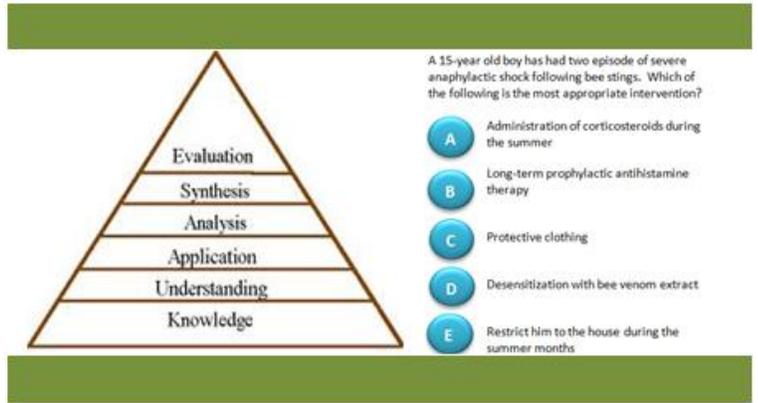# Writing Multiple-Choice Questions for the Basic and Clinical Sciences

The NBME recommends using **Application Questions** on multiple-choice exams as they assess students' ability to use "recalled" knowledge.

➢ If an item requires an examinee to reach a conclusion, make a prediction, or select a course of action, it should be classified as an *Application of Knowledge* item.

➢ If an item tests rote memory for isolated facts (without requiring their application), it should be classified as a *Recall* item.

A 15-year old boy has had two episode of severe anaphylactic shock following bee stings. Which of the following is the most appropriate intervention?

A. Administration of corticosteroids during the summer

B. Long-term prophylactic antihistamine therapy

C. Protective clothing

D. Desensitization with bee venom extract

E. Restrict him to the house during the summer months

Seek to write items that require application of knowledge, allowing assessment of both a student's information base plus ability to use that information. Application items better prepare students for Step 1 and for clinical clerkships.

Measuring Recall vs. Knowledge

Recall	Application of Knowledge

1. Which condition manifests as chronic (longer than 3 months) airspace disease on a chest radiograph?
  a. Streptococcal pneumonia
  b. Adult respiratory distress syndrome
  c. Pulmonary edema
  d. Pulmonary alveolar proteinosis
	A 30-year old man presents with a 4-month history of dyspnea, low-grade fever, cough and fatigue. Given the following chest radiograph, what is the MOST likely diagnosis?
	  a. Streptococcal pneumonia
	  b. Adult respiratory distress syndrome
	  c. Pulmonary edema
	  d. Pulmonary alveolar proteinosis

2. Which is MOST responsible for the swelling that typically occurs after an anterior cruciate ligament tear?
  a. Disruption of the capillaries in the knee capsule
  b. Synovial irritation
  c. Disruption of the anterior cruciate ligament
  d. Soft tissue swelling
  e. Disruption of the medial geniculate artery
	A college student is brought into the ER after receiving a hard sideways tackle during a football game which produced a loud pop in his knee. Which is MOST responsible for the swelling he is experiencing?
	  a. Disruption of the capillaries in the knee capsule
	  b. Synovial irritation
	  c. Disruption of the anterior cruciate ligament
	  d. Soft tissue swelling
	  e. Disruption of the medial geniculate artery

Writing Clinical Vignettes as the Stem

Steps in Writing	Include
1. Start with a theme--**Fatigue**	Age and Gender
2. List the diagnoses associated with fatigue or clinical conditions : ■ Depression ■ Folate deficiency ■ Congestive heart failure	Site of care Presenting complaint
3. Write the vignette with the patient info listed on the right. If you need a collaborator – a number of Society of Teacher Scholars members write items for national examinations and are available for guidance. Email sts@mcw.edu.	Duration Patient history Physical findings
4. Remember: There needs to be **one** single best answer.	Positive/negative findings

Integrative Questions

1. A (patient description) has (abnormal findings). Which [additional] finding would suggest/suggests a diagnosis of (disease1) rather than (disease 2)?

2. Following (procedure), a (patient description) develops (symptoms and signs). Laboratory findings show (findings). Which of the following is the most likely cause?

3. A (patient description) has (symptoms and signs). Exposure to which of the (toxic agents) is the most likely cause?

4. A patient has (abnormal findings), but (normal findings). Which of the following is the most likely diagnosis?

Sample Lead-Ins

1. Select the item which best explains... (abnormal)?	*Option sets could include sites of lesions; list of nerves; list of muscles; list of enzymes; list of hormones; types of cells; list of neurotransmitters; list of toxins, molecules, vessels, spinal segments.*	2. Select the most likely finding to explain these findings.	*Option sets could include list of laboratory results; list of additional physical signs; autopsy results; results of microscopic examination of fluids, muscle or joint tissue; DNA analysis results; serum levels.*
3. Which of the following is the most likely cause?	*Option sets could include list of underlying mechanisms of the disease; medications that might cause side effects; drugs or drug classes; toxic agents; hemodynamic mechanisms, viruses, metabolic defects.*	4. Which of the following should be administered?	*Option sets could include drugs, vitamins, amino acids, enzymes, hormones.*
5. Which of the following is defective/deficient/ nonfunctioning?	*Option sets could include list of enzymes, feedback mechanisms, endocrine structures, dietary elements, vitamins*	6. Given the pedigree, what is the likelihood that the next child (specify gender) will have the disease?	

Additional Items and templates can be found in the Appendix of the NBME Item-Writing Guide*, pages 67--92.*

For this and other questions about writing Multiple Choice Question assessments, please contact acad_oei@mcw.edu*.*

References:

Paniagua, Miquel, MD and Swygert, Kimberly, PhD. (2016), editors. Constructing Written Test Questions For the Basic and Clinical Sciences. *(National Board of Medical Examiners).* http://www.mcw.edu/Medical-School-FileLibrary/DEPT-Medical-School/Teaching-Toolbox/IWWGoldBook_webversion01.30.2016.pdf