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## COMPETENCY ASSESSMENT OF CLINICAL APPROACH DURING PRIMARY SPECIALIZATION IN DENTISTRY: INTEGRATED LICENSING EXAM

*Doroshenko O. M.\**, *Sirenko O. F.\*\**,  
*Stupnytska O. M.\*\*\**

*\*MD, Dr. Sc., full professor, director  
of the Institute of Dentistry, Shupyk National  
Medical Academy of Postgraduate  
Education, Kyiv, Ukraine*

*\*\* PhD, associate professor of the  
Department of Dentistry, Shupyk National  
Medical Academy of Postgraduate  
Education, Kyiv, Ukraine*

*\*\*\* PhD, associate professor of the  
Department of Dentistry, Shupyk National  
Medical Academy of Postgraduate  
Education, Kyiv, Ukraine*

**Summary :** There is a growing body of literature that recognizes the importance of competency-based testing formats in dental education. A key aspect of learning process in Dentistry is the ability of applying theoretical knowledge to clinical approach with advanced development of practical skills. It has previously been observed that usage of the multiple-choice questionnaire can lead to superficial learning. The main disadvantage of such assessment is that theoretical knowledge is more important than practical skills and passive recognition is possible because of given correct responses.

The specific objective of this study was to discover the ways of improving the test context for developing clinical reasoning, professional thinking and self-confidence.

**Key words :** dental education, primary specialization, interns, learning monitoring system, integrated licensing exam.

There is a growing body of literature that recognizes the importance of competency-based testing formats in dental education. In recent years, there has been an increasing interest in improving or modifying the existing methods of measuring descriptive knowledge and capturing the ability to apply theoretical knowledge in a specific context to solve a problem or reach a clinical decision (procedural knowledge) [1, 6, 7, 8].

The past decade has seen the rapid development of computer technologies in many fields of science and education. Distance learning is fast becoming a key instrument in different fields of education. Learning monitoring systems can play an important role in the measurement of the requisite combination of knowledge, practical skills and ability to engage in professional decision-making in medicine [1]. Several systematic reviews of e-learning have been undertaken [1, 2]. A recent data [2, 3] indicates that internet-based learning, using pre- and post-tests, has demonstrated high effectiveness in relation to obtaining of knowledge (factual or conceptual understanding) and practical skills acquisition.

More recent attention has been focused on the provision of the necessity to improve preparedness and transition into the

clinical learning environment [5]. Enhancing content contextualization, further opportunities for the application of knowledge and skills, and constructive alignment of assessment tasks and pedagogical aims are thought to be helpful in young specialists' adaptation [5]. The ability to choose the reliable source of clinical data for diagnostics and making adequate clinical decisions should be developed during internship as well as theoretical knowledge and practical skills. Principles of evidence-based medicine have a pivotal role in learning process in dentistry during both primary specialization and continuous professional improvement.

A recently published article by Hong B., Plugge E. (2017) indicates the importance of teaching evidence-based practice for dental students [4]. Notwithstanding, there is no readily available information showing how evidence-based dentistry is taught across the dental schools in the United Kingdom. Authors [4] recognize critical appraisal as one of the key steps of evidence-based decision making and deliberately investigated by an electronic survey of the level of teaching and assessment of critical appraisal skills in dental schools. Their survey included questions regarding teaching methods, duration and timing of teaching, and assessment methods. It was stated that there were greatly varied approaches between institutions in every surveyed aspect of critical appraisal skills education [4]. Hong B., Plugge E. (2017) came to the conclusion that critical appraisal skill teaching and assessment strategies should be regularly reviewed in dental curriculum and integrated into clinical practice [4].

**Competency-based testing formats.** A systematic understanding of how different teaching methods contribute to final knowledge and practical assessment is still

deficient. There is a large volume of published studies describing the role of different assessment methods (summative or formative) for the competency levels and the licensing requirements for dentistry. As mentioned in the literature review, all assessment methods can be valued by the range of the parameters of validity, reliability, acceptance, cost, feasibility and influence on teaching and learning [1]. According to the recent reviews [1] there are different assessment methods, which can be applied in dental education:

- Multiple-choice Questionnaire;
- Structured Oral Examination;
- Modified Essay Question;
- Key Features Exam;
- Objective Structured Clinical Examination;
- Objective Structured Practical Examination;
- Standardized Patients;
- Clinical Evaluation Exercise;
- Mini-Clinical Evaluation Exercise;
- Entrustable Professional Activities;
- Directly Observed Procedural Skills;
- Portfolio;
- Multi-source feedback (Multisource Evaluations).

Each competency level requires the certain assessment format. To assess factual knowledge (theoretical medical knowledge) the Multiple-choice Questionnaire and Structured Oral Examination are used [1, 9-11]. Procedural knowledge (context-specific knowledge) is usually revealed by Modified Essay Question and Key Features Exam [1, 12-16]. Evaluating of the ability to perform skills under instructions (individual procedural skills) is provided by Objective Structured Clinical Examination, Objective Structured Practical Examination and

Standardized Patients [1, 17-22]. The next competency level of the ability to perform skills independently (practical skills in complex situations) is assessed by workplace-based testing: Clinical Evaluation Exercise, Mini-Clinical Evaluation Exercise, Entrustable Professional Activities, Directly Observed Procedural Skills, Multi-source feedback and Portfolio [1, 23-25].

The multiple-choice questionnaire is widely used in medical and dental education for testing theoretical knowledge, meaning descriptive knowledge of primary competency level. Its validity and reliability is classified as high [1, 9, 10] provided high-quality questions and sufficient quantity are used. Concerning the low cost in light of the numbers and frequency of tests, it is established as an effective assessment format. The multiple-choice questionnaire is quite feasible requiring less time and resources after test pool formation. The possibility of distance performing with easy online access makes such tests available for the significant number of participants simultaneously. The developed question pools can be applied by numerous universities [1, 9-11].

The main disadvantage of such assessment is that theoretical knowledge is more important than practical skills and passive recognition is possible because of given correct responses. However previously mentioned methods suffer from some disadvantages, they are still able to reveal the main characteristics of competency level provided high-quality tests are performed.

**Experience of applying learning monitoring system for preparation to state licensing integrated examination.** Existing assessment scenario, depending on competency level according to the qualification requirements, stated by the order of the Ministry of Health of Ukraine

from 14.02.2012 N 121, provides licensing integrated examination "STEP 3. Dentistry" as a part of state attestation of interns in specialty of Dentistry (the order of the Ministry of Health of Ukraine from 20.11.2006 N 763). It consists of 200 multiple-choice tasks covering the aspects of general dental knowledge with the emphasis on clinical cases and reaching a clinical decision. This integrated licensing exam gives the main conception of mastering the learning program and the necessary level of competence to be allowed to further part of state attestation. Passing of licensing integrated test in Dentistry is a compulsory element of admission to the final theoretical and practical examination performed by the state examination board whose positive decision allows assigning the title of dentist and providing appropriate certificate for clinical practice in Dentistry.

In order to improve interns' preparedness to licensing integrated test, learning monitoring system was used. Several question pools were introduced into the on-line testing system (<http://lms.inmeds.com.ua/ilias.php>). The largest question pool consists of 2000 tasks from test bank. All of the specialties are represented in questions of this pool, including General Dentistry, Therapeutic Dentistry, Prosthetic Dentistry, Pediatric Dentistry, Orthodontics, Maxillofacial Surgery. They are also divided into subtests, such as clinical examination; treatment of dental patients requiring special tactics because of physiological states and physical illnesses; emergency aid; the organization of dental health care, including prevention; initial visits; repeated visits (treatment ongoing). Moreover, separate question pools based on previously issued test booklets were created with the aim of helping gain familiarity with the structure of future exam.

The sets of tests were performed during preparation period, including the period of time on clinical bases. The main advantage of the learning monitoring system is the possibility of distance learning and passing tests on-line. While working in clinics and practicing skills under tutors' supervision during internship, interns can train for the licensing integrated examination distantly.

The tests' set was successful as it was able to identify students who have some weaknesses in their knowledge. Formation of the group of risk helps to work harder with them on specific topics which have been revealed by training test. It also helps to provide individualized approach in training curriculum for such interns. Some tests can be accessible for the manually added participants for their better preparation and self-confidence.

The structure of the on-line training tests is similar to the paper-based state examination (200 tasks per 200 minutes). The result of an on-line test is available immediately after finishing the test, therefore interns don't have to wait for the result of the training test. Aforementioned on-line testing additionally helps to be prepared and acquainted with the structure and the timing of the actual licensing examination psychologically, avoiding the impact of stressful situation on the results of the test.

During the training testing, each participant gets a different set of questions. Questions are randomly selected from one or more question pools. Participants can work through the test only for a specified period of time. Time is clocking away from the moment a user starts a test for the first time. ILIAS displays the test results after the test pass is finished. After finishing the test pass participants can access their test results on the 'Info'-tab at any time. The summary of

results is appended at the point in time indicated in the setting above: A 'Table of Detailed Test Results' shows the title of the questions and the points scored in a particular test pass. A test with a random set of questions is available furthermore. A user's learning progress status is set to 'Completed' after the user has passed the test.

Evaluation of all participants is presented in the table with the detailed evaluation for each intern or question. Obtained data can be analyzed as prognostication criterion for the forecasting an exam success.

Aggregated test results are available to the tutor of the course and consist of total number of participants who started the test, total finished tests (participants that used up all possible passes), average test processing time, total passed tests, average points of passed tests and average processing time of all passed tests.

**Conclusions.** However, the assessment method of multiple-choice questionnaire suffers from some disadvantages, it is still able to reveal the main characteristics of competency level provided high-quality tests are performed.

An implication of the on-line distance learning and testing system gives an opportunity to provide the monitoring of academic performance and to evaluate the interns' competency level during primary specialization in dentistry before the state attestation.

Improving test context is required for developing clinical reasoning, professional thinking and self-confidence during internship.

Thorough tiered assessment of knowledge and skills during primary specialization helps to avoid weaknesses of the curriculum and provide a unified

assessment of competency level in different educational institutions.

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