An Evaluation of Clinical Mock Boards and Their Influence on the Success Rate on Qualifying Boards

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Abstract: An important responsibility of each dental school to its graduating dental students is exposure to and evaluation on a mock board that simulates one or more of the examinations given by its respective regional testing agencies. An introduction to the procedures and environment that will be encountered on a qualifying examination will hopefully increase a student’s chance for success on such a test. The purpose of this study was to test the relationship of the various attributes or variables of mock boards given by dental schools in the United States and Puerto Rico with results obtained on the regional or state qualifying board(s) related to timing, structure, method of evaluation, graduation, and remediation. A twenty-item questionnaire was mailed to key clinical or curricular deans at fifty-four accredited dental schools. Ninety-three percent of schools completed and returned the questionnaire. In the sample of respondents, the percentages of schools participating in the various qualifying exams were: CRDTS = 22 percent; NERB = 42 percent; SRTA = 20 percent; WREB = 28 percent; Independents = 24 percent, with a reported overall passing rate (greater than or equal to 70) of 58 percent. The median time between the mock board and the qualifying board was 7.5 weeks. Results indicated that no single aspect of a mock board had a statistically significant effect on the outcome of qualifying examinations, resulting in a failure to reject the null hypothesis. Such findings may indicate that schools should focus their efforts on reassessing the restrictions and requirements imposed upon their students related to their mock board. A future study could include surveying recent graduates for their opinions of the value of their mock board experiences.

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Key words: mock board, qualifying board, clinical competencies, testing agencies

Submitted for publication 6/24/02; accepted 9/18/02

It is logical to believe that a new or recent graduate of an accredited dental school should be able to perform the basic clinical procedures required for the practice of general dentistry; however, in reality many recent graduates fail state or regional board examinations. Although the American Dental Association reported that approximately 97 percent of U.S. dental school graduates are licensed within one year of graduation,1 failure rates for first-time applicants are often as high as 40 to 50 percent. Individuals who are unsuccessful in passing the licensing examinations were not necessarily at the bottom of their graduating class. Often, clinically weaker students pass these examinations on their initial attempt, while students in the top quarter of the same class might take multiple attempts to pass.2 Factors such as patient and tooth selection, evaluator(s), organizational attributes, familiarity with or knowledge of the testing format, and the ability to function under stress contribute to the outcome of such an examination.

One of the crucial factors in the evaluation of clinical performance is measurement, which is defined as the systematic assignment of numerical values.3 As regional and state boards have become clear in their grading criteria, the subjectivity brought out through personal judgment has been replaced, to some degree, by objective measurement. Statistically, the greater the objectivity of the measurement, the greater the probability that a correct decision will be made. A primary obstruction to accurate measurement is variability, which may be the result of an error in measurement or from erratic performance by an individual. Regarding the latter, variability may be the result of both extrinsic and intrinsic circumstances. As related to a dental licensing exam, extrinsic factors might include variability in equipment, auxiliaries, and/or patients.3 Chambers and Loos4 stated that the primary cause of unreliability in the outcome of clinical tests is trial-to-trial variation by students, caused predominantly by patient variation. Their study found that while the error of measurement was affected to some degree by the calibration or number of raters or the content of the examination, increasing the number of trials or times a particular exam was taken had the greatest effect on measurement reliability. Support for this finding is demonstrated by multiple-choice examinations. It is widely accepted that the reliability of this type of
test is a function of the number of questions on the test. As the number of test questions increases, so does the overall reliability. Relating this concept to either a mock or qualifying board, a student’s evaluation would not be overly influenced by the effects of either patient or student day-to-day performance variations. The addition of multiple trials would take these two factors into account and allow for a more reliable evaluation of a student’s level of knowledge and clinical expertise.

Examples of intrinsic circumstances include a student’s lack of necessary clinical skills, inability to visualize the desired end product, and lack of knowledge or experience to know when to stop one component of a procedure and proceed with the next one. It is imperative that the format of all qualifying license examinations allows for the evaluation of these three situations. No matter how talented a person may be with his or her hands, satisfactory quality cannot be attained on a routine basis without the knowledge of the desired “end product” of a procedure.

Stress in the profession of dentistry is not only confined to those who practice, but affects its students as well and may be compounded by the educational demands of dental curricula. The burden of dental school is far removed from most students’ undergraduate studies. A study examining the relationship between academic performance and stress in dental schools found that higher levels of stress resulted in lower grades. The manner in which a student reacts to stress not only greatly influences the grades received in didactic courses but may potentially impact his or her clinical education, which includes such critical clinical evaluations as a mock or qualifying board. In a survey by Garbee et al., among the sources of stress for dental students, the first and fourth most often cited were atmosphere created by professors and patient care responsibilities, respectively.

Every dental school in the United States, as part of its curriculum, conducts some form of mock board examination for its graduating class. This mock board is usually given in the spring semester, prior to the school’s regional or state qualifying board. These mock boards are as different from each other as the schools that conduct them. Not only are there distinct differences due to the regional or state qualifying board that each mock board tries to mimic, but there are differences in structure, timing, evaluation, and remediation, if required, of the schools hosting the same regional qualifying examinations.

The purpose of this study was to discover common variables of various mock boards that appeared to improve the success rate of dental school candidates on the licensing examinations, as well as any relationship among these variables. While the mock board is only a small portion of a school’s overall clinical curriculum, it is nonetheless integral to the evaluation and qualification of its candidates for the regional or state board examination. Practicing certain procedures within a format similar to that of an actual examination should have a positive influence on the outcome. Conversely, unknown or untried conditions may be as much a reason for failure as the lack of needed clinical skills.

Methodology

There are four regional testing agencies recognized within the United States, as well as twelve states or protectorates that independently qualify their prospective dentists.

Over the years, more and more states, while not members of a specific regional qualifying board, have begun to accept the results of one or more of these regional examinations. A few states also recognize the results of states that hold their own independent testing. The regional and independent testing agencies are listed in Figure 1.

In the spring of their final year, most undergraduate dental students are required to participate, and successfully complete, a mock board that is either identical to or closely resembles the specific regional or independent qualifying examination(s) mandated by their home state for a license to practice dentistry. To acquire desired information on mock boards conducted by the fifty-four dental schools in the United States and Puerto Rico, a twenty-item questionnaire was mailed to key clinical or curricular deans at these institutions (Figure 2). Second and third mailings, each three weeks apart, were sent to schools that had not responded to the first or second mailings, respectively. Fifty out of fifty-four schools responded, resulting in a response rate of 92.6 percent. Questions were designed to elicit responses to information outlined in the purpose of the study.

Statistical analysis of the data included both descriptive and analytic tests. Descriptives were mainly percent/proportion and frequency distributions. Chi-square tests of association were used to investigate any associations or relationships among dependent variables.
Results

In the sample of respondents, the percentage of schools participating in the various qualifying exams were: CRDTS = 22 percent; NERB = 42 percent; SRTA = 20 percent; WREB = 28 percent; Independents = 24 percent. These schools, as a group, had a combined student passing rate (a score greater than or equal to 70) of 58 percent on the initial attempt, with CRDTS schools reporting the highest passing rate (82 percent) and NERB the lowest (45 percent).

The number of weeks between the mock and examining board for the respondents varied from two to seventeen, with a median time of seven and one-half weeks. Dividing these responses into two groups—one with the time between the mock board and qualifying board less than the median time, and the other group’s time greater than the median time—and testing them against the raw passing rate resulted in Chi-square and p-values of no statistical significance.

When asked how students were evaluated on their mock board, slightly over one-half (53.3 percent) of the responding schools had grading criteria identical to their qualifying board. Another 10 to 15 percent had either a minimum passing grade, pass/fail, or some hybrid form of grading, with one school reporting their students were not graded on the mock board. Seventy-five percent of dental schools require their students to pass or complete the mock board to be eligible for graduation. As indicated in Table 1, 40 schools reported specific expectations for student performance on their mock board: five schools required students to obtain an overall passing score but not necessarily pass each section; twenty-five schools required students to pass the overall board and also...
Figure 2. Survey questionnaire

AN EVALUATION OF CLINICAL “MOCK” BOARDS AND THEIR INFLUENCE ON THE SUCCESS RATE ON QUALIFYING BOARDS

The following questions are designed to provide information on the structure, evaluation, and remediation of your clinical “mock” board and its correlation, if any, with the success of your graduates on their qualifying board. Please circle the letter(s) or number(s) of the most appropriate answer(s) or fill in the information in the space provided. Additional comments may be written on the back of the last page of this questionnaire. Your answers will be given anonymously, and the results will only be presented on aggregate levels.

1. What qualifying board(s) is offered to your graduating students to practice dentistry in your institution’s home state? (Circle all that apply.)
   a. Central Regional Dental Testing Service
   b. North East Regional Board
   c. Southern Regional Testing Agency
   d. Western Regional Examining Board
   e. Independent (State) Testing Agency

2. Approximately when, each year, do your graduating students take their qualifying board(s) (e.g., first week of April; second week of May)? (Circle all that apply and list dates offered.)

   **Board:**
   a. Central Regional Dental Testing Service  __________________________
   b. North East Regional Board  __________________________
   c. Southern Regional Testing Agency  __________________________
   d. Western Regional Examining Board  __________________________
   e. Independent (State) Testing Agency  __________________________

3. In relation to the qualifying board(s), how many weeks in advance is your “mock” board? (If more than one qualifying board is offered, list weeks in advance for each one.) __________________________

4. Does your state accept the results of more than one regional testing agency or of one or more independent states?
   a. Yes (If Yes, under what format are your students tested on your “mock” board?)
      1. Similar to one qualifying board (name specific board)
      2. Combine aspects of more than one qualifying board (list boards and procedures)
      3. Not similar to any qualifying board
      4. Other (please describe): __________________________
   b. No

5. If your state accepts the results of only one regional testing agency, does your “mock” board mimic the qualifying board exactly, with respect to procedures and time allocation?
   a. Yes
   b. No

6. Are the evaluation criteria of your “mock” board identical to that used on the qualifying board(s)?
   a. Yes
   b. No (If No, please describe differences)
Figure 2. Survey questionnaire, continued

7. How are students evaluated (graded) on your “mock” board?
   a. Identical to qualifying board(s)
   b. Minimum passing grade (Please list grade) ________
   c. Pass/Fail
   d. No grading
   e. Other (please describe): ________________________________________

8. In order to successfully complete your “mock” board, students are required to:
   a. Receive an overall passing grade
   b. Receive an overall passing grade and pass each section of the exam
   c. Participate in all sections of the exam
   d. Other: _______________________________________________________

9. Is the successful completion of your “mock” board a graduation requirement?
   a. Yes
   b. No

10. Are all participating faculty calibrated on both evaluation criteria and grading protocol of your “mock” board?
   a. Yes (If Yes, please describe how they are calibrated) _______________________________________________________
   b. No

11. For those students who do not pass either all or one or more procedures on your “mock” board, is remediation required?
   a. Yes (If Yes, please describe) _______________________________________________________
   b. No

12. Are students required to supply their own “mock” board patients?
   a. Yes
   b. No (If No, please describe how patients are supplied) _______________________________________________________

13. Do any procedures on your “mock” board utilize standardized patients?
   a. Yes (If Yes, which procedures?) _______________________________________________________
   b. No

14. Do any procedures on your “mock” board involve the use of dentoforms?
   a. Yes (If Yes, are they performed as a bench exam on dentoforms, or on dentoforms in a mannequin?) Please describe: _______________________________________________________
   b. No

15. If dentoforms are used on the “mock” board exam, for which procedures are they utilized? (Please list all.)
pass all sections; and ten schools required students to participate in the mock board but did not require a passing score. At schools requiring an overall passing score on the mock board, 60 percent of students passed the qualifying exam on the first attempt. At schools with the most rigorous standard (pass all sections and pass overall), 36 percent of the students had first-attempt success on the qualifying exam. Thirty percent of students passed the qualifying exam on the first try at schools that only required participation in the mock board but not a passing score.

Approximately 70 percent of the responding schools reported that faculty involved with the mock board were calibrated on evaluation criteria and grading protocol. Sixty-eight percent of the respondents to the question of remediation stated that students who did not pass one or more of the sections of the mock board exam or did not achieve an overall pass-
ing score (≥ 70) were required to undergo some form of remediation.

Regarding patients, 87 percent of respondents reported that students were required to supply their own mock board patients. Only 15 percent of the schools stated that standardized patients were used on their mock board. Unfortunately, none of these schools listed the specific procedures in which these standardized patients were utilized, as requested.

In response to the survey question of whether dentaforms were part of the mock board examination, almost 90 percent responded affirmatively. Schools reported an even distribution between dentaforms mounted in a manikin and those performed as a bench exam. Procedures involving the use of dentaforms included crowns and bridges, endodontics, and provisional restorations, with a few schools requiring their students to prepare amalgam and inlay preparations on such teeth.

Respondents were requested to indicate the percentage of their school’s students who were successful on the first attempt at the licensing examination. They were then asked to place their students, as a group, in one of the five categories as indicated in Table 2.

A series of five dichotomous variables of mock boards (survey questions 5, 6, 9, 10, and 11) were compared with the percentages of students who passed their qualifying exam on the first attempt. These independent variables were selected because they are not specific for one school, each being a potential covariant with student passing rates. As shown in Table 3, not one of these variables had a statistically significant effect on the outcome of a qualifying examination.

Seventy-six percent of the respondents reported a change to their mock board format within the past three years. Changes cited most often were instituting similar changes made by their qualifying board(s); moving the mock board date closer to the licensing exam; making the mock board more criteria-driven; and implementing time constraints for various procedures. When asked what impact the

Table 1. Criteria for passing mock board in relation to successfully completing qualifying examination

<table>
<thead>
<tr>
<th>Criteria</th>
<th>No. of Respondents (n = 40)</th>
<th>Percentage of Respondents</th>
<th>Percentage of Students Passing Qualifying Exam on First Attempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>5</td>
<td>12.5</td>
<td>60</td>
</tr>
<tr>
<td>Pass and pass all sections</td>
<td>25</td>
<td>62.5</td>
<td>36</td>
</tr>
<tr>
<td>Participate</td>
<td>10</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 2. Percentage of students passing the qualifying exam on first attempt by schools

<table>
<thead>
<tr>
<th>Overall Student Passing Percentage</th>
<th>Percentage of Schools Responding (n = 49)</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 60</td>
<td>10</td>
<td>20.4</td>
</tr>
<tr>
<td>61 – 70</td>
<td>8</td>
<td>16.3</td>
</tr>
<tr>
<td>71 – 80</td>
<td>7</td>
<td>14.3</td>
</tr>
<tr>
<td>81 – 90</td>
<td>9</td>
<td>18.4</td>
</tr>
<tr>
<td>91 – 100</td>
<td>15</td>
<td>30.6</td>
</tr>
</tbody>
</table>

Table 3. Comparison between mock board variables and student success on initial attempt on qualifying board

<table>
<thead>
<tr>
<th>Mock Board Variables</th>
<th>No. of Affirmative Responses</th>
<th>Percentage of Respondents</th>
<th>Percentage of Students Passing Qualifying Exam on First Attempt</th>
<th>Chi-square</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mimics qualifying board format (timing and structure)</td>
<td>22</td>
<td>62.8</td>
<td>59.1 (n = 13)</td>
<td>0.002</td>
<td>0.966</td>
</tr>
<tr>
<td>Evaluation criteria identical to qualifying exam</td>
<td>37</td>
<td>80.4</td>
<td>56.8 (n = 21)</td>
<td>0.640</td>
<td>0.420</td>
</tr>
<tr>
<td>Graduation requirement</td>
<td>35</td>
<td>74.4</td>
<td>61.7 (n = 21)</td>
<td>0.912</td>
<td>0.340</td>
</tr>
<tr>
<td>Faculty calibrated</td>
<td>32</td>
<td>69.5</td>
<td>56.2 (n = 18)</td>
<td>0.044</td>
<td>0.834</td>
</tr>
<tr>
<td>Remediation required</td>
<td>32</td>
<td>68.1</td>
<td>62.5 (n = 20)</td>
<td>0.010</td>
<td>0.730</td>
</tr>
</tbody>
</table>
changes had on their students’ performance on the qualifying exam, the responses were mixed. Some institutions felt that the changes had assisted the students in their time management as well as improving the overall performance or passing rate. Some stated that board examiners had indicated an improvement in student preparedness, while several felt the changes instituted had made no impact at all. An equal number of schools responded affirmatively and negatively as to whether any further changes to their mock board were anticipated in the near future. Reasons given for probable modifications were duplication of qualifying board changes; utilization of more typodont exercises for restorative procedures; standardization of periodontal patients; and improving the calibration of faculty evaluators.

The last question on the survey asked if the qualifying examination had an influence on the clinical curriculum at the institution. Approximately 53 percent of the respondents felt that the qualifying board did in fact have some degree of influence on the curriculum, mostly in a negative manner. Comments included the creation of a specific senior course for board preparation; excess time spent on inlays; and the feeling that lesions were diagnosed and restorations were placed on teeth that might not otherwise be restored. Very few schools reported that they had not allowed the examining boards to influence what they teach.

Discussion

The extremely high response rate to this study probably reflects the perceived value of a mock board examination by dental schools, while underscoring an often unexpressed concern about the demands such examinations place on the rest of the dental curriculum. Many schools begin preparing their students for licensing examinations at the onset of their clinical training. Clinical competencies on patients are often structured and evaluated under circumstances similar to those that students will encounter on the licensing examination. This type of institution-wide attitude works against a comprehensive care concept where patients’ needs are viewed as a “whole” rather than a list of procedures and where the oral health needs of the public are placed above the educational material that they represent to the student.12

The results demonstrate that there are many approaches to preparing dental students for licensing examinations. While each variable or component of an individual mock board contributes in some way to the eventual outcome, information received from this survey indicates that no single aspect of a mock board had a statistically significant effect on the outcome of qualifying examinations. This statement is supported by information found in Tables 2 and 3 and indicates the need for reassessment by dental schools of how they prepare their students for regional or independent licensing examinations.

Other investigators have identified several factors that are influential in affecting the outcome on qualifying or licensing exams. Among them are patient selection, auxiliary assistance, and familiarity with and proper functioning of test equipment.3,4 A candidate’s knowledge and understanding of the clinical procedures to be encountered on such an examination, as well as the conditions under which they will be performed, also contribute to the result.3 Another factor involves how a student copes with the inevitable stress associated with such an examination. A common cause of stress for dental students is the fear of failure. If this fear becomes acute, the anxiety that results is likely to impair the functions necessary for success.13 Being able to reach one’s potential while performing under intense pressure might explain how a clinically weaker student might pass his or her qualifying exam, while a more competent student, who does not handle stress well, fails.14-16

The results of this study support the contention expressed by some dental educators that mock board and licensing examination preparation has encroached heavily into the overall clinical education process of some dental schools. The need for student training, faculty indoctrination and participation, and curricula accommodation impact already crowded undergraduate education programs.5 The resulting frustration of some schools is evident in comments reported in the survey results. Of particular interest is the number of responses to this issue that allude to diagnosing lesions and restoring teeth that, if not for their need on the qualifying examination, might be treated in a more conservative manner. The required use of live patients on these exams often sets up an ethical conflict between the desired outcome of the candidate and the professional care of the patient. The delay of patient care and the exposure to unnecessary radiographs are examples of such behavior.17

A few licensing entities have integrated simulation into the restorative component of their examination to decrease the number of human subjects required for the exam.18 While the number of patients required for various licensing examinations is one
concern, the use of simulation takes some of the variability out of exams with a reduction in procedures utilizing live patients. This holds true for mock boards as well. The use of nonstandardized, live patients on any clinical examination inherently results in a different and unique set of examination parameters resulting in what amounts to a different examination for each candidate. Patient difficulty and the patient’s level of compliance, which can vary considerably, influence student performance. For this reason, medical schools are moving toward the use of standardized patients on medical licensing examinations.

The fact that dental applicants are successful in passing either a state or regional board within one year of their initial failure and that students at schools requiring successful completion of a mock board for graduation are able to pass this exam in a relatively short period of time (usually the last few months of their senior year), often without remediation, suggest that a candidate’s clinical ability might not be the primary reason for their initial failure. This study found no specific format or any one aspect of a mock board that greatly influenced candidates’ results on a qualifying examination. Therefore, the rationale for mock boards should be reexamined. While it is important for students to be introduced to what will be expected of them on their respective licensing examinations, schools may want to refocus their attention on measures that do not restrict or encumber student performance. If for no other reason, they introduce students to the procedures and testing conditions that they will encounter on licensing examinations. Until the various testing agencies and individual states modify their examinations to evaluate clinical competency more reliably, it is the responsibility of all dental institutions to expose their graduating students to a mock board that simulates their qualifying examination. This responsibility should include a continuing effort to reevaluate and modify their mock board in ways that enhance their students’ chances of successfully securing a dental license.

Acknowledgments

I would like to acknowledge the support of the University of Texas Health Science Center at Hous-