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## Let us help you Crack the Code

*By Jack Krasuski, MD*

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### Table of Contents

- Introduction
- Treatment Algorithms
- Treatments in Specific Populations
  - Recognizing Zebras
- Details of Treatment Interventions

### Introduction

Hi, it's Dr. Jack Krasuski. Thanks for downloading this manuscript. My objective for this handout is to help you better understand how you're being tested. On a board exam there is the "What" and the "How."

What refers to the actual exam content as outlined by the board in their exam blueprints. But simply knowing the content – even if you know it well – does not necessarily ensure success. I've known many incredibly knowledgeable physicians who consistently score low on exams. I believe one reason for this lower-than-expected performance is the lack of understanding of how exam question writers are trained to write the exam questions. This manuscript begins to fill that void.

As you read the sections I've included, consider how the ideas relate to exam questions you've already encountered in your career. Then when you take practice tests – as I highly recommend you should – do not only answer the question, but pause to consider the "mechanics" of the question itself:

- What is the main clinical (diagnostic, assessment, treatment) point the question is testing you on?
- What distinction do you need to identify in the patient presentation that will affect the direction of your management of the patient?
- What is the import of each of the response options you're provided?
- Which response options are "near misses," that is, not necessarily incorrect but either not relevant to the patient's management at this point or not the best next step to take?
- Which response options are meant to confuse you by appearing superficially similar to the correct response or sensible if you didn't attend to the details of the question?



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Now, that I've set the scene, let's begin learning some of these question mechanics.

## Treatment Algorithms

Medical board exams primarily test clinical knowledge. As such, questions that assess your knowledge of treatment interventions are common. There are three aspects of treatment that can be tested:

- Details of specific treatment interventions
- Treatments in specific populations and by disease variants
- Treatment algorithms

Treatment algorithms are the focus of this post. Algorithms are a rank ordering of treatment interventions beginning with first-line treatments proceeding to second, third, and fourth-line treatments, and ending at last-line treatments at whatever level they happen to fall.

Some exam questions present a case vignette in which the patient appropriately should receive what's considered first-line treatment and a first-line treatment intervention is available in the question's response options.

You can consider this as an easier type of question since it only tests your knowledge of first-line treatments. This type of question would be appropriate for rare disorders for which you would not be expected to show more than basic knowledge of clinical management. Alternatively, the condition could be common but usually treated by a physician from a different specialty but with an expectation that your specialty know the basics of diagnosis and management. An example would be a psychiatric condition being tested on the internal medicine or family medicine boards. Or a neurologic condition tested on the psychiatry certification exam.

A different type of board question presents a clinical case that tests your knowledge of treatments found at lower levels of the treatment algorithm, that is, at the second, third, fourth or even lower stages. These types of questions can be structured in one of two ways.

The first approach is to have the question vignette include information that makes it clear that the patient is NOT a candidate for first line treatment. For instance, the vignette may state that the patient has certain allergies, or has responded poorly to first-line treatments before, or has had a serious adverse effect to a previous trial of a first-line treatment. Therefore, you have been provided a reason within the question to look for treatments other than first-line treatments in the response options.

The second way an exam question can force you to choose a second-line (or lower) treatment option is by simply not providing you a first-line treatment in your list of response options. The question stem presents a straight-forward case for which you would choose a first-line treatment if you could. However, the answer options do not include a first-line treatment option. Thus, you are forced to choose the most appropriate response option from the ones included.

### Example Exam Question from Psychiatry

Question: A 21 year old male college student presents with depression and intense fear and avoidance of nearly all social situations. He has failed trials of several SSRIs, venlafaxine, mirtazapine clonazepam, and propranolol. In addition to cognitive behavioral therapy, which medication would you most likely recommend to the patient?

- A. **Phenelzine**
- B. Quetiapine
- C. Levothyroxine
- D. Valproic acid
- E. Lithium

Explanation: The patient in this case vignette suffers from depression and social anxiety disorder. He has had failed trials with several classes of first-line and FDA-indicated medications: several SSRIs, an SNRI, mirtazapine (an antidepressant with a more complex mechanism of action), a benzodiazepine, and a centrally-acting beta-blocker. The only FDA indicated medications for social anxiety disorder are paroxetine, sertraline, and venlafaxine XR. Out of the response options available, the medication with the most



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evidence of efficacy is phenelzine, a monoamine oxidase inhibitor (MAOI). Prior to the availability of SSRIs in 1985, the MAOIs were the most commonly prescribed medications for social anxiety disorder. Studies show comparable or better efficacy of MAOIs compared to SSRIs for social anxiety disorder. However, MAOIs now have been relegated to lower levels in the treatment algorithm for social anxiety and major depression due to the danger they pose in precipitating a hypertensive crisis when a diet high in tyramine, an amino acid with noradrenergic effects, is ingested.

## Treatments in Specific Populations

Medical board exams include a high percentage of treatment-focused questions, unsurprisingly so since, ultimately, appropriate treatment is what patients seek from physicians. Specialty board exams test three aspects of treatment:

- Details of specific treatment interventions
- Treatments in specific populations and by disease variants
- Treatment algorithms

Today's post focuses on the choosing the right treatment for a patient based on that patient's membership in a specific population or suffering from a particular disease variant. The board organizations direct their question writers to test your ability to know which specific treatment interventions apply to particular forms of the disease and within special populations. Such specificity is reserved for conditions or disease states that have well-established current treatment guidelines or recommendations.

For example, in patients with diabetes mellitus who have elevated albumin-to-creatinine ratios as measured on at least 3 tests conducted over a six month period, the addition of an ACE inhibitor is recommended at doses that achieve normalization of albumin excretion. (American Diabetes Association Standards of Medical Care in Diabetes, 2014)

Another example: a woman with anorexia nervosa who has been amenorrheic for 6 months or longer, should receive a bone densitometry test since extended amenorrhea places her at particularly high risk of osteoporosis. (American Psychiatric

Association Practice Guideline for the Treatment of Eating Disorders, Third Edition, 2005)

Example Exam Question from Psychiatry

Question: A 17 year old female presents in her 9th week of pregnancy. She is diagnosed with an episode of severe major depressive disorder. Which antidepressant would be least safe to prescribe?

- A. Bupropion
- B. Clozapine
- C. Fluoxetine
- D. **Paroxetine**
- E. Venlafaxine

Explanation: If a pregnant patient needs treatment with an antidepressant, the medication to most clearly avoid from among the available response options is paroxetine. It's the only medication in Pregnancy Category D because of its associated teratogenic risk of cardiac abnormality. Further, the fetal heart is most susceptible to teratogenic insults in the first trimester. (But note that recent research indicates that heart development occurs later into gestation than previously thought; the heart muscle is not fully organized until the 20th week of gestation.)

Let's review the other response options: Bupropion and clozapine are Pregnancy Category B, the safest category presented, although, as an antipsychotic, clozapine is not indicated for this patient's condition. Fluoxetine and venlafaxine are in Pregnancy Category C.

One could argue about the limited meaningfulness of the currently assigned Pregnancy Categories, but this is a real world concern and not necessarily an exam-world concern. Exams test you on treatment appropriateness based on some established standard, even if that standard at some later point is revised, as inevitably happens.



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## Recognizing Zebras

The medical boards pride themselves on presenting multiple-choice questions on their exams that are clinically-relevant and fair. In other words, the boards are not trying to trick you. This means that most clinical vignettes will describe patients with a common form of a disease or disorder. After all, these are the cases most of us physicians spend our days assessing and treating. However, as clinicians we do need to recognize the rare condition. So, the question arises, on the board exam how do you distinguish whether the question is about a 'horse' or a 'zebra'?

If it's a zebra, there will be some information provided within the clinical vignette about the patient's demographics that is unusual for that disease state, such as it being an unusual occurrence at that patient's age, in their gender or perhaps racial or ethnic group. For instance, if on the family medicine boards you're presented with a classic presentation of acute cholelithiasis occurring in an adolescent who has never been pregnant, the patient's age should alert you to etiologies that are not common in adults but common in children and adolescents, such as presence of hemolytic disease which, when present, leads to formation of black pigment stones. Or if on the psychiatry boards, you have a dementia presentation described in a 50 year old man without a family dementia history, the etiology is probably not Alzheimer's disease (unless the patient has trisomy 21, perhaps of a mosaic form which has less evident physical stigmata of Down's syndrome). Or if the vignette presents a young East-Asian woman who presents to the ER unconscious, you should wonder why her race or ethnicity is described in the vignette. Let's pretend the vignette goes on to state that you learn from family members that she immigrated from a rural province from China and has been severely despondent about her move to this country. (See discussion of organophosphate poisoning below.)

Or, perhaps, the question suggests a 'zebra' because it includes a piece of information about the clinical presentation that is clearly out of place. An example would be a patient with nocturnal panic attacks – which are not uncommon – who also reports that he's already taking some – unnamed – medication given him by his primary care physician for anxiety. The test-taker's initial impression may be that

the current treatment is not working. This indeed may be the case. An alternative explanation is that the patient has been prescribed a short-acting medication whose effects wear off prior to the next dose. A common culprit of nocturnal anxiety or panic is immediate release alprazolam. Although this medication has an FDA indication for panic disorder, it has a very short half-life and because of this often leads to drug-withdrawal anxiety when medication plasma levels fall. The fact that the vignette provides information about the occurrence of nocturnal attacks together with the patient taking 'some medication' may be enough to trigger you to think beyond your first clinical hypothesis.

A third type of clue for a zebra relates to the nature or setting of the disease. Perhaps the question vignette mentions that the patient has traveled internationally (especially to a tropical country), or they've been involved in an unusual activity or hobby (for example, such as high altitude mountain climbing), or their occupation is described. In latter case, pay particular attention to information suggesting the patient works in a factory, or a farm or other rural setting. For example, accidental or intentional exposure to organophosphates is much more common in individuals living in a farming or rural community because many herbicides are organophosphate compounds and they readily available. Recall that organophosphates are cholinesterase inhibitors and poisoning with one of these compounds leads to muscarinic and nicotinic overactivity and high rates of death from diaphragmatic failure. Intentional poisoning is the most common method of suicide in young women living in rural China. Accidental poisoning is also common. The example mentioned in the previous section – the young woman who emigrated from China, given her rural background, may have been knowledgeable about the lethality of these commonly obtained chemicals. Also, the fact that the vignette discussed her despondent state of mind was also an important clue.

The motto for the exam is "Nothing in the vignette has been placed there by accident." Every fact or other piece of information is inserted into questions is designed to lead you down one diagnostic path or another, or down one treatment path or another. The information is there to help you make diagnostic and/or treatment distinctions.



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## Example Exam Question from Psychiatry

Question: A 46 year old man returned last week to the US from a business trip to Japan. After arriving at his home he feels short of breath, tired, and 'panicky.' When the feelings do not subside he takes a cab to the nearest emergency room. Upon questioning he tells the physician that he had a history of anxiety when younger but has for the most part overcome it. Which of the following disorders is this patient most likely to suffer from?

- A. Hyperthyroidism
- B. **Pulmonary embolism**
- C. Panic disorder
- D. Generalized anxiety disorder
- E. Post-traumatic stress disorder

Explanation: Pulmonary emboli are not common. There are dozens of individuals with anxiety disorders for every one person who develops a pulmonary embolism. However, in this case the information – not very subtle and therefore not that challenging – points to a medical cause for this man's anxiety. First, he was sitting for perhaps 10- 14 hours on a cramped flight, his symptom onset was abrupt, and he had not experienced significant anxiety in many years prior to this event. Deep venous thrombosis, with pulmonary embolism as a sequela, is a well-known hazard of immobility as occurs on a long airplane flight. Also, there is no supportive evidence provided in the vignette suggesting post-traumatic stress disorder, generalized anxiety disorder, or hyperthyroidism. Therefore, the two top choices are panic disorder and pulmonary embolism. Given the context of travel and no other symptoms suggesting panic disorder, pulmonary embolism is the best option.

## Details of Treatment Interventions

It's not a secret that the board tests your knowledge of the details of all the myriad interventions used in treating patients. In addition to knowing the circumstances of when to choose each intervention (discussed in other posts), you are expected to know the details of each specific treatment intervention. The question arises, just how much detail do you need to know?

Each field of medicine has interventions that are administered by only a subset of practitioners in that field or, alternatively, patients are referred to other specialists to complete these procedures. For the purposes of the board exam, you are assumed to be an average and general practitioner in your specialty. Given this, what are you expected to know about interventions you may not yourself administer?

One touchstone to help you gauge the level of knowledge needed is to base it on what you would need to know in order to obtain informed consent from a patient. If you are the physician who is recommending a certain procedure, either as part of the work-up or treatment, and yet are not the physician administering that procedure, you nevertheless need to know enough about it to obtain the initial informed consent for that procedure from your patient.

These are examples of facts you should know:

- The main concept behind the procedure. How the procedure is known or theorized to help establish a diagnosis or treat the condition. What the effects of the procedure are on the body.
- What the risks and benefits are of the procedure.
- What are alternative procedures and what are their risks and benefits.
- What are the risks and benefits of no treatment (which is always an alternative).

Here are some examples:

- Neurologist needs to know the indications for and the general procedures and general interpretation of findings of electromyographic studies.
- General surgeon who is not a breast cancer specialist, needs to know the risks, benefits, and general procedures of lumpectomies versus mastectomies.
- Psychiatrist who refers a patient for electroconvulsive therapy needs to know indications, general procedures, and risks (including risk of death) and benefits of electroconvulsive therapy (ECT).



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## Example from Psychiatry: What Do You Need to Know about ECT

On the psychiatry boards, a general psychiatrist is expected to know the following about ECT and can be expected to see between 1-3 multiple choice questions on their certification or maintenance of certification exams on the topic of ECT.

Disorders with an indication for ECT:

- Common indications: depression, mania, psychosis
- Rare indications: neuroleptic malignant syndrome, unresponsive severe Parkinsonism (akinetic-mutism), uncontrolled epileptic seizures

Indications for ECT:

- Failed medication trials
- Patient preference
- Previous good response to ECT
- Severe depression placing patient at acute risk of suicide, dehydration, or malnutrition
- Catatonic features
- Mania in the context of pregnancy (since several anti-manic agents confer high risk for congenital malformations)

Main concepts of ECT treatment

- Patient needs extensive informed consent
- Patient needs to be NPO midnight prior to procedure (to minimize risk of aspiration)
- Patient is placed under general anesthesia for procedure (with an induction agent)
- Patient receives "muscle relaxant" such as succinylcholine
- Patient receives assisted ventilation during time of muscle paralysis
- An electrical current is passed through the brain for the purpose of inducing a seizure.
- Seizure activity should last between about 25-120 seconds
- If seizure lasts longer than 120 seconds, it should be aborted with IV anticonvulsant
- Seizure activity is monitored with EEG and by cutting off circulation to one leg prior to injection with succinylcholine, thus, preventing paralysis in one limb to give a visual cue of tonic-clonic seizure activity
- A bilateral generalized seizure is required for effectiveness

- Usually 12-20 individual treatments are required, that are given 2-3 times a week
- As soon as ECT stops, patient will begin to relapse and continuation treatment is required, either with medications or with maintenance ECT.
- ECT is presumed to provide benefit because of massive releases of neurotransmitters from neurons during seizures, including of serotonin, norepinephrine, and dopamine.

Contraindications

- Note there are no absolute contraindications, only relative ones
- Cardiovascular system
  - Recent MI (risk of re-infarction during ECT due to blood pressure fluctuations)
  - Uncompensated congestive heart failure
  - Severe cardiac valve disease
  - Aneurysms and vascular malformations
- Central nervous system
  - Increased intracranial pressure
  - Recent cerebral infarction
- Pulmonary
  - Severe COPD or pneumonia

Potential Adverse Effects

- Death at a rate of between 1 in 10,000 and 1 in 50,000 ECT applications
- Myocardial infarction and stroke precipitated with fluctuations in vital signs. ECT often causes tachycardia and hypertension followed by bradycardia and hypotension. (These fluctuations are related to discharges predominantly of the sympathetic nervous system initially quickly followed by the parasympathetic nervous system
- Prolonged apnea, usually as a result of pseudocholinesterase deficiency. Examinee needs to know that this adverse effect, if it were to occur, should be managed through assisted ventilation until normal breathing returns. And if the patient has a known deficiency, then alternative paralyzing agents are available.
- Post-ictal agitation that can be monitored and controlled behaviorally if mild or with a benzodiazepine or antipsychotic if moderate to severe



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- Cognitive impairment is common. Patient usually recovers from post-ictal confusion in a matter of minutes to hours. Long term memory deficits and deficits in other cognitive spheres can last for months as they slowly resolve. There is no evidence that ECT causes brain damage or permanent cognitive deficits.

This may seem like an exhaustive list. However, if you are a psychiatrist who administers ECT, you would know much more as, for example, the following list illustrates. Knowledge about the items below would not be required for your board exam, however.

- The different induction agents used and which ones increase or decrease seizure thresholds
- The electrical parameters of the stimulus: energy settings and wave forms
- Placement of leads and differences in seizure parameters that need to be observed between bilateral and unilateral lead placement
- Medications and their doses for aborting a seizure
- Detailed understanding of managing adverse effects, including which medications can be used, at what dose and with which timing

## Thank You

This is the end of version 1 of the Tips to Crush Your Boards! I'd like to request one thing from you: send your feedback, advice, or your own board tips that I can incorporate into this growing manuscript. When new sections are added, we will automatically notify you.

Signing off, yours in board success,

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