding inhaler techniques, especially if the patient is on multiple types of inhalers. At every visit there should be a discussion regarding tobacco avoidance. There is no need for annual routine PFTs or annual arterial blood gas analysis.

Classification of individual items as follows:

Section A:

Select: 1, 2, 3, 4, 5, 7

Optional: 6, 8, 9, 10, 11, 12, 13

Section B:

Select: 1, 3, 5, 11, 12

Optional: 2, 8, 10, 13

Avoid: 4, 6, 7, 9, 14, 15, 16

Section C:

Select: 4

Optional: 7

Avoid: 1, 2, 3, 5, 6

Section D:

Select: 5, 6, 10, 11, 12, 13

Optional: 15

Avoid: 1, 2, 3, 4, 7, 8, 9, 14

Section E:

Select: 1, 2, 3, 4, 5, 7, 8

Optional: 6

Section F:

Select: 2, 3, 4

Optional: 8

Avoid: 1, 5, 6, 7, 9, 10, 11

Section G:

Select: 1, 2, 5, 6, 7, 8, 9

Optional: 10

Avoid: 3, 4

Selected references:

1. Barreiro TJ, Perillo I. An approach to interpreting spirometry. *Am Fam Phys* 2004; 69(5):1107-1114.
2. Belfer MH. The impact of exercise on activities of daily living and quality of life: a primary care physician's perspective. *COPD* 2007; 4(3):289-291.
3. Calverly PM, Anderson JA, Celli B, *et al.* (TORCH investigators). Salmeterol and fluticasone propionate and survival in chronic obstructive pulmonary disease. *N Eng J Med* 2007; 356(8):775-89.
4. Celli BR, Cote CG, Marin JM, *et al.* The body-mass index, airflow obstruction, dyspnea, and exercise capacity index in chronic obstructive pulmonary disease. *N Engl J Med* 2004; 350:105.
5. Celli BR, MacNee, *et al.* ATS/ERS task force: standards for the diagnosis and treatment of patients with COPD: a summary of the ATS/ERS position paper. *Eur Respir J* 2004; 23:932-946.
6. Dougherty DE, Belfer MH, Brunton SA, *et al.* Chronic obstructive pulmonary disease: consensus recommendations for early diagnosis and treatment. *J Fam Prac* 2006; 55(11) (suppl):1-8.
7. Dougherty DE, Chapman KR, Martinez FJ, *et al.* The value of early diagnosis for effective management of chronic obstructive pulmonary disease. *J Fam Prac* 2007; 56(10) (suppl):1-24.
8. Ferguson GT, Make B. Management of stable chronic obstructive pulmonary disease. In: Rose BD, ed, UpToDate. Wellesley, MA: UpToDate 2007 <http://www.utdol.com/utd/content/topic.do?topicKey=copd/2921> Accessed November 2007.
9. Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD). <http://www.goldcopd.org/Guidelineitem.asp?l1=2&l2=1&intId=989> Accessed 26 December 2007.
10. Karnani NG, Reisfield GM, Wilson GR. Evaluation of chronic dyspnea. *Am Fam Phys* 2005; 71(8):1529-1537.
11. Maltais F, Hamilton A, Marciniuk D, *et al.* Improvements in symptom-limited exercise performance over 8h with once-daily tiotropium in patients with COPD. *Chest* 2005; 128(3):1168-78.
12. Murata GH, Kapsner CO, Lium, DJ, *et al.* A multivariate model for predicting respiratory status in patients with chronic obstructive pulmonary disease. *J Gen Intern Med* 1998; 13(7):462-468.
13. Nici L, Donner C, Wouters E, *et al.* ATS/ERS statement on pulmonary rehabilitation. *Am J Respir Crit Care Med* 2006; 173(12):1390-1413.

CSP author

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Akron, OH

Approach to writing the Clinical Set Problem

1. Select the subject area. Contact the Clinical Set Editor to review the topic under consideration. As with topics covered in the question issues of The Core Content Review, we do not repeat topics until or unless new material is available. We use the clinical set problems to cover a topic in a more comprehensive, case-management format that is too broad to be covered in the regular question format.
2. Research current references on your selected topic. To assist authors, Core Content Editors have broken down desired sources into tiers. First tier references must be searched for every question/discussion; Second tier searches are highly recommended. References outside of the tiers may certainly be used, but not at the expense of bypassing the more desirable databases.

First Tier

1. Agency for Healthcare Research and Quality Clinical Guidelines and Evidence Reports (AHRQ) <http://www.ahrq.gov/clinic/>
2. Cochrane Database of Systematic Reviews <http://www.cochrane.org/index.htm>
3. Institute for Clinical Systems Improvement
<http://www.icsi.org/templates/documents.aspx?catID=12>
4. National Guideline Clearinghouse <http://www.guideline.gov/>
5. National Institute for Health and Clinical Excellence <http://guidance.nice.org.uk/>

Second Tier

1. AAFP Monographs or CME bulletins <http://www.aafp.org/online/en/home/cme.html>
2. Bandolier <http://www.jr2.ox.ac.uk/bandolier/bformHJ.html>
3. Chapters in the most current edition of standard textbooks
4. Journal of the American Medical Association <http://jama.ama-assn.org/>
5. Lancet <http://www.thelancet.com/>
6. Mayo Clinic Proceedings <http://www.mayoclinicproceedings.com/pastissues.asp>
7. National Library of Medicine <http://www.ncbi.nlm.nih.gov/sites/entrez?db=PubMed>
8. New England Journal of Medicine <http://content.nejm.org>
9. BMJ <http://www.bmj.com>
10. Trip Database <http://www.tripdatabase.com/index.html>

3. Decide on the teaching points that will be the basis of the clinical set problem. Draft a discussion based on these points.

4. Choose a clinical scenario that best illustrates the teaching points. Decide on a case presentation time line that makes both clinical sense and is easy for the reader to follow.
5. Formulate the sections of the clinical set problem with information leading to the question banks. Each clinical set problem should have at least five question banks. Each question bank should include 5 to 10 questions to be selected, avoided or optional.
6. Complete the writing of the discussion. It should lead with an acknowledgment and discussion of the correct diagnosis (es) or clinical topic under consideration. Generally, the discussion should follow the same time line as the case scenario. **All of the options offered in the question banks must be addressed in the discussion.**
7. Cite all of the references as noted below in the reference section.

III. Writing Tips

1. Make sure that the correct and all incorrect answers are discussed. Confirm that the stated letter answer is, indeed, the correct answer. The correct answer should be discussed first and should occupy the majority of the discussion. In the case of multiple matching questions, the discussion should follow the order of the questions. The discussion should not merely be a restatement of the questions.
2. Try to use the most current and evidence-based information. Medicine changes rapidly, so it is important to use recent references and to check the accuracy and timeliness of the material that you submit. We prefer references that are no more than five years old, unless they are classic papers. References with free access to full text articles on the Internet are also favored. Articles with full text available free online should have the hyperlink added at the end of the citation with the month and year the article was last accessed.

Example: Patel SH, Patel R. Inferior vena cava filters for recurrent thrombosis: current evidence. *Tex Heart Inst J* 2007; 34(2):187-94.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1894721/pdf/20070600s00011p187.pdf> Accessed April 2010.

3. Check on the accuracy of numerical values (e.g., laboratory values, medication dosages) that you give. When presenting laboratory data, please give the correct units and also give the normal values in parentheses. Normal ranges for these values can often be found in Appendix B.

Example: hematocrit, 25 mL/dL (normal, 37-47 mL/dL)

4. If you use an acronym, write out the full name followed by the acronym in parentheses. After the initial introduction, the acronym can be used alone. The full name must be introduced in both the question and the discussion.

Example: gastroesophageal reflux disease (GERD)

5. When giving the names of medications and drugs, give the biochemical name first, followed by the brand name in parentheses. If a generic is available, the word "generic" should precede the brand-name medication in parentheses. Generic over-the-counter medications do not need to have brand names listed. It is not necessary to include the® or the™ symbols.

Example: amlodipine (Norvasc)

Example: metronidazole (generic, Flagyl)

6. Do not put numbers at the end of sentences to indicate the reference source supporting the content of the sentence. Selected references are listed following the discussion.
7. Auto numbering may be used when listing reference sources.

IV. References

For each question and discussion, at least three current references are required. Acceptable references include

1. Articles from journals that are indexed by the National Library of Medicine
2. Monographs
3. Chapters in the most current edition of standard textbooks
4. Internet resources of recognized medical or governmental organizations (e.g., Web sites and information of professional academies and organizations such as the Centers for Disease Control and Prevention or the Food and Drug Administration). Patient-oriented informational web sites should not be cited.
5. Selected references should be listed at the end of the discussion. As noted previously, they should be current, that is, published within the previous five years. An exception to this criterion would be an article considered a classic in the medical literature. Citations from secondary sources such as eMedicine (<http://www.emedicine.com/>) or UpToDate (<http://www.uptodate.com/>) should not be used. Please see the sections above on writing for additional information on recommended references.

All references should be listed in alphabetical order using the first letter of the last name of the lead author. For guidelines, recommendations or consensus statements that have no stated author use the first letter in the first word in the title excluding articles (e.g., the, a).

Journal References

Each journal reference must include

1. **Authors** should have last name followed by initials (without a comma between and without periods between the initials). If the reference has multiple authors, place commas between the names and a period at the end of the list. If the reference has more than three authors, cite the first three authors followed by et al. (e.g., Smith AJ, Jones FJ, Doe MG, et al.)

2. Titles of the article should have the first word capitalized, but the remaining words should start with lower case letters. The title of the article should be followed by a period.

3. The journal should be listed next. It should be listed as indexed in the National Library of Medicine (NLM). For example, The Journal of Family Practice is indexed as J Fam Pract and the New England Journal of Medicine is indexed as N Engl J Med (not NEJM). The journal abbreviations can be obtained on the PubMed Web site (www.ncbi.nlm.nih.gov/PubMed) by clicking on “Journal Browser” in the left column under PubMed Services. Type in the full name of the periodical or journal and then click “go.” The correct abbreviation will appear. Following the abbreviated name of the journal are the year of publication, a semicolon, a space, the volume number followed by the issue number in parentheses, a colon and then the inclusive page numbers followed by a period.

Examples:

1. Belch J, MacCuish A, Campbell I, et al. The prevention of progression of arterial disease and diabetes (POPADAD) trial: factorial randomised placebo controlled trial of aspirin and antioxidants in patients with diabetes and asymptomatic peripheral arterial disease. *BMJ* 2008; 337:a1840.
2. Ogawa H, Nakayama M, Morimoto T, et al. Low-dose aspirin for primary prevention of atherosclerotic events in patients with type 2 diabetes: a randomized controlled trial. *JAMA* 2008; 300(18):2134-41.

In the case of publications like the Morbidity Mortality Weekly Report that has no authors other than the Centers for Disease Control and Prevention, the reference should be noted as below.

Examples:

1. Advisory Committee on Immunization Practices. Recommended adult immunization schedule – US, 2010. *MMWR Morb Mortal Wkly Rep* 2010; 59(1): 1-4.
2. Centers for Disease Control and Prevention. Congenital syphilis – United States, 2002-2008. *MMWR Morb Mortal Wkly Rep* 2010; 59(14): 413-417.

Textbook References

1. Author(s) of the chapter should be listed with last name followed by initials just as with journal references (see 1 above).

2. Chapter title should follow, with the first letter of the first word capitalized, but with the remaining words in lower case letters. The chapter number is not necessary.

3. The **book editor(s)** is/are then listed. The names are listed in the same way as authors (last name followed by initials) followed by a comma, then “ed” or “eds” followed by a comma. The names should be preceded by “In” followed by a colon.

4. **Book title** is then listed with capitalization of all major words and followed by a period. The title is followed by the edition (e.g., 14th ed.).

5. The **city of publication** is listed followed by a colon.

6. The **publisher** is then listed followed by a comma.

7. **Date of publication** is then listed followed by a colon.

Page numbers are then listed followed by a period. If you are using an electronic version of a textbook that does not have page numbers, substitute “electronic version” for the page numbers (see example 2 below). No space separates the colon from the page numbers.

Examples:

1. Davis ID, Avner ED. Conditions particularly associated with hematuria. In: Behrman RE, Kleigman RM, Jenson HB, eds, Nelson Textbook of Pediatrics. 18th ed. Philadelphia: WB Saunders Co., 2007:1735-1746.

2. Lum GM. Kidney and urinary tract. In: Hay WW, Levin MJ, Sondheimer JM, *et al.*, eds, Current Pediatric Diagnosis and Treatment. 17th ed. New York: Lange Medical Books/McGraw Hill, 2005: electronic version.

3. Cantrill SV. Face. In: Marx J, Hockberger R, Walls R, eds, Rosen’s Emergency Medicine: Concepts and Clinical Practice. 5th ed. St. Louis: Mosby 2009:314-329.

Monographs and Booklets

Monographs and booklets may or may not have authors or editors listed. If authors are listed, they should be noted first. If no authors or editors are listed, the title of the monograph or booklet is listed first.

Examples:

1. Zuber TJ. Gastroesophageal reflux disease. Diagnosis and medical management. CME Bulletin. American Academy of Family Physicians 2003;2(5): 1-6.
2. Peterson WL. Improving the management of GERD. Evidence-based therapeutic strategies. Continuing medical education: Consensus opinion in gastroenterology. American Gastroenterological Association 2002:1-28.
3. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. National Institutes of Health.

Cochrane Database

References from the Cochrane Database will have a search term in lieu of page numbers.

Example:

1. Wong CL, Farquhar C, Roberts J, *et al.* Oral contraceptive pill as treatment for primary dysmenorrhoea. Cochrane Database Syst Rev 2009; 15(2):CD002120.

Internet Sources

Internet resources must be from reputable sources. Sites that adhere to the principles of Health on the Net Foundation Code of Conduct (www.hon.ch) are preferred over sites that do not adhere to these principles. When placing a hyperlink at the end of a citation, please cite the html version, rather than the .pdf (adobe) version. The date that the Web site was accessed should be listed after the Web site address.

Examples:

1. Mounsey AL, Matthew LG, Slawson DC. Herpes zoster and postherpetic neuralgia: prevention and management. Am Fam Physician 2005; 72(6):1075-80, 1082. <http://www.aafp.org/afp/20050915/1075.html> Accessed October 2009.
2. Last AR, Wilson SA. Low-carbohydrate diets. Am Fam Physician 2006; 73(11):1942-1948. <http://www.aafp.org/afp/20060601/1942.html> Accessed October 2007

V. Illustrations and Graphics

Because illustrations are an integral part of medical education, The Core Content Review of Family Medicine welcomes and encourages members of the national faculty to provide graphic material that will enhance the educational value of questions and discussions. Acceptable graphics include plain-film x-rays, radionucleotide scans, ultrasonograms, computed tomography (CT) scans, magnetic resonance imaging (MRIs), electrocardiograms, photographs (black and white or color), charts, graphs and tables.

When submitting illustrations or graphics, please keep the following in mind:

1. Realize that family physicians usually do not interpret subtle findings on specialized radiologic studies such as CT scans or MRIs. Therefore, a question should not focus on the participant's diagnosis or interpretation of such graphic material. However, interpretation of plain-film x-rays, electrocardiograms and other pictorial material is within the scope of family medicine practice.

2. Adhere to copyright law. Material protected by copyright of a third party (i.e., a publisher of a textbook, monograph, journal or Web site) cannot be used unless permission is granted by the holder of the copyright. **If you submit a copyrighted graphic, such as a photograph or table, you must obtain permission from the third party to use the graphic in a publication such as The Core Content Review. Please send a copy of that permission with your submitted material. This includes photographs and other material reproduced from Internet sources. As a rule, The Core Content Review does not pay the owner to reproduce copyrighted material. Occasionally, we will make an exception to this rule if the owner of the material is requesting only a nominal fee. We always list the source and give credit to the owner for granting permission to use copyrighted material.** (Below is an example of a brief note requesting permission to reproduce copyrighted material. You may use this to model your permission requests.)

"I am an author for The Core Content Review of Family Medicine, which is a non-profit organization that provides continuing medical education for health care professionals. I am writing a question and discussion on (topic name). I am writing to request permission to reproduce (example: Table 1 entitled "Conditions Associated with Elevated Tumor Marker Levels" from an article by Dr. Perkins in Am Fam Physician 2003; 68:1075-82.) I feel this material will greatly enhance the educational value of the written material. You will be recognized in the publication with wording of the caption at your discretion. Initially, this material will be used in a print format. Every two years we release previously printed material in both CD and online format. This material will only be provided to subscribers and will be password protected on our website. Thank you for your consideration. Your help is very much appreciated. "

3. Photographs - If you have taken a photograph where the patient could be clearly identified, you must obtain a release for publication signed by the patient or the patient's parent or guardian. The release form is Appendix C located at the back of the guide. If the patient cannot be identified in the photograph, no release is needed. Photographs should be submitted in .jpg, .tif, or .png format.

4. Other Graphics - Graphs, charts and tables may be included in the question/discussion material. If they are taken directly from another source, permission (as in 2 above) must be obtained and the correct wording of the credit that must be given. If a graph, chart or table is adapted from another source, that source must be noted under that particular graphic. Graphs, charts and/or tables must be submitted to us in their native file format to ensure the highest quality when reproducing this material.

Hints on illustrations and graphics

1. High-quality digital photographs should be submitted electronically as a file separate from the written document.

2. High-quality electrocardiographic tracings may be photocopied and sent flat by regular mail or they may be photographed with a digital camera or scanned and sent electronically.

3. Plain-film x-rays can be made into electronic form by taking a digital picture of the film on a light board. Generally, using a tripod will create the sharpest image.

4. Governmental Web sites such as the Centers for Disease Control and Prevention have numerous charts, graphs, maps and tables that are for public use and do not require special permission. This type of graphic should be saved (downloaded) and submitted in its original format along with the Internet address at which the original is located. A credit line must be included to be printed under the graphic item.

Sources of some non-copyrighted graphics:

Centers for Disease Control and Prevention <http://www.cdc.gov/>

Gray's Anatomy <http://www.bartleby.com/107/>

National Eye Institute <http://www.nei.nih.gov/photo/>

Public Health Image Library <http://phil.cdc.gov/phil/home.asp>

World Health Organization <http://www.who.int/en/>

VI. Word Processing the Questions and Discussions

All submissions should be uploaded to the author site in Microsoft Word format.

Helpful Hints When Submitting Material

1. Do use a simple heading at the top of each question and associated discussion:

Question topic (ex., Migraine headache)

Author name (ex., John Doe, M.D.)

Date (ex., 12/23/01)

2. Do put each individual question and discussion together in the same file (document) and label it with the same heading as in 1. If a series of questions relates to one discussion, they can all be placed in one file.

3. Do upload all material to the author website and check the “completed” check box when submitting completed material.

VII. Plagiarism

The Core Content Review is subject to the same ethical and professional standards of authorship as any medical journal. Medical writing requires literature searches, note taking, analysis, interpretation and, finally, synthesis of medical facts, theories, research and clinical studies. The copying or verbatim use of material written by others without acknowledging their ownership is plagiarism and is not acceptable. Of note, even if authorship is acknowledged, please do NOT replicate or “copy and paste” sections out of other articles.

VIII. Topic Categories

1. Adolescent
2. Allergy - Immunology
3. Blood
4. Circulatory/Vascular
5. Congenital/Genetic
6. Critical Care
7. Diagnostic Testing
8. Digestive
9. Domestic Violence/Abuse
10. Endocrine
11. ENT
12. Ethical/Legal
13. Genitourinary
14. Geriatric Medicine
15. Health Care System
16. Health Maintenance
17. HIV
18. Hospital care
19. Infectious
20. Medications/Drugs
21. Men's Health
22. Metabolic
23. Musculoskeletal
24. Neoplasm/Malignancy
25. Neurologic
26. Nutrition
27. Occupational Medicine
28. Pain Management
29. Pediatric/Neonatal
30. Practice Management/Informatics
31. Pregnancy/Childbirth
32. Psychologic
33. Public Health
34. Quality Improvement
35. Respiratory
36. Rheumatologic
37. Sensory
38. Sexuality
39. Skin
40. Sports Medicine
41. Substance Abuse
42. Surgery
43. Systems-based practice – inpatient
44. Systems-based practice - outpatient
45. Travel Medicine
46. Urgent/Emergency
47. Women's Health

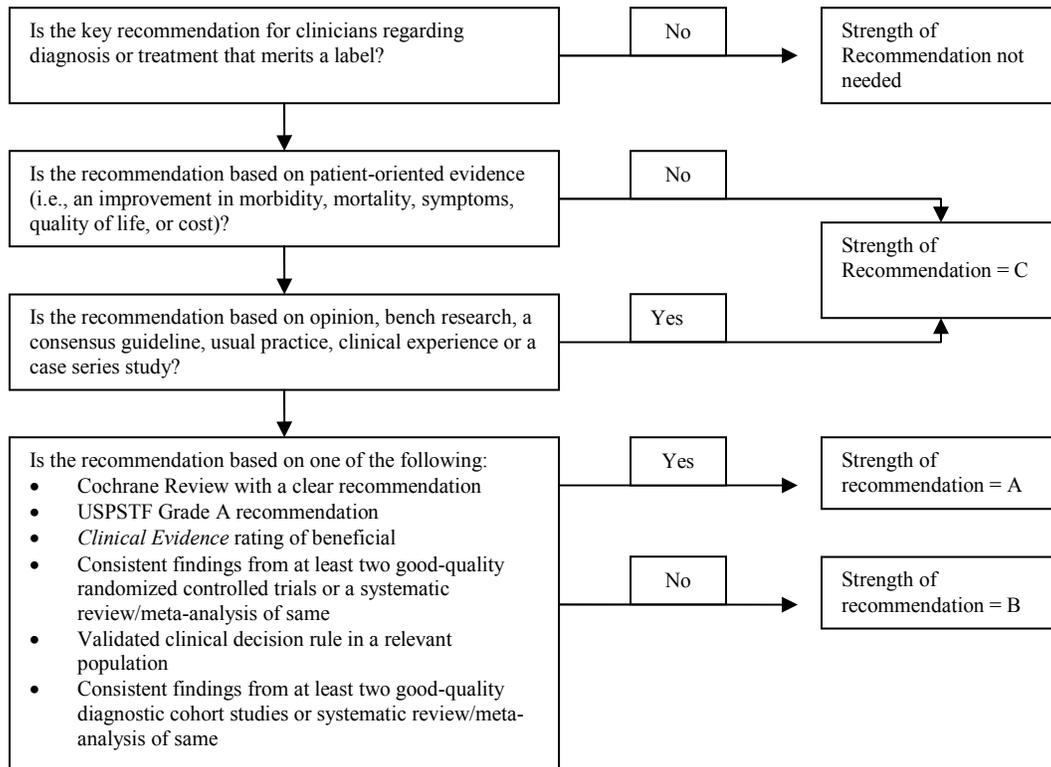
Appendix A

Strength of Recommendation Taxonomy (SORT) Strength-of-Recommendation Grades

Strength of Recommendation	Basis for Recommendation
A	Consistent, good-quality patient-oriented evidence*
B	Inconsistent or limited-quality patient-oriented evidence*
C	Consensus, disease-oriented evidence*, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention or screening

*-Patient-oriented evidence measure outcomes that matter to patients: morbidity, mortality, symptom improvement, cost reduction and quality of life. Disease-oriented evidence measures intermediate, physiologic or surrogate end points that may or may not reflect improvements in patient outcomes (e.g., blood pressure, blood chemistry, physiologic function, pathologic findings).

Strength of Recommendation Based on Body of Evidence



Algorithm for determining the strength of recommendation based on a body of evidence (applies to clinical recommendations regarding diagnosis, treatment, prevention or screening). While this algorithm provides a general guideline, authors and editors may adjust the strength of recommendation based on the benefits, harms, and costs of the intervention being recommended. (USPSTF – U. S. Preventive Services Task Force)

Reproduced with permission: Ebell M, Siwek J, Weiss BD, *et al.* Strength of recommendation taxonomy (SORT). *Am Fam Physician* 2004; 69(3):548-556.

<http://www.aafp.org/afp/20040201/548.html> Accessed December 2007

Appendix B

The table below provides normal values for the most commonly reported laboratory tests. Other normal values can be found in references sources such as Conn's Current Therapy. The Core Content Review generally uses conventional units rather than SI units (le Système International d'Unites).

HEMATOLOGY TESTS	CONVENTIONAL UNITS
Cell counts	
Erythrocytes	
Males	4.6-6.2 million/mm ³
Females	4.2-5.4 million/mm ³
Children	4.5-5.1 million/mm ³
Leukocytes, total	4,500-11,000/mm ³
Leukocyte differential counts	
Myelocytes	0%
Band neutrophils	3-5%
Segmented neutrophils	54-62%
Lymphocytes	25-33%
Monocytes	
Eosinophils	1-3%3-7%
Basophils	0-1%
Platelets	150,000-400,000/mm ³
Reticulocytes	25,000-75,000/mm ³
Coagulation tests	
Partial thromboplastin time, activated (apt)	20-35 seconds
Prothrombin time (PT)	12-14 seconds
Corpuscular values of erythrocytes	
Mean corpuscular hemoglobin (MCH)	26-34 pg/cell
Mean corpuscular volume (MCV)	80—96 μm ³
Mean corpuscular hemoglobin concentration (MCHC)	32-36 gm/dL
Hematocrit	
Males	40-54 mL/dL
Females	37-47 mL/dL
Children	35-49 mL/dL
Hemoglobin	
Males	13-18 gm/dL
Females	12-16 mg/dL
Children	11.2-16.5 gm/dL
Sedimentation rate (Westergren)	
Males	0-15 mm/h
Females	0-20 mm/h

CLINICAL CHEMISTRY TESTS	CONVENTIONAL UNITS
Alanine amino transferase (ALT) serum (SGPT)	1-45 U/L
Albumin, serum	3.3-5.2 gm/dL
Alkaline phosphatase, serum	
Adult	35-150 U/L
Adolescent	100-500 U/L
Child	100-350 U/L
Amylase	25-125 U/L
Aspartate aminotransferase (AST) serum (SGOT)	1-36 U/L
Bicarbonate (venous plasma)	23-29 mEq/L
Bilirubin, serum	
Conjugated	0.1-0.4 mg/dL
Total	0.3-1.1 mg/dL
Calcium, serum	8.4-10.6 mg/dL
Calcium, ionized serum	4.25-5.25 mg/dL
Carbon dioxide, total, serum or plasma	24-31 mEq/L
Chloride, serum or plasma	96-106 mEq/L
Creatine kinase (CK), serum	
Males	55-170 U/L
Females	30-135 U/L
Creatinine, serum	0.6-1.2 mg/dL
Ferritin, serum	20-200 ng/mL
Folate, serum	3-18 ng/mL
Follicle- stimulating hormone (FSH), plasma	
Males	4-25 mU/mL
Females, premenopausal	4-30 mU/mL
Females, postmenopausal	40-250 mU/mL
Gamma-glutamyltransferase (GGT), serum	5-40 U/L
Glucose, fasting	<100mg/dL
Haptoglobin, serum	20-165 mg/dL
Iron, serum	75-175 µg/dL
Iron binding capacity, serum	
Total	250-410 µg/dL
Saturation	20-55%
Lactate dehydrogenase (LDH), serum	110-220 U/L
Lipase, serum	10-140 U/L
Osmolality	275-295 mOsm/kg water
Phosphate, inorganic, serum	
Adult	3.0-4.5 mg/dL
Child	4.0-7.0 mg/dL
Potassium, serum	3.5-5.0 mEq/L
Prolactin, serum	
Males	1.0-15.0-ng/mL
Females	1.0-20.0 ng/mL
Sodium, serum	135-145 mEq/L
Thyroglobulin	3-42 ng/mL

Thyrotropin (TSH), serum	0.4-4.8 μ IU/mL
Thyroxine (FT4), free, serum	0.9-2.1 ng/dL
Thyroxine (T4), serum	4.5-12/0 μ g/dL
Transferrin	250-430 mg/dL
Triiodothyronine, (T3), serum	70-190 ng/dL
Triiodothyronine uptake, resin (T3RU)	25-38%
Urate	
Males	2.5-8.0 mg/dL
Females	2.2-7.0 mg/dL
Urea nitrogen, serum or plasma	11-23 mg/dL

Appendix C

CORE CONTENT REVIEW OF FAMILY MEDICINE

CONSENT TO PHOTOGRAPH

Name _____ Date _____

I hereby grant permission for photos to be taken of (me, my son, daughter, wife, husband) by authorized personnel of *The Core Content Review of Family Medicine* for educational use. I grant this permission freely.

Signature of Person Photographed _____

Date _____

Parent or Guardian _____

Witness _____

Photographer _____

A copy of this release form will remain on file at the executive offices of *The Core Content Review of Family Medicine*. This document is not a part of the patient's permanent medical record.