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Chairperson**

The role of the item writer in development of the NMTCB examination is very critical and important. Each year, the NMTCB identifies individuals who are recognized content experts in the areas of radiopharmacy, radiation protection, instrumentation, imaging, and non-imaging, and asks them to participate in developing new items for the NMTCB examination. Following are guidelines provided to assist item writers and other interested individuals in writing technically sound multiple-choice test items. The resulting test items should provide a reliable measure of an examinee's preparedness to practice as a nuclear medicine technologist.

Item-writing Principles

There is a series of well-defined steps in the development of multiple-choice test items. The item writer will be assigned a task at a specific taxonomy level (comprehension, application, or analysis) from the task list. The task assigned represents an activity identified by the NMTCB as requiring items. The task and taxonomy level should guide the item writer to select an appropriate topic for the question to be developed.

Characteristics of Taxonomy Levels

Comprehension. Items written at the comprehension level test for the most basic level of understanding and remembering. Attributes being tested include recall, recognition, or understanding of facts, specifics, or patterns, and the item may involve recognizing information presented in graphic form. Behavior terms that may fall in this category include re-state, recognize, remember, express, identify, recall, and translate.

Application. Items written at the application level test the examinee's comprehension as well as the ability to apply knowledge in a novel situation. The examinee is asked to identify the operations necessary for a problem or context and perform them; recognize and apply technical principles, ideas, theories, and formulas in

a novel context; and interpret graphs or images. Behavior terms that may fall in this category include interpret, employ, illustrate, practice, sketch, predict, use, and apply.

Analysis. Items written at the analytic level test the examinee's ability to comprehend and apply as well as analyze a concept, principle, or idea. The examinee is asked to separate a concept, principle, or idea into its component parts and identify relationships among the parts; combine concepts, principles or ideas into a new pattern or structure; evaluate an image or procedure to determine accuracy and/or errors; reduce complex expressions into simpler or more basic expressions; and compare, contrast and identify similarities and differences among concepts, principles, or ideas. Behavior terms that may fall in this category include compare, contrast, diagram, examine, analyze, construct, and relate.

Multiple-Choice Tests

The multiple-choice format is generally regarded as the type of item most widely applicable and adaptable to the measurement of important learning objectives. This examination form has been adopted by the NMTCB and has the advantages of efficient high-speed scanner scoring and effective psychometric analysis.

Regardless of the specific form of multiple-choice, each item has three main parts: a stem—a question or an incomplete statement presented to the examinee first; the keyed response—the correct response to the question;

and the incorrect alternative responses to the question.

Every test item begins with an idea. Ideas selected for test items should be important in the practice of nuclear medicine technology. They should not be trivial bits of knowledge which would stump even the most knowledgeable examinees.

Once the topic is determined, the next step is the construction of the stem. The item stem should convey the question or problem in its entirety. The test of whether this criterion is met is to ask if a knowledgeable examinee can answer the question without looking at the choices.

Once the stem has been written, the next step is to design the keyed correct response. The keyed response must be the most acceptable of the five responses.

The final step is to develop the incorrect alternative responses. These alternatives are designed to differentiate those examinees who are prepared to practice from those who are not. The incorrect responses should not be written to trick examinees, but to discriminate between those examinees who truly know the answer and those who do not. The alternatives, "none of the above" or "all of the above" should be avoided.

Multiple-choice items take several different forms. The forms selected for use in the NMTCB examination are the correct-answer form, the best-answer form, and the negative-approach form.

When the correct-answer form is used, one response is unequivocally correct. When the best-answer form is used the examinee is required to select the best answer from among those presented. The answer, however, may not be the best of all possible answers. When the negative-approach form is used, the examinee must select the incorrect or least defensible response from among several correct or more satisfactory ones. The negative aspect should be highlighted or capitalized and the question must be worded very carefully to avoid confusion.

An item for the NMTCB examination is well-written and appropriate if all the above criteria are met.

NMTCB Examination Dates 1991-1992

Year	Exam Date	Application Deadline
1991	September 28	July 20
1992	June 27	April 18
1992	September 26	July 18

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