NMTCB REPORT

George W. Alexander, Jr., CNMT, Chairman

Over the last 2–3 years, most examinees have reported favorably on the quality of the Nuclear Medicine Technology Certification Board (NMTCB) exam. The exam not only covers all aspects of nuclear medicine technology practice, but also covers the knowledge and skills essential for practice at the entry level. Some examinees, however, question the lack of math principles, specifics about anatomy and physiology, history of the profession, and basic science questions and formulae. A review of the development and ideology of the NMTCB competency-based (criterion-referenced) exam may help to answer these questions.

In 1977, the directors of NMTCB set a goal to develop a true criterion-referenced as opposed to a norm-referenced exam. In norm-referenced testing, pass/fail decisions are made in relation to all individuals taking the test. An individual's exam result is dependent on the general score, yielding relative standing to other examinees. In this type of testing, an individual's score would obviously be quite different if he/she would test with a high-ability group as opposed to a low-ability group. In contrast, an individual's status in a criterion-referenced exam is determined with respect to well-defined behaviorial domain.

The pass/fail determination is therefore made on the basis of how many questions the individual answers correctly. Criterion-referenced testing as a concept began in the 1960's and by 1977 (the inception of NMTCB), information was readily available about competency-based exams, and the NMTCB was able to use it from the beginning.

Inherent to this discussion is the similarity between educational programs and certification examinations. Educational programs propose to teach the student through the use of a curriculum developed from the "Essentials" as provided by the Joint Review Committee on Nuclear Medicine Technology. Thus, some individuals may consider that topics included on a certification exam should parallel what is taught in the classroom and that examinee competency should be based upon how well the student learned the curriculum. (Knowledge taught in this fashion, however, may not be relevant to current practice.) Certification exams are not, however, based upon the "Essentials" but rather on the defined, professionally validated application of knowledge essential for competent entry-level practice.

The *Uniform Guidelines for Employee Selection Procedures,* used by federal agencies in enforcing civil rights legislation, emphasize criterion validity, but they also allow for procedures to measure specific abilities if it can be shown that: a) the selection procedure measures and is a representative sample of that knowledge, skill, or ability and; b) that knowledge, skill, or ability is used in and is a necessary prerequisite to performance of critical or important work behaviors (38302) (*1*). The *Guidelines* explicitly allow for selection tests based on critical abilities, especially appropriate for certification exams. In short, the *Guidelines* require that the test's validity be established. A concise definition of content validity is evidence of the examinee's competency on specific abilities considered necessary for entry-level practice.

In preparing its examination, the Board asks itself: "Is the exam measuring what it is intended to measure; and, more important, does the NMTCB exam measure those aspects of competency that are necessary for entry-level practice?" The challenges of content validity are: a) defining the content behavior domain; and b) obtaining as much empirical support of the importance of content and behaviors and their importance to entry-level practice. The steps in developing the certification exam are to: 1) define the domain of content behaviors to be tested (i.e., skills such as those reflected in the taxonomy levels of comprehension, application, and analysis; 2) develop the test; 3) administer and score the test; 4) determine the passing score; and 5) report the scores. Step 1 is the most critical in that it is absolutely necessary to produce a well-defined domain of content and skills in order to establish content validity. In addition, this step assists the Board in determining the test specifications matrix, developing examination items, and emphasizing relative content areas. Furthermore, defining content behavior is beneficial in identifying the type and number of questions to include as well as interpreting test scores (i.e., pass/fail criteria).

In defining which domain of content behaviors to test, an expert judgement committee usually writes a content or task outline. In regard to the NMTCB exam, a list of tasks performed by technologists at career entry (task analysis) was developed and maintained by the NMTCB directors to ensure job-relatedness. Examination content is based on the tasks identified in this validated analysis. Periodic validation of the analysis is needed to ensure that the list is comprehensive and current. The validation also ascertains that the focus assigned to each exam topic reflects its relative emphasis in clinical practice. The first task analysis validation study was conducted in 1981 in collaboration with the Vocational Technical Education Consortium of States (*2*). Because of rapid changes occuring in nuclear medicine practice, a second validation of the revised 1982 task list was initiated in 1983 (*3*). This last study enabled the Board to: a) define those tasks that are critical to entry-level practice and those that are in the associated domain; b) determine relative weights for each task; and c) develop a new test specification matrix that incorporates all data.

By reviewing how the NMTCB exam is developed, dif-

ferences in the focus of certification and education can be identified. Educational programs are primarily concerned with developing a well-rounded individual who can function in the clinical setting by teaching required skills. Students are taught past and future developments. However some of the knowledge and skills taught are not necessarily applicable to entry-level practice. On the other hand, certification examinations determine an individual's preparedness for entry-level practice by testing the relevant application of acquired knowledge. Furthermore, establishing specific educational eligibility requirements eliminates the need to test this area, leaving the Board free to focus on those skills identified as crucial to successful entry-level practice. These skills are identified in the following ways:

1. Instead of asking textbook questions about specific anatomy of the human body, NMTCB asks examinees to apply this knowledge to patient imaging.
2. Mathematical principles are on the exam by inference (i.e., the examinee must perform calculation problems).
3. Recall of formulae on the exam is not requested, but the examinee must use or apply formulae in order to solve or analyze a problem.
4. While recognizing that history is important to the general education of an individual, it is not relevant to entry-level practice.
5. Radiopharmaceutical lists are reviewed to ensure that only the most current are reflected on the exam. In the event that a radiopharmaceutical is removed from the market, all references to that particular product are deleted from the NMTCB item bank. The same criteria applies to equipment and procedures.
6. Questions are phrased to determine not only what an individual knows but how that knowledge is applied in a given situation (i.e., understanding and recognizing a decay scheme is important, but the NMTCB exam would question application of decay scheme knowledge to the clinical setting, such as the use of this knowledge to select appropriate collimators).

Since 1977, NMTCB has made great strides in developing an excellent certification examination that primarily focuses upon the assessment of validated knowledge and skills required for entry-level nuclear medicine technology practice. This has only been accomplished through the cooperation and support of the nuclear medicine technology community, which we strongly encourage. Thank you for sharing your expertise.

REFERENCES

1. Uniform Guidelines for Employee Selection Procedures. Civil Service Commission and Department of Labor and Justice. 1978.

2. NMTCB Certification Examination Validation Report. *J Nucl Med Technol* 1982;10:210-22.

3. NMTCB Critical Task Validation Study: Identification of Entry Level Domain. *J Nucl Med Technol* 1984;12:192-200.

NOMINATIONS FOR NMTCB DIRECTORS

The Nuclear Medicine Technology Certification Board is seeking nominations for NMTCB Directors from the nuclear medicine technology community. Terms for new Directors will be from January 1987 through December 1989. Persons interested in serving should contact the NMTCB Office at (404) 493-4504.

1986 NMTCB EXAMINATION AND APPLICATION DEADLINES

March 15, 1986 is the application deadline for the June 28, 1986 examination.
June 21, 1986 is the application deadline for the September 27, 1986 examination.

New NMTCB Board Members

Sue P. Lance, CNMT; James A. Senecal, CNMT; and Ann M. Steves, CNMT have been elected to the NMTCB Board of Directors.

A total of 28 ballots were mailed to the National Council. Sixteen ballots were counted using preferential voting in the presence of a notary.

Candidates Announced

The nominees for the 1986 Technologist Section Election are as follows:

President-Elect
Marcia R. Boyd, CNMT
James C. Trainor, CNMT

Secretary/Historian
Sharon A. Corbett, CNMT
Lynn A. Fulk, CNMT

Treasurer
Susan A. Gilbert, CNMT
Art Hall, CNMT

Trustee
Vincent V. Cherico, CNMT
Floyd L. Potes, CNMT

Finance Committee
Donna E. Johnson, CNMT
Dennis P. Moran, CNMT

Membership Committee
Allen E. Beranek, CNMT
George L. Colouris, CNMT
Mark H. Crosthwaite, CNMT

Nominating Committee
Jeffrey S. Carey, CNMT
Judy Hopping, CNMT
Ronni Markwell, CNMT
Thomas F. Pearce, CNMT
Bradley K. Pounds, CNMT
Cardiff "Mickey" Williams, CNMT

Every Technologist Section member (in good standing) will receive a ballot and an election bulletin, which will mail no later than April 23, 1986. Ballots must be returned (postmarked) no later than May 23, 1986.