

NEVADA STATE BOARD  
of  
DENTAL EXAMINERS



CE COMMITTEE TELECONFERENCE  
MEETING

AUGUST 25, 2020

6:00 P.M.

**PUBLIC BOOK**

**Agenda Item (4)(a)**

**NAC 631.257**

**NAC 631.257 Administration of certain neuromodulators related to *Clostridium botulinum* and dermal or soft tissue fillers: Required training; submission of proof of completion of training and certain other information with application for renewal. ([NRS 631.190](#), [631.330](#), [631.391](#))**

A holder of a license to practice dentistry who, pursuant to [NRS 454.217](#), injects a neuromodulator that is derived from *Clostridium botulinum* or that is biosimilar to or the bioequivalent of such a neuromodulator or who, pursuant to [NRS 629.086](#), injects a dermal or soft tissue filler, must:

1. Successfully complete a didactic and hands-on course of study in the injection of such neuromodulators and fillers that:

(a) Is at least 24 total hours in length;

(b) Includes at least 4 hours of didactic instruction and at least 4 hours of hands-on instruction in each of the following subjects:

(1) The use of neuromodulators that are derived from *Clostridium botulinum* or that are biosimilar to or the bioequivalent of such neuromodulators in the treatment of temporomandibular joint disorder and myofascial pain syndrome;

(2) The use of neuromodulators that are derived from *Clostridium botulinum* or that are biosimilar to or the bioequivalent of such neuromodulators for dental and facial esthetics; and

(3) The use of dermal and soft tissue fillers for dental and facial esthetics; and

(c) Is approved by the Board.

2. Include with the application for the renewal of his or her license:

(a) Proof acceptable to the Board that he or she has successfully completed the course of study required by subsection 1; and

(b) A statement certifying that each neuromodulator that has been or will be injected by the holder pursuant to [NRS 454.217](#), and each dermal or soft tissue filler that has been or will be injected by the holder pursuant to [NRS 629.086](#), is approved for use in dentistry by the United States Food and Drug Administration.

(Added to NAC by Bd. of Dental Exam'rs by R044-17, eff. 5-16-2018)

**Agenda Item (5)(b)**  
**WREB - OSCE Exam**  
**Dental Hygiene**

## **WREB Dental Hygiene Licensing Examination COVID-19 Options for 2020**

The following are options state boards could consider in response to COVID-19:

### Dental Hygiene Clinical Examination (patient-based)

WREB's standard dental hygiene examination includes the following components:

- Patient Qualification
- Extraoral/Intraoral Examination
- Calculus detection and removal
- Tissue Management
- Periodontal Assessment
- Professional judgment

Many Candidates are still faced with completing educational requirements and CODA has approved alternative methods to have students complete their didactic and clinical requirements. The COVID-19 pandemic has touched everyone; however, some dental hygiene programs are seeing more restrictive state policies being implemented than similar programs in other states. Because of these inconsistencies, the time period for completion of dental hygiene requirements will vary by state; some programs are being postponed for several weeks and others for several months.

In the interim, and at the request of educators, WREB has rescheduled all Dental Hygiene, Local Anesthesia, and Restorative examinations. Taking a clinical examination is still a viable option, as WREB anticipates Candidates will still want an examination that allows them greater portability than licensure in a single state.

WREB is acutely aware of the risks associated with COVID-19 but is well prepared and capable of adjusting our exam protocol to adhere to national and state regulations without risking the integrity of the exam or the safety of the candidates, patient, and examiners.

### Comprehensive Written Dental Hygiene OSCE Component

WREB understands that for many states, the current patient-based clinical examination may not fit the current needs of state boards seeking alternative pathways for dental hygiene licensure. COVID-19 associated risks along with social distancing, impede a student's ability to challenge the traditional, patient-based examination. WREB understands that COVID-19 is creating a crisis for students, for dental hygiene education programs, and even for the profession, and is prepared to serve as a resource for our member state boards and committees during this crisis and provide alternative testing methods while still maintaining the fidelity of our examinations.

WREB is developing a dental hygiene written OSCE that includes dental hygiene components that are essential for safe practice while testing a candidate's knowledge about dental hygiene care. This examination is an accumulation of beta-tested dental hygiene items that have been used in

other WREB examinations and are psychometrically sound. The examination may serve as an alternative to a patient-based examination for licensure. WREB is prepared to administer this examination on site at each school with our own equipment utilizing social distancing protocols. Utilizing testing centers will not be necessary.

The process of treating a patient's oral health not only requires good instrumentation skills, but also possessing an aptitude for making correct treatment decisions. Critical thinking skills are important in the assessment of the patient's needs and to accurately develop a care plan that reflects a patient's individualized care. These steps form the foundation for dental hygiene treatment which ultimately leads to healthy outcomes and improvement in health.

The WREB Dental Hygiene OSCE is a multiple-choice written component that assesses these multi-faceted components of dental hygiene care. This is a comprehensive overview of dental hygiene knowledge, radiographic interpretation, AAP staging and grading, extra and intra oral assessment and risk assessment, care plan development, and assessment and treatment of the periodontium. The exam is an avenue to test the skills of an entry-level student, either replacing the current clinical examination or in conjunction with a clinical licensure exam should a state board want an additional assessment examination.

**WREB Dental Examination Options Under COVID-19**

Option	Exam Type	Description	Availability
WREB Comprehensive Treatment Planning Exam	Written Authentic Simulated Clinical Examination(ASCE)	Constructed response exam requiring students to perform tasks and make decisions with high fidelity to dental practice. For states considering an OSCE examination only as a pathway to licensure WREB's CTP ASCE is a more authentic demonstration of relevant candidate knowledge.	Most candidates completed this exam in the Fall of 2019. For those that have not, they can complete it as soon as Prometric Testing Centers open again. Projected to be May 1, 2020.
Traditional WREB Patient Based Examination	Traditional exam requiring demonstration of skills on a mannikin for Endodontic and Prosthodontics and on a patient for Periodontics and Operative and the written CTP (ASCE) exam.	Although many states require completing two procedures for the Operative section WREB has demonstrated that candidate competency can reliably assessed with 1 patient. For states that require 2 procedures currently they could relax the requirement to require only one procedure.	Depends on the event line of COVID-19; circumstances will vary widely across sites and require willing patients and available volunteers, freedom of air travel, available lodging, etc.
COVID-19 Alternative Performance Based Simulation	Written Authentic Simulated Clinical Examination(ASCE) exam and mannikin based Operative, Endodontics and Prosthodontics sections	Candidate is required to successfully perform both preparation and finish of a conventional Class II restoration on a molar and a Class III restoration on a central incisor. All procedures are performed, like they are for the Endodontics and Prosthodontics sections, in full simulation and with rubber-dam isolation. Results are assessed using established Operative Section criteria. Certain critical errors are preserved, and the passing cut-point remains unchanged.	Can begin as soon as June depending on CDC recommendations, local conditions, etc. Will be administered utilizing appropriate social distancing protocols

**WREB Dental Hygiene Examination Options Under COVID-19**

Option	Exam Type	Description	Availability
Dental Hygiene Clinical Examination	Patient Based Examination	WREB's standard dental hygiene examination includes the following components: Patient Qualification; Extraoral/Intraoral examination, Calculus detection and removal, Tissue Management, Periodontal Assessment and Professional Judgment.	Depends on the event line of COVID-19; circumstances will vary widely across sites and require willing patients and available volunteers, freedom of air travel, available lodging, etc.
Comprehensive Dental Hygiene OSCE	Written Exam	The WREB Dental Hygiene OSCE is a multiple-choice written component that assesses these multi-faceted components of dental hygiene care. This is a comprehensive overview of dental hygiene knowledge, radiographic interpretation, AAP staging and grading, extra and intra oral assessment and risk assessment, care plan development, and assessment and treatment of the periodontium. The exam is an avenue to test the skills of an entry-level student, either replacing either replacing the current clinical examination or to be administered in conjunction with a clinical licensure exam should a state board want an additional assessment examination.	Can be administered beginning in June of 2020.

## Interim Dental Hygiene Comprehensive OSCE for COVID-19

Hello Dental Hygiene Directors and Educators,

Many of you have reached out to WREB requesting information about the WREB Dental Hygiene Objective Structured Clinical Examination (OSCE), and specific content of the examination. WREB is working on finalizing a Candidate Guide that will be available for educators and students.

The WREB OSCE has been developed to address the need for an alternative to the patient-based clinical examination, in response to the COVID-19 pandemic. A Candidate should confirm that the OSCE is a pathway for licensure in the state where they are seeking employment.

This multiple-choice written examination will be administered onsite by WREB personnel at designated dental hygiene schools. Proctoring the examination at a school will allow Candidates to take the examination earlier and also eliminate the burden of having to register and travel to a testing center. Social distancing and infection prevention protocols will be followed in the exam's administration.

The WREB base fee for the examination is \$450.00. In addition to the base fee, each school may also assess a school use fee, which may be different site to site. Candidates already registered for the patient-based exam will receive a refund of the difference in fees. If not registered, Candidates will need to email the WREB office ([hygieneinfo@wreb.org](mailto:hygieneinfo@wreb.org)) to assist them with registration. WREB staff will send notifications via email with details regarding their schools schedule and testing session information.

The exam will be administered in sessions, with the actual examination time scheduled for two hours. Initially, results will not be available onsite. Candidates will generally have access to their results within a few days after completing the examination. **However, the timing for receiving results may be 4-8 weeks longer in the earliest part of the examination season, until a sufficient quantity of data has been collected to confirm the adequacy of equating, which ensures fairness across multiple test forms.** Candidates will receive an email notification that results have been posted to their confidential profile.

### CONTENT

The OSCE is comprised of multiple-choice items that include dental hygiene components that are essential for safe practice. The topics tested are based on the protocols and concepts required as educational and performance standards by the American Dental Association, the American Dental Hygiene Association and the Council on Dental Accreditation. A Candidate should be familiar with these principles and be able to demonstrate entry-level competency in identifying common intraoral conditions, as well as the extent and severity of bone loss.

Treating a patient's oral health not only requires good instrumentation skills, but also possessing an aptitude for making correct treatment decisions. Critical thinking skills are important in the assessment of the patient's needs and to accurately develop a care plan that reflects a patient's individualized care. The following categories (including an overview of topics within the categories) reflect the components of dental hygiene care that are important and tested on the examination.



Category
<b>Medical History</b> <ul style="list-style-type: none"> <li>• Interpretation of medical history and systemic conditions</li> <li>• Systemic conditions (i.e., diabetes, heart)</li> </ul>
<b>Risk Assessment</b> <ul style="list-style-type: none"> <li>• ASA Classifications</li> <li>• Caries</li> <li>• Risk factors</li> </ul>
<b>Extraoral and Intraoral Assessment (Images)</b> <ul style="list-style-type: none"> <li>• Recognition of oral conditions</li> </ul>
<b>Periodontal Assessment</b> <p><b>Periodontal Evaluation</b></p> <ul style="list-style-type: none"> <li>• AAP (staging and grading)</li> <li>• Classification of furcation</li> <li>• Clinical attachment loss</li> <li>• Types of gingival diseases</li> </ul> <p><b>Dentition Evaluation</b></p> <ul style="list-style-type: none"> <li>• Abscesses</li> <li>• Occlusal trauma</li> </ul> <p><b>Radiographic Interpretation (Images)</b></p> <ul style="list-style-type: none"> <li>• Recognition of types of bone loss</li> <li>• Extent of bone loss</li> </ul>
<b>Dental Hygiene Care Plan</b> <p>Dental Hygiene Diagnosis</p> <ul style="list-style-type: none"> <li>• Documentation</li> <li>• Patient recare</li> <li>• Dental hygiene aids</li> <li>• Non-surgical periodontal treatment</li> <li>• Outcomes</li> <li>• Fluoride, fluoride varnish</li> <li>• Local anesthesia</li> <li>• Teeth whitening</li> </ul>
<b>Instrumentation</b> <ul style="list-style-type: none"> <li>• Instrumentation technique</li> <li>• Ultrasonic instrumentation</li> <li>• Implants</li> <li>• Air and rubber cup polishing</li> </ul>
<b>Tissue Management</b>



**WREB Dental Hygiene  
Objective Structured Clinical Examination:  
COVID-19 Interim Dental Hygiene Examination**

**Psychometric Overview**

**July 10, 2020**



**WREB Dental Hygiene Objective Structured Clinical Examination:  
 COVID-19 Interim Dental Hygiene Examination  
 Psychometric Overview**

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## **WREB Dental Hygiene Objective Structured Clinical Examination: COVID-19 Interim Dental Hygiene Examination**

### **Psychometric Overview**

#### **Introduction**

Results from standardized assessments are one source of evidence used by licensing bodies to make decisions about a candidate's readiness for practice. Licensing examinations must be developed and administered in a valid, reliable, and legally defensible manner. The purpose of this report is to provide test users with an overview of descriptive and technical documentation regarding the nature and quality of the WREB Interim Dental Hygiene Examination to support inferences based on examination results.

WREB examinations are developed, administered, and scored in accordance with the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME; 2014) and *Guidance for Clinical Licensure Examinations in Dentistry* (AADB, 2005). An overview and description of activities conducted to evaluate the technical quality of the WREB Interim Dental Hygiene Examination, including psychometric and statistical results of field-testing and initial administration. Details of additional activities and research studies relevant to the interim examination are also maintained and available for review by test users, test takers, and other stakeholders.

#### **Background and Overview of the Interim Examination**

The advent of health risks due to the COVID-19 (SARS-CoV-2) virus and the social-distancing directives that have been in place since March of 2020 has put pressure on many state licensing boards to consider temporary alternatives to the traditional patient-based dental examination. Several state licensing boards have requested that WREB propose temporary examination alternatives that could be administered during the COVID-19 crisis.

WREB has been researching and evaluating the validity and viability of alternatives to patient-based assessment for several years. For example, two non-patient-based alternatives to WREB's standard, patient-based Dental Hygiene Examination, 1) a computer-based alternative assessment that can approximate the critical thinking and decisions involved in clinical practices,

and 2) a clinic-based typodont simulation employing custom-designed materials, are currently in development and undergoing review. WREB had not planned to implement any assessment alternative during the 2020 dental hygiene examination season.

WREB's view at this time is that a clinic-based typodont simulation would not be a sufficiently valid and defensible alternative. Even if a simulation with adequate fidelity was available, now, students will not have had ample opportunity to prepare for the new medium. WREB will continue to research and evaluate the viability of a typodont simulation alternative and may offer a dental hygiene simulation option in the future when the validity of a more realistic and involved simulation can be demonstrated.

Given the requests for temporary alternatives due to restrictions and limitations on patient-based examination posed by COVID-19, however, WREB has accelerated the development of a computer-based examination that assesses the appropriate clinical judgments and interpretations required in clinic-based patient treatment. The Interim Dental Hygiene Examination will assess a candidate's ability to make correct treatment decisions and think critically within a clinical context.

WREB maintains the position that a dental hygiene examination that does not include a patient-based evaluation component remains limited with respect to fidelity, which is a critical type of validity evidence. A computer-based examination cannot directly assess the cognitive motor coordination and instrumentation skills required to effectively treat a patient. However, the Interim Dental Hygiene Examination that WREB has developed can evaluate, in a comprehensive and reliable manner, the application and execution of judgments, techniques, and behaviors involved in patient care and promoted in the Standards for Clinical Dental Hygiene Practice (ADHA, 2016). The Interim Dental Hygiene Examination that WREB is offering for 2020 is intended to be a provisional solution for COVID-19 only and is intended neither to replace WREB's standard patient-based Dental Hygiene Examination for states that continue to require it nor to be a final version of other non-patient-based alternative examinations that remain in development.

The Interim Dental Hygiene Examination is a comprehensive, computer-based Objective Structured Clinical Examination (OSCE) format that employs images and radiographs to replicate authentic oral conditions and clinical situations. The test format name, OSCE, was given to station-based examinations used in medical schools in in the 1970s (Harden, Stevenson, Downie, and Wilson, 1975). At the time, the format allowed a standardized assessment of student knowledge at

a time when a) few models of performance-based standardized testing existed and b) the technical capabilities of evaluating human raters (i.e., examiners) was limited by the lack of modern computing. Recent assessments adopting features of the OSCE format (e.g., the American Dental Association's DLOSCE [2020]) do not employ physical stations, but present images and situations exclusively via computer. The word "objective" in the format label refers to the manner of examinee response, which is multiple choice or variations of multiple choice where multiple responses are required. The term "objective" (meant as an opposite of "subjective") is no longer used in this manner in the testing profession, since the fairness and validity of performance-based tests has been demonstrated successfully since the late 1970's. Multiple-choice and other selected-response testing formats can underrepresent content by not assessing skills and abilities that are critical to determining minimal competence in a profession that depends on physical and cognitive motor abilities.

The development of WREB's Dental Hygiene OSCE (DH OSCE) has drawn on decades of experience with creating innovative and reliable computer-based assessments and has transformed clinical situations and presentations into visual stimuli and realistic situations that can, at least, reflect many critical aspects of clinical practice with a high degree of fidelity during this time when patient-based testing may not be possible. The DH OSCE can serve as a temporary replacement for the standard Dental Hygiene Examination while the challenges posed by COVID-19 limit patient-based options.

The following sections will describe several aspects of the DH OSCE, including examination development, dental hygiene content assessed, standard setting, field testing, technical quality, and procedures reflecting the additional precautions required to minimize exposure to the COVID-19 virus.

### **Examination Development**

The DH OSCE examination committee was appointed by the Board of Directors in April of 2020 in response to calls for alternative examination options during conditions imposed by COVID-19. The committee was charged with developing a valid and reliable computer-based examination focused on the assessment of clinical judgments and abilities in dental hygiene candidates. The committee is comprised of four practicing dental hygienists with experience as state board members and two dental hygiene educators. The interruption in committee members'



daily ability to practice dental hygiene or teach in a clinical environment, prompted by COVID-19, allowed the committee to conduct frequent virtual meetings within the accelerated timeline via remote collaboration software.

The committee developed test specifications to align with aspects of clinical practice that were judged as frequent and important in the most recent dental hygiene practice analysis conducted (WREB, 2020a). The selected-response format of the DH OSCE, while limited with respect to direct evaluation of clinical performance, allows for assessment of a broader and more standardized range of clinically-oriented content, including appropriate selection of hand and powered instruments, optimal determination of techniques, patient risk assessment, and management of emergency situations. The committee was able to draw on a large bank of images, radiographs, and authentic patient situations, as well as a bank of over 1,600 previously administered selected-response items that ran from 2011 to 2014 on the WREB Dental Hygiene Process of Care examination. The Process of Care examination (WREB, 2016) is an interactive computer-based examination that requires developing comprehensive dental hygiene care plans and answering questions related to two in-depth patient cases. Committee members modified existing items and developed new questions to ensure sufficient content coverage for the DH OSCE.

### **Test Specifications**

The Interim Dental Hygiene Examination is comprised of multiple-choice items that assess aspects of dental hygiene practice that are important for entry-level dental hygienists entering the profession, with an emphasis on clinic-based practices and abilities. Each content category contains sub-categories that align with professional practices and reflect frequent and important practices that appear in the most recent dental hygiene practice analysis (WREB, 2020a). The examination requires candidates to think critically and demonstrate entry-level competency in several areas that are essential for the safe treatment of patients in a clinical setting. The following six content categories reflect the components of dental hygiene care that are tested on the examination.

- 1. Medical History.** Includes medical history interpretation, recognition of systemic conditions (i.e. diabetes, autoimmune diseases) blood pressure guidelines, HbA1c values, and chief complaint.

2. **Risk Assessment.** Includes prevention, recognition and management of possible complications, risk factors (smoking, caries), and ASA Classification of Disease.
3. **Extraoral and Intraoral Assessment.** Includes rationale for completing an assessment, recognition of normal and atypical conditions, proper recording and documentation, and assessment of intraoral findings.
4. **Periodontal Assessment.** Includes application of 2017 AAP guidelines for Staging and Grading (AAP, 2017), periodontal and peri-implant diseases, and conditions (modifying and non-modifying). Also includes identification and classification of furcation and mobility, generalized and localized conditions, clinical attachment, and utilization of local anesthesia during non-surgical periodontal therapy. Periodontal probe measurement is assessed utilizing intraoral images. The DH OSCE Candidate Guide (WREB, 2020b) notes that candidates must be familiar with the University of North Carolina (UNC) 1-12 mm periodontal probe. Additional aspects of periodontal assessment that are evaluated include:
  - **Dentition Evaluation.** Recognition of factors contributing to occlusal trauma. Etiologies of abscesses.
  - **Radiographic Interpretation.** Assessment of radiographic findings utilizing images and identification of severity and types of interproximal radiographic bone loss.
5. **Dental Hygiene Treatment and Care Plan.** Includes Dental Hygiene Diagnosis and rationale, recommendation, and implementation of treatment (dental hygiene care plan, non-surgical periodontal therapy, surgical phase). Also included are recommendations regarding interdental aids, desensitizing agents, fluoride, and tooth whitening, as well as assessment and documentation of outcomes and proper referral.
6. **Instrumentation.** Included are basic instrumentation and ultrasonic technique (correct adaptation, activation), e.g., correct power settings, cavitation of power units,

implementation, and rationale for implant scalers (types), air and rubber cup polishing, and self-assessment and management of tissue during dental hygiene treatment.

The proportion of questions within each content area was determined by the examination committee outlining critical sub-topics to be assessed within each content area. Percentages per content area correspond to the raw weighted categorization from the most recent dental hygiene practice analysis but were adjusted to reflect the committee's desire to ensure assessment of clinic-oriented practices. All categories are within 0 to 4 percentage points away from the practice analysis weights (i.e., 11%, 12%, 5%, 26%, 35%, and 11% for the six categories, respectively) except for Instrumentation, which is weighted higher to account for the need to enhance assessment of instrumentation skills in lieu of patient-based examination, and Dental Hygiene Treatment and Care Plan, which is weighted lower, given that professional knowledge in this area is addressed on the National Board Dental Hygiene Examination (JCNDE, 2019). The content domains are represented on the examination according to the percentages listed in Table 1.

Table 1. *Dental Hygiene OSCE 2020: Percentage of Questions within Content Domains*

<b>Content Domain</b>	<b>Percentage</b>
Medical History	13%
Risk Assessment	12%
Extraoral and Intraoral Assessment	6%
Periodontal Assessment	30%
Dental Hygiene Treatment and Care Plan	20%
Instrumentation	19%

### **Standard Setting**

The process of setting the passing standard must be credible, legally defensible, and well-informed, to protect the public as well as the rights of candidates. The *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014) state that passing standards should be high, in order to protect the public and the profession by excluding unqualified individuals, but not

so high as to “unduly restrain the right of qualified individuals to offer their services to the public” (p.175).

Standard 11.16 in the current *Standards for Testing* states that the "level of performance required for passing a credentialing test should depend on the knowledge and skills necessary for credential-worthy performance in the occupation or profession and should not be adjusted to regulate the number or proportion of persons passing the test" (p. 182; AERA, APA, & NCME, 2014). The passing standards set by WREB examination committees are set in accordance with the *Standards for Testing* and are absolute, or criterion-referenced. An absolute, or criterion-referenced, standard is set to reflect a standard of knowledge and practice, meaning that, theoretically, all candidates could pass or all could fail when compared to an absolute standard. In practice, pass rates of 100% and 0% are unlikely when a credible and defensible passing standard has been set. For many credentialing examinations, the vast majority of candidates are very well-prepared, so relatively high pass rates are not unusual.

Passing scores on WREB examinations are set, and reviewed regularly, by WREB examination committees. The examination committee determines passing scores based on professional standards of content and practice, even when arbitrary cut scores have been legislated, such as “75%.” A passing score should reflect minimal competence, not an arbitrary percentage. Setting a passing score at 75% without evidence to support that the level of performance corresponds clearly to minimal competence is not a credible, defensible standard for a credentialing test; 75% of a difficult test is not comparable to 75% of a less challenging test. Some states have acknowledged that setting a percentage for passing is not appropriate. For example, California has stated that "Boards, programs, bureaus, and divisions that have laws or regulations requiring a fixed passing percent score should seek to change the law or regulation to require a criterion-referenced passing score that is based on the minimal competence criteria" (California Department of Consumer Affairs, 2000, p. 6). Until all states reject arbitrary fixed passing percentages, WREB continues to re-scale some examination passing scores to be interpreted as "75"; however, the scores reflect the defensible passing standard set by the professional examination committee.

At several sessions in May 2020 the DH OSCE examination committee engaged in a first round of standard setting to determine a preliminary passing score on the examination. In the final preparation of new and modified questions to be field-tested, the committee assessed each question

according to Ebel's method (Ebel, 1972; Zieky, Perie, and Livingston, 2008). Ebel's method involves each member independently assigning the test item to a category that reflects degree of professional relevance (e.g., essential) and degree of difficulty (i.e., the estimated probability of correct response by a minimally competent candidate) and then the committee comes to consensus regarding classifications for each item. For example, a test item might be judged to assess "essential" content and a minimally competent candidate should find it "easy" to select the correct response. Estimated probability values are weighted by relevance and applied to each test form to set a preliminary passing standard for field testing. Groups of items within each category are multiplied by pre-determined estimates of proportion correct and summed to set the preliminary standard. Once an adequate sample of data is acquired, the empirical values of proportion correct can be summed and compared with the original estimates for review by the committee.

The modified and new items were "taken" and reviewed by subject matter experts and field-tested with dental hygiene students. Due to a very limited sample size for student field-testing, results for the operational administration of the examination were held until data from a sufficiently large sample of candidates had been collected in order to conduct the final round of standard setting and re-confirm item quality.

Comparisons between the committee's Ebel estimates and empirical data collected from subject matter experts, student field-test examinees, and candidates after initial operational administration of the examination were reviewed. Analysis details for the comparisons are presented later in this document.

Application of the preliminary passing score derived from the Ebel estimates to the student field-test data would have produced a very low passing percentage of 28.0%. When empirical difficulty values were categorized by the same categories as the original Ebel estimates, the corresponding passing score would result in a passing percentage of 56.0%. While these preliminary estimates of potential impact are severe, it was acknowledged that this could be due to a) the final test forms contained higher proportions of items that had been categorized into the "medium" and "difficult" categories and fewer that had been categorized as "easy," b) the field-test sample was small and may not have been representative of the larger candidate pool or as highly motivated as active candidates, and c) test scores reflected several test items that later received minor revisions, such as slight improvements to images or minor changes in language clarity (items that were replaced or revised significantly were not included in projecting passing

percentages). Additional information and details regarding student field-testing results are provided later in this document.

The final forms presented to active candidates during the initial administration of the examination were very similar to the forms taken by the students, except for ten items that were revised or replaced, and five items that were exchanged between forms to balance level of difficulty. One test item on each final form was left unscored due to technical inadequacy. Application of the preliminary passing score derived from the Ebel estimates to the initial administration candidate data would have produced a passing percentage of 86.0%. When empirical difficulty values were categorized by the same categories as the original Ebel estimates, the corresponding passing score would result in a passing percentage of 96.7%. A significant difference in candidate mean performance between the two initial administration sites was observed. If the Ebel-derived preliminary passing score were applied to the results at one of the sites (i.e., an exam site that comprised 40% of the total initial sample of candidates) the passing percentage would be 76.7% and the empirically-generated preliminary passing score would produce a passing score of 93.3%.

The second round of standard setting included an item-mapping and “bookmark” approach to review and finalize the raw passing standard (e.g., Schulz, Kolen, and Nicewander, 1999; Mitzel, Lewis, Patz, and Green, 2001). Item-mapping involves the subject matter experts reviewing visual displays of assessment items separated by content and ordered by proportion correct or probability of correct response. Bookmarking involves independent review of collections of individual test items, ordered by degree of challenge. Both approaches are augmented with impact estimation (based on empirical data) for the final determination of the passing score, e.g., to resolve “ties” and/or ensure that subject matter experts judge the standard as fair and reasonable.

The second round of standard setting took place on July 2, 2020. The session was conducted via remote collaboration software to avoid infection risks associated with air travel. All six members of the examination committee participated, with attendance by three WREB staff including facilitation by the WREB psychometrician. When applicable, committee members communicated independent decisions via direct email to agency staff.

Committee members reviewed the purpose of the standard setting session, discussed important features of a just minimally competent candidate, and reviewed results of analyses

assessing the relationship among the original Ebel estimates, student field-test examinee performance and candidate performance. After reviewing item maps by detailed topic for the student field test results and initial administration candidate results, the committee members participated in a bookmark-style activity.

The committee reviewed six different item lists, one per content category, that displayed examination questions ordered from least to most difficult. Questions represented difficulty values that ranged from more challenging than would correspond to the Ebel-derived passing score (i.e., would produce an estimated passing percentage of 76%) to less challenging than would correspond to the empirically-generated passing score (i.e., would produce an estimated passing percentage of 100%). Committee members were instructed to independently choose one item, i.e., one “stopping point,” as they reviewed the items and record it to be sent for averaging with the other panelist decisions after all six ordered item lists were reviewed. The stopping point on each list reflects the point at which the panelist believes that a just-minimally competent candidate would be likely to find the item “hard” or very challenging, rather than “medium” or moderately challenging. Other than noting that choosing all six end points at one extreme or the other would produce impact estimates of 76% or 100% respectively, committee members were not shown any passing percentage impact estimates until after the results were computed. The committee was also told that some content areas were more challenging than others and they would not be expected to choose a stopping point at similar locations across all six ordered item lists.

Average stopping points within each of the six ordered item lists ranged from 69.4% of items to 83.3% of items and individual decisions varied more in some categories than others, with standard deviations ranging from 6.8% to 19.7%. The average stopping point within the largest category (Periodontal Assessment) was split between two items, which resulted in two different possible passing scores, a raw score of 75 and a raw score of 72. The committee then reviewed the impact data at each raw score and came to a consensus decision at 74, which corresponds to an estimated passing percentage between 94.7% and 98.0%. Raw scores were then re-scaled so that the raw passing score is reported as a score of 75 out of 100 scale points. Post-equating was not necessary; the difficulty level and score range for each of the pre-equated final forms were very similar. Results from initial administration data are presented later in this document.

### **Administration and Security**

Candidates are administered the examination at host schools, not at national testing centers, to ensure that candidates can be tested in a timely manner given delays in scheduling at national testing centers due to interruptions in administration caused by COVID-19. Time allocated for the examination is two hours, unless an accommodation for additional time is granted (*Standards for Educational and Psychological Testing*, AERA, APA, & NCME, 2014; Americans With Disabilities Act, 1990).

At the examination site, candidates must provide two valid, non-expired forms of personal identification. Admittance to the exam does not imply that the identification presented was valid. If it is determined that a candidate's identification is fraudulent or otherwise invalid, WREB will report to the appropriate governing agencies or board. Any candidate or other individual who has misreported information or altered documentation in order to fraudulently attempt an examination, will be subject to dismissal and reporting.

A primary security concern for computer-based tests is unauthorized exposure of assessment items. WREB continually develops and field-tests new testing items to support large item banks and creates multiple test forms for selected-response examinations. The final questions that comprise the new DH OSCE test forms have had no previous administration exposure, other than limited screening and field testing under secure conditions with subject matter experts and small student field-test sessions. Many more items than appear on operational test forms were field-tested, and the equated test forms are randomly assigned to candidates. All subject matter experts, staff, and candidates sign a non-disclosure agreement regarding all secure examination material and information.

Notes, textbooks, or other informational material must not be brought into the examination administration area. All electronic devices, including cell phones and smart watches, are prohibited. Prior to entry, candidates are required to empty and turn out all pockets, raise pants legs above the ankles, and shirt sleeves above the wrist. Eyewear and hair accessories are subject to inspection. Additional details of administration procedures and security guidelines are included in the DH OSCE Candidate Guide (WREB, 2020b).



## **Remediation**

All pass/fail tests, theoretically, misclassify some examinees (i.e., false negatives and false positives), particularly for observed scores that are close to the passing score. Providing appropriate retake opportunities allows a candidate, who was misclassified hypothetically in their examination outcome but may be truly minimally competent, an opportunity to demonstrate minimal competence upon retake. However, the probability that a competent candidate would be theoretically misclassified (i.e., false negative) upon third or higher retake becomes very low and decreases with the number of retakes (Clauser, Margolis & Case, 2006).

If a candidate fails the DH OSCE three (3) times, he or she is required to obtain formal remediation in the areas of failure prior to a fourth attempt. Upon failing a section a fourth time (or any subsequent failures), additional remediation is required, with a substantial increase in hours required. WREB will specify the required hours of remediation. Individual states may have more stringent requirements for remediation. If a candidate has failed any section of the exam two or more times, he or she is advised to contact the state in which he or she is seeking licensure to obtain the state's requirements regarding remediation. Remediation must be completed at an accredited dental hygiene school in the United States or Canada.

## **Interim Social Distancing and Infection Prevention Protocol**

Preventing infection by COVID-19 that may arise from airborne transmission or contact with potentially virulent surfaces is critical to ensuring the safety of candidates, school personnel, and agency personnel during examination and examination-related activities. Protocols must be followed to ensure that a) individuals participating in the examination are sufficiently distant from each other at all times, b) individuals use appropriate Personal Protective Equipment, and c) materials and surfaces remain clean and disinfected.

Social-distancing and infection-prevention protocols have already been field tested by WREB for an interim alternative examination section being implemented in the WREB Dental Examination and will be applied to all administrations of the WREB Interim Dental Hygiene Examination, DH OSCE. In two recent Dental field tests conducted using the protocol, 93% of examinees surveyed felt that it was "Easy" to maintain social distancing throughout the examination. Survey comments included satisfaction with the safety measures, e.g., "I think this is a great way to test in a safe environment given the circumstances of the class of 2020" (WREB,

2020c). In the recent DH OSCE field test conducted using the protocol, 100% of examinees surveyed responded “Yes” regarding whether the protocol used allowed for proper social distancing before, during, and after the examination. Additional results from the survey of field test examinees are provided later in this document.

The social-distancing and infection-prevention protocols that are in place for the administration of the DH OSCE include, but are not limited to, the following examination features:

- Limits on numbers of personnel and candidates assigned to the examination at one time and in one location
- Distribution, required completion, and collection/review of a self-assessment survey instrument immediately prior to the examination (e.g., regarding symptoms, recent contact with suspected or known patient with COVID-19, and recent travel)
- Required capture and logging of each participant’s temperature
- Assignment of separated arrival times
- Set-up, preparation, and monitoring for entry to the facility and examination area (e.g., survey completion and approval, donning face mask, temperature capture, hand sanitization, etc.)
- Installation of floor and location markings throughout examination areas to ensure adherence to social distancing
- Location of assigned individual testing areas that conform to social distancing guidelines
- Pre-provision of examination equipment at individual testing areas to reduce unnecessary movement
- Specific instructions regarding how to move around the testing area when necessary, how to return equipment, and how to leave the testing area and building upon completion without congregating
- Monitoring of social distancing, use of PPE, and limiting of contact with objects and surfaces throughout the examination
- Appropriate cleaning and disinfection of all equipment, individual testing areas and involved surfaces immediately before and following every examination

The features described may be augmented according to updates for infection prevention from the Center for Disease Control (CDC) or more stringent school-specific requirements. The protocols employed will reflect or exceed CDC guidelines. If the test site has stricter guidelines than the CDC, then the protocol employed will reflect the test site requirements.

WREB is coordinating with each site hosting an examination to develop a document communicating the social-distancing and infection-prevention protocol for that examination site. Prior to the exam, the document will be provided to candidates, on-site staff, and any other individuals who will be involved in examination. Candidates are expected to conform to the social distancing and infection prevention protocol and may risk dismissal and failure of the examination for gross, willful, or repeated protocol violation.

### **Subject Matter Expert Review of 2020 Test Items**

From May 21-23, 2020, 23 subject matter experts (SMEs) from eleven states conducted independent reviews of over 300 finalized test items from the DH-OSCE item bank. Test items were assembled into review “test forms” in the same online test administration platform that was to be used to administer the DH OSCE to candidates. The SMEs included four members of the examination development committee, as well as 19 additional practicing dental hygienists with extensive experience as board examiners, state licensing board members and/or educators. The 23 SMEs accessed three test forms with over 100 items each, responded to each item, made notes of any concerns, and responded to a survey after completing the review. Feedback regarding specific items led to revisions of several items and improvements in the size and quality of some images.

Item responses were examined to determine whether the SMEs responded as expected, with respect to proportion correct, based on first round judgments of level of difficulty. There were ten items that had not received a difficulty rating by the committee and eight items that were immediately slated for removal or revision due to technical issues, e.g., one question was accompanied by the wrong image. A one-way analysis of variance (*ANOVA*) was conducted between the proportion correct values and the initial difficulty judgments of the examination committee for the remaining 284 items. The proportion correct values were highly related to the predicted difficulty categories, with an *F* ( $df = 2, 282; \alpha = 0.05$ ) value of 12.94, and significant value of  $p < 0.01$ . Table 2 provides the mean proportion correct by predicted difficulty category,

including the lower and upper bounds for the 95% confidence intervals around each mean. Other indicators of item quality were reviewed mostly for extreme results, given the limited stability of indicators like point-biserial correlations and item discrimination values with a small sample of 23 examinees. Despite the small sample, mean point-biserial values ranged from 0.19 and 0.23 and mean item discrimination values ranged from 0.20 and 0.24, which are moderately small, but under conventional administration, would be anticipated with the criterion-referenced nature of the assessment. Mean proportion correct values over the three forms were between 0.78 and 0.82 and the Cronbach's alpha reliability estimates were between 0.80 and 0.86.

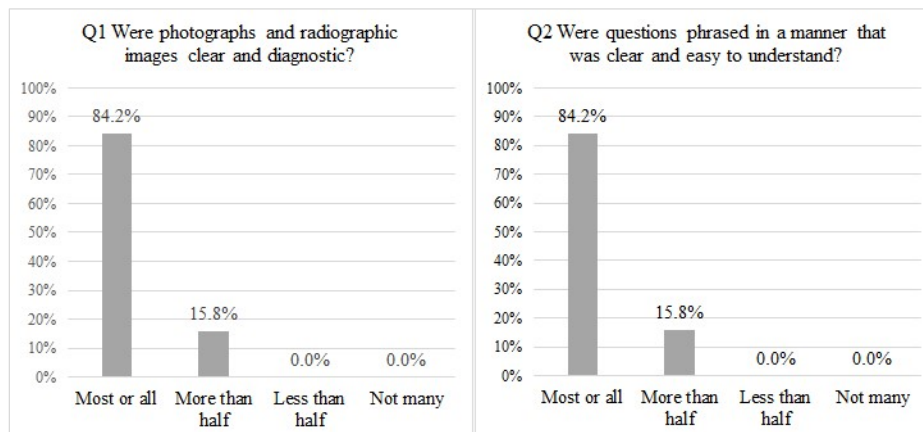
Table 2. *Subject Matter Expert Review Mean Proportion Correct Values by Committee Predicted Difficulty Category, with 95% Confidence Interval Upper and Lower Bound Values*

Predicted Difficulty Category via First Round Standard Setting (Ebel)	<i>N</i> Items	Mean ( <i>SD</i> )	95% CI Lower Bound	95% CI Upper Bound
Easy	120	0.85 (0.15)	0.82	0.88
Medium	139	0.79 (0.20)	0.76	0.82
Difficult	26	0.65 (0.26)	0.54	0.76

### **Survey of Subject Matter Expert Review Participation**

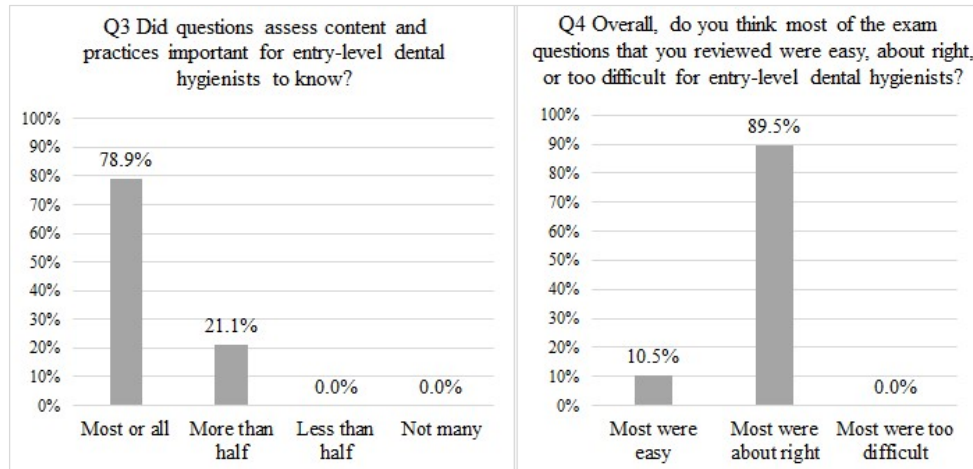
SMEs were also asked to respond to a follow up survey, consisting of four questions with optional comments and a fifth question inviting other comments or suggestions. A link to the online survey was e-mailed to all twenty-three SMEs. Nineteen responded for a response rate of 83%. Many respondents also included additional feedback regarding specific items in the survey.

Question 1 asked if photographs and radiographic images were clear and diagnostic and Question 2 asked if questions were phrased in a manner that was clear and easy to understand. Figures 1a and 1b illustrate the percentages of each response for Questions 1 and 2. On both questions, sixteen SMEs (84.2%) responded "Most or all" and the other three (15.8%) responded "More than half." Optional comments on Question 1 noted specific test questions, noting size or clarity issues. Optional comments on Question 2 also indicated specific questions, with some offering advice for revision, e.g., "#X could use a patient's age to help clarify" or providing other feedback, e.g., "#X is too hard for students."



Figures 1a and 1b. Proportion of different responses to SME Survey Questions 1 and 2.

Question 3 asked if the questions assessed content and practices that are important for entry-level dental hygienists to know and Question 4 asked the SMEs to rate the level of challenge posed by the examination. Figures 2a and 2b illustrate the percentages of each response for Questions 3 and 4. On Question 3, fifteen SMEs (78.9%) responded “Most or all,” with optional comments including “challenging but very good questions” and “I didn’t notice many that didn’t seem relevant.” The other four (21.1%) responded “More than half,” with comments including “Concern with questions about specific instruments - some entry-level may not be familiar” and “Seemed like a National Board exam.” On Question 4, seventeen SMEs (89.5%) responded “Most were about right,” with optional comments like, “Some seemed easier and some seemed a little more challenging.” The other two (10.5%) responded “Most were easy,” with one optional comment, “I want to say they seemed too easy, then again I am not sure how I scored.”



Figures 2a and 2b. Proportion of different responses to SME Survey Questions 3 and 4.

Other comments or suggestions included mostly comments that followed up on the previous two questions, with a few encouraging more technique or clinical content questions, e.g., “Needs to be more clinical due to replacing assessment of candidate’s ability to detect and remove calculus.” The others were generally positive or expressed gratitude for the opportunity to participate, e.g., “Good questions from a wide scope,” “Overall good,” and “Thanks for the opportunity. It was interesting to be on the candidate side of it.”

All comments were reviewed. Nearly all comments that provided specific feedback regarding question wording, images, or appropriateness for the examination purpose led to question revision or exclusion. The objectives established regarding the development of the DH OSCE examination included an emphasis on clinical content and techniques, and an intent to not assess content covered on the National Board Dental Hygiene Examination. Comments by SMEs reinforced these goals.

### Field Testing

A student field-test was conducted from June 9 – 11, 2020. The field test was held in the WREB office in Phoenix, AZ, with small groups assigned to administration times across the available dates. A total of 25 dental hygiene students from two local dental hygiene schools participated. The field-test sample was much smaller than would have been preferred due to a) limitations regarding travel, b) reticence of dental hygiene programs and individual students to participate during pandemic conditions, and c) a significantly reduced time frame in which to

develop the examination. The small sample allowed for screening and revision of some item issues and initial estimation of equated forms; however, final confirmation of item quality, setting of the passing score, and reviewing test forms for equating occurred later, following the receipt of results from an adequate sample of examinees. The field test also allowed for assessing the implementation of social distancing protocols and confirming that the amount of time allowed for the examination is appropriate.

Field-test examinees were allowed up to two hours to complete the DH OSCE Field Test. The average length of time taken to complete the examination was 44 minutes, with a minimum testing time of 28 minutes and a maximum time of one hour, 11 minutes. The two-hour time was not reduced, however, given the small sample and the possibility that many examinees spent less time reviewing their responses due to the low-stakes nature of the test than they might during an authentic administration situation.

The forms developed for the student field test adhered to the test specifications, including committee-recommended numbers of test items per subtopic within each category. An estimate of a preliminary passing standard based on the Ebel difficulty estimates was applied by summing and averaging the products of a hypothetical proportion correct (i.e., 0.85, 0.75, and 0.60 for Easy, Medium, and Difficult, respectively) and the number of items within each estimated difficulty category that appear on the forms. The estimated mean proportion correct of 0.77 corresponds to a score of 82 out of the total of 107 items per form.

Despite the small sample, some test items stood out as non-viable or under-functioning due to very poor indices of item quality. Approximately one-third of items appeared on both student field test forms as anchor items, which provided a slight improvement in assessment of item functioning for some items. Ten items (i.e., fewer than 1%) required extensive revision and two items were replaced with other questions from the item bank and which had undergone review by the subject matter experts. Several other items received minor revisions or image re-sizing, upon final review. Mean point-biserial values ranged from 0.13 and 0.14 and mean item discrimination values ranged from 0.15 and 0.19, which are relatively small, but not unusual for criterion-referenced assessment. Mean proportion correct values over the two forms were between 0.72 and 0.78 and the Cronbach's alpha reliability estimates were between 0.66 and 0.71. Score ranges were limited, given the small sample, particularly for one of the forms. A disparity in the level of

difficulty between forms was also observed and addressed in the composition of final forms for operational administration.

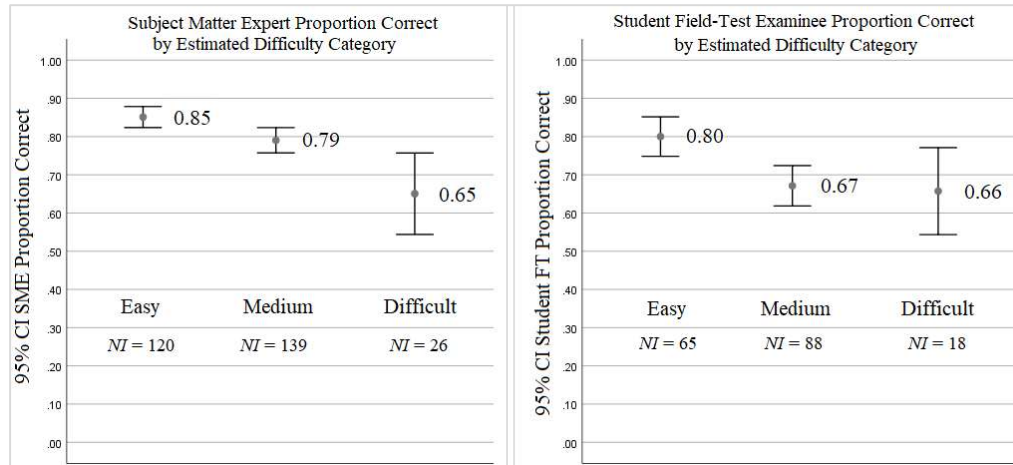
The raw field test forms were more challenging than expected, with only seven of twenty-five (28%) attaining a score of 82 or higher. The sample was too small to conclude that the examination is excessively difficult and scores are likely to increase following the item revisions and replacements across forms. Though more challenging, overall, the performance of the student examinees was still highly related to the examination committee's predicted levels of difficulty categories. The committee's Ebel difficulty estimates were significantly related to student examinee performance, with an  $F$  ( $df = 2, 168; \alpha = 0.05$ ) value of 6.45, and significant value of  $p < 0.01$ . Table 3 provides the mean proportion correct by predicted difficulty category, including the lower and upper bounds for the 95% confidence intervals around each mean.

Table 3. *Student Field-Test Mean Proportion Correct Values by Committee Predicted Difficulty Category, with 95% Confidence Interval Upper and Lower Bound Values*

Predicted Difficulty Category via First Round Standard Setting (Ebel)	<i>N</i> Items	Mean ( <i>SD</i> )	95% CI Lower Bound	95% CI Upper Bound
Easy	65	0.80 (0.21)	0.75	0.85
Medium	88	0.67 (0.25)	0.62	0.72
Difficult	18	0.66 (0.23)	0.54	0.77

Figures 3a and 3b provide a comparison between the results of the SME review and the student field test. The figures display error bar graphs for SME performance by difficulty estimate and student examinee performance by difficulty estimate, respectively. The three categories were all significantly different from each other in the SME results. In the student field-test results, the "Easy" category is significantly different from the "Medium" and "Difficult" categories, but the "Medium" and "Difficult" categories are not significantly different from each other. However, the wide range for "Difficult" in the student field-test results does include the hardest items on the forms. A notable difference between the SME and student field-test results is the degree to which the SMEs outperformed the students on items that were predicted to be at a "Medium" level of challenge.





Figures 3a and 3b. Error bar graphs for (a) SME item proportion correct and (b) student field-test examinee item proportion correct by estimated difficulty category. Number of items across forms is shown as *NI* per category. Points indicate the mean proportion correct within category. Bars represent upper and lower bounds of the 95% confidence interval around each mean.

### Survey of Field-Test Examinees

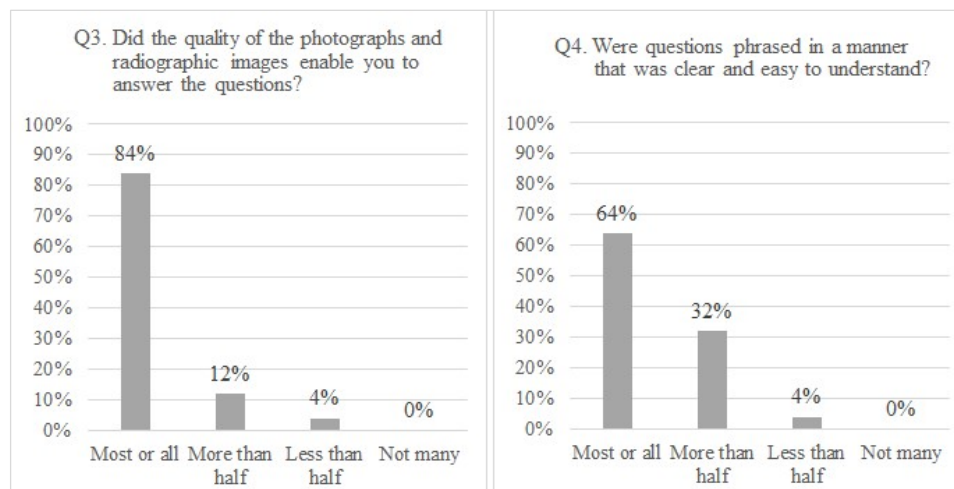
Student field-test examinees were given a paper and pencil survey to complete following the field-test examination. The survey had eight questions, with optional responses for each along with a final invitation for other comments or suggestions. All twenty-five examinees responded, with two responding to the first five questions only, presumably due to not turning the page over. Three questions, regarding the Candidate Guide, examination timing and the social distancing protocol, received unanimous responses of “Yes” and are shown in Table 4.

Table 4. *DH OSCE Student Field-Test Survey Questions 1, 2, and 8, with Unanimous Response*

Questions	Unanimous Response
1. Did the Candidate Guide provide the necessary information to adequately prepare you for the examination?	Yes, 100%
2. Did you finish the exam earlier than the time allotted?	Yes, 100%
8. Did the protocol in place allow for proper social distancing before, during and after the examination?	Yes, 100%

These three questions elicited few optional comments. One comment regarding Question 1 was “More practice questions would be helpful” and the only comment regarding Question 2 was “I tend to finish faster than average most of the time.” No optional comments were provided for Question 8.

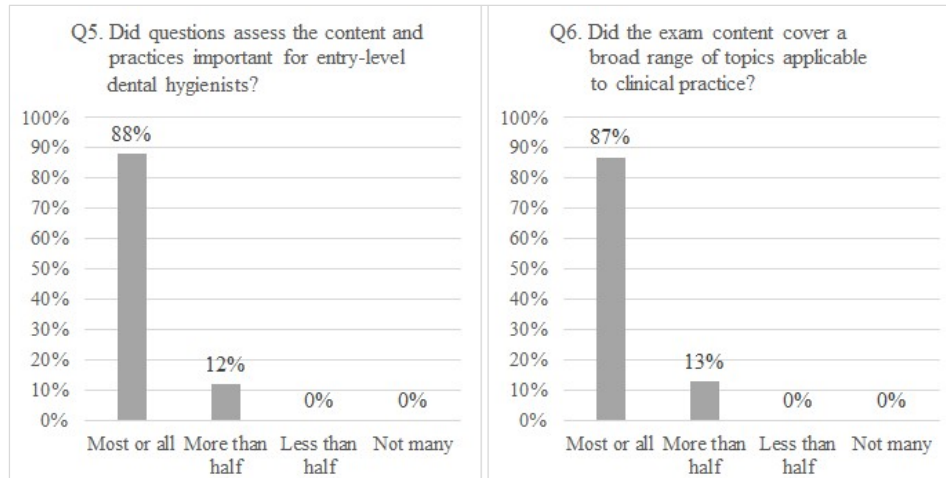
Question 3 asked if the quality of the photographs and radiographic images enable the examinee to answer the test questions and Question 4 asked if the questions were clear and easy to understand. Figures 4a and 4b illustrate the percentages of each response. On Question 3, many student examinees (84%) responded “Most or all,” a few (12%) responded “More than half,” and one (4%) chose “Less than half.” Optional comments included “A select few radiographs and intraoral photos were difficult to interpret due to image quality” and “Quality was great!” On Question 4, almost two-thirds of examinees (64%) responded “Most or all,” several (32%) responded “More than half,” and one (4%) chose “Less than half.” Optional comments included “I saw two instrument names I hadn’t heard of” and “Some were confusing the way they were worded.”



Figures 4a and 4b. Proportion of different responses to Field-Test Survey Questions 3 and 4.

Question 5 asked if the questions assess content and practices important for entry-level dental hygienists and Question 6 asked if the exam content covered topics applicable to clinical practice. Figures 5a and 5b illustrate the percentages of each response. On Question 5, most student examinees (88%) responded “Most or all” and a few (12%) responded “More than half.” No optional comments were provided to Question 5. On Question 6, most student examinees (87%) responded “Most or all” and a few (13%) responded “More than half.” Only one optional comment

was given “I don’t recall many pharmacology questions, maybe two or three?” Note that while a small number of items may assess some pharmacological content indirectly, pharmacology is not a content area or subtopic specified for the DH OSCE examination, since it is one of the content areas assessed on the National Board Dental Hygiene Examination (JCNDE, 2019).



Figures 5a and 5b. Proportion of different responses to Field-Test Survey Questions 5 and 6.

Question 7 asked if the questions were easy, moderate, or difficult. Figure 6 illustrates the percentages of each response. Most student examinees (82.6%) responded “Moderate,” two (8.7%) responded “Easy,” and two (8.7%) responded “Difficult.” Only two comments were provided, e.g., “Some easy, some difficult.”

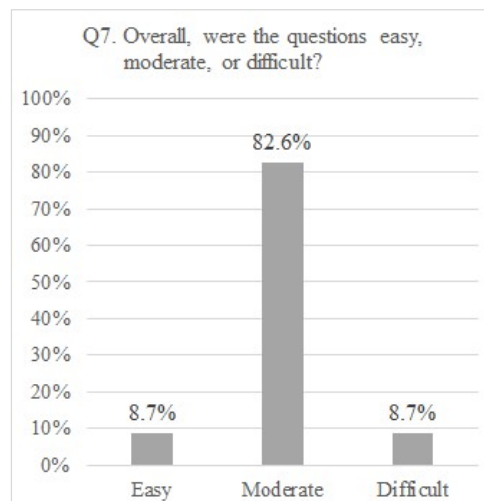


Figure 6. Proportion of different responses to Field-Test Survey Question 7.

Most of the “Other comments or suggestions” offered at the end of the survey included generally positive remarks, expressions of thanks, or repeats of previous comments, e.g., “More practice questions would be helpful” and “Overall I thought the test covered all the topics I learned in school and they were easy to understand.” One other comment, “Did not like that fluoride was PPM and not a %,” led to including percentages in addition to any references to ppm (parts per million) in relevant items.

### Technical Quality

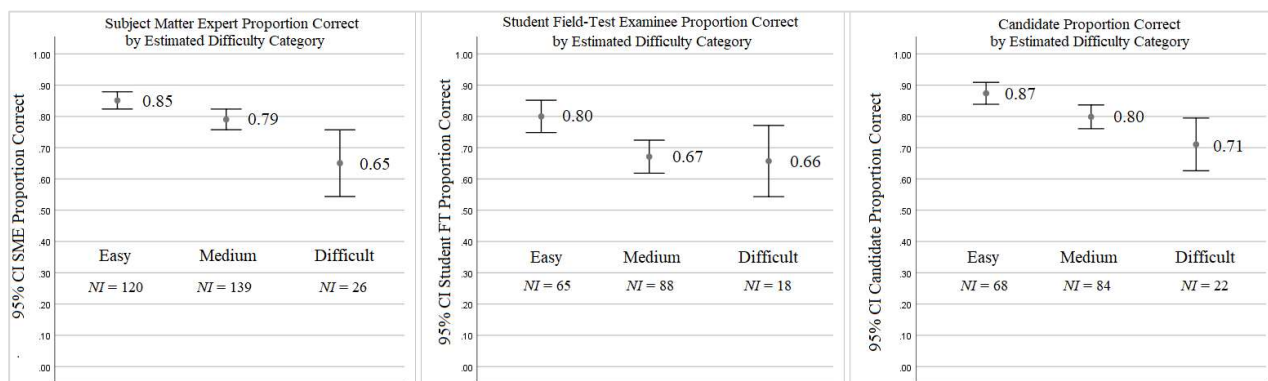
Operational administration of the DH OSCE began on June 26, 2020. One hundred and fifty (150) candidates from eleven different dental hygiene programs were administered the examination at two exam sites in two different states over two days in small sessions to facilitate social distancing. The average length of time taken by candidates who did not receive a time extension accommodation to complete the examination was one hour and 15 minutes (i.e., 75 minutes), with a minimum testing time of 32 minutes and a maximum time of one hour, 57 minutes (i.e., 117 minutes). The results of this initial administration sample were analyzed to confirm technical adequacy and support the final round of standard setting that was held on July 2, 2020.

As with the student field-test results, the original Ebel difficulty estimates by the SMEs were also compared to the initial administration candidate results for review at the final standard setting session. The committee’s Ebel difficulty estimates were significantly related to candidate performance, with an  $F$  ( $df = 2, 171$ ;  $\alpha = 0.05$ ) value of 8.49, and significant value of  $p < 0.01$ . Table 5 provides the mean proportion correct by predicted difficulty category, including the lower and upper bounds for the 95% confidence intervals around each mean.

Table 5. *Candidate Mean Proportion Correct Values by Committee Predicted Difficulty Category, with 95% Confidence Interval Upper and Lower Bound Values*

Predicted Difficulty Category via First Round Standard Setting (Ebel)	$N$ Items	Mean ( $SD$ )	95% CI Lower Bound	95% CI Upper Bound
Easy	68	0.87 (0.14)	0.84	0.91
Medium	84	0.80 (0.18)	0.76	0.84
Difficult	22	0.71 (0.19)	0.63	0.79

Figures 7a, 7b, and 7c. provide a comparison among the results of the SME review, the student field test, and initial candidate results. Figures 7a and 7b display the error bar graphs shown earlier for SME and student examinee performance by difficulty estimate with the results for candidate performance by difficulty estimate (Figure 7c). The relationship between candidate performance and the three categories was similar to the student field-test results, with the “Easy” category significantly different from the “Medium” and Difficult” categories, and the “Medium” and “Difficult” categories not significantly different from each other. However, the average proportions correct are more comparable to SME performance. It was noted that initial administration results included high performance from some schools, which have demonstrated very high performance on past examinations (e.g., the conventional patient-based dental hygiene examination and local anesthesia written examination).



Figures 7a, 7b, and 7c. Error bar graphs for (a) SME item proportion correct, (b) student field-test examinee item proportion correct, and (c) candidate proportion correct by estimated difficulty category. Number of items across forms is shown as *NI* per category. Points indicate the mean proportion correct within category. Bars represent upper and lower bounds of the 95% confidence interval around each mean.

The DH OSCE examination forms were developed to be equivalent in content, level of challenge, and length of time needed to complete the test. As noted earlier, one test item on each final form was left unscored due to technical inadequacy. The items will remain on the test forms, unscored, so that the response data collected can inform review and revision later in the season (e.g., to examine whether the topic assessed, which was common to both items, may perform

differently by region or program). The results from the initial administration sample showed no significant difference between forms, so no post-equating of forms was conducted.

Results of analyses of test item quality, form comparability, overall test functioning as well as candidate performance by content area and candidate pass/fail outcomes are presented in this section, for data collected through July 7, 2020, reflecting 172 examination attempts. Methods are based on classical test theory and Rasch/item response theory (IRT) methods. Classical item analysis statistics reviewed include item analysis statistics (e.g., proportion correct, item discrimination index [i.e., the difference between the proportions correct for the highest and lowest 27% of examinees], and point-biserial correlation [i.e., the correlation between item responses and overall test performance]) and conventional descriptive statistics (i.e., mean, standard deviation, etc.). Classical indicators of overall test performance and performance by test form include overall means, standard deviations, medians, standard errors of measurement, internal consistency reliability estimates, as well as conditional standard errors of measurement at the raw passing score.

The Rasch model (Rasch, 1960/1980), c.f., one-parameter logistic IRT model, is also applied. The Rasch model is well-suited for monitoring and improving assessments because requirements of the basic model include data properties consistent with optimal test design (e.g., unidimensionality). Indicators of item and test performance under the Rasch model reflect the degree of departure from outcomes that would be expected given optimal item and test functioning. The basic Rasch model for dichotomous responses can be expressed as follows,

$$\log(P_{ni} / P_{ni} - 1) = B_n - D_i, \quad (1)$$

where  $P_{ni}$  is equal to the probability of correct response by a person  $n$  on a given item  $i$ , which is a function of the difference between the person's ability,  $B_n$ , and the item's difficulty,  $D_i$ . Rasch model analysis item statistics reviewed include parameter estimates of item difficulty, infit and outfit mean-square fit statistics, and other statistics, where applicable (e.g., displacement values, when anchoring for pre-equating). For most analyses, means of all parameter estimates, except candidate ability, are constrained at zero, to allow estimation of candidate ability relative to item or task difficulty. Parameter estimates are reported in log-odds units, or logits, which can range from negative  $\infty$  to positive  $\infty$ , but usually do not exceed  $|5.0|$ . Lower, negative parameter estimates

correspond to lower candidate ability and lower levels of item difficulty. Higher, positive parameter estimates correspond to higher candidate ability and higher levels of item difficulty. Fit statistics should generally fall between 0.5 and 1.5 logits, with a range of 0.8 to 1.2 logits considered reasonable for high-stakes selected-response tests (Wright and Linacre, 1994). Mean-square statistics that exceed 2.0 may reflect distortion in the measurement system and prompt close review.

Means and standard deviations of basic item statistics were very similar between forms and are displayed in Table 6. Means of discrimination values and point-biserial correlations are relatively small but expected given the criterion-referenced nature of the assessment. Over two-thirds of items on each form have values over 0.10. Many values below 0.10 are associated with items that have a high proportion of correct response.

Table 6. *DH OSCE Item Statistics by Test Form: Mean and Standard Deviation (SD), with Number of Items (NI) by Form; July 7, 2020, 172 Examination Attempts*

	Mean (SD)	
	Form A NI = 106	Form B NI = 106
Proportion Correct	0.81 (0.17)	0.81 (0.18)
Discrimination Index	0.14 (0.14)	0.15 (0.14)
Point-biserial Correlation	0.18 (0.13)	0.18 (0.13)

All Rasch model infit mean square fit statistics were within recommended ranges, with values ranging from 0.89 to 1.13 for Form A and from 0.89 to 1.16 for Form B. Most outfit mean square statistics were within recommended ranges, with six items (5.7%) exceeding a value of 1.20 on Form A (outfit values ranged from 0.38 to 1.61) and seven items (6.6%) exceeding a value of 1.20 on Form B including one over 2.00 (outfit values ranged from 0.31 to 2.05). The item with an outfit value of 2.05 had a very high proportion correct (i.e., 0.99).

Table 7 provides the mean number correct and standard deviation for scored items, by test form, for the six content areas. Performance by content area was similar across forms. Final scores are based on all items, however, candidates who are not successful receive a score report that is broken out by content area, with a caution to consider all content areas in their preparation for

retake, since the number of items within a category is much smaller and performance within a category is likely to vary more than overall score across subsequent examination attempts.

Table 7. *DH OSCE Content Areas by Test Form: Mean Number Correct and Standard Deviation (SD); July 7, 2020, 172 Attempts*

	Mean Number Correct (SD)	
	Form A	Form B
Medical History (14 Items)	11.75 (1.58)	11.61 (1.45)
Risk Assessment (13 Items)	10.81 (1.26)	11.94 (1.40)
Extraoral & Intraoral Examination (7 Items)	6.15 (0.85)	5.70 (1.06)
Periodontal Assessment (30 items)	23.86 (2.82)	22.76 (2.66)
Dental Hygiene Treatment & Care Plan (21 items)	16.84 (1.86)	17.98 (1.59)
Instrumentation (21 Items)	16.86 (2.05)	16.82 (1.96)

No significant difference in mean performance was found between test forms. Table 8 displays means, standard deviations, and results of one-way analyses of variance (*ANOVA*) conducted to assess comparability of Rasch ability parameter estimates, raw scores, and scale scores (i.e., reported scores) across test forms.

Table 8. *ANOVA Results for Ability Parameters, Raw Scores, and Scale Scores by DH OSCE Test Form: Means, Standard Deviations (SDs), 95% Confidence Intervals for Means, F-values, degrees of freedom (df), and p-values, July 7, 2020, 172 Attempts, Form A N = 85, Form B N = 87*

	Test Form	Mean (SD)	95% CI For Mean	F value df= (1,170)	p value <sup>b</sup>
Rasch Ability Parameter <sup>a</sup>	A	1.80 (0.51)	1.69; 1.91	2.89	0.09
	B	1.93 (0.53)	1.82; 2.04		
Raw score	A	86.27 (6.35)	84.90; 87.64	0.23	0.64
	B	85.80 (6.53)	84.41; 87.20		
Scale score	A	84.60 (5.00)	83.52; 85.68	0.27	0.61
	B	84.20 (5.27)	83.07; 85.32		

<sup>a</sup> In logit (log-odds) units

<sup>b</sup> Significance level  $\alpha = 0.05$



Summary statistics for raw scores, scale scores (i.e., reported scores), and Rasch ability parameter estimates, standard errors of measurement (SEMs), conditional standard errors of measurement at the passing score (CSEMs), indicators of reliability, indices of classification adequacy, and passing percentages by test form are presented in Table 9. Estimated values of Cronbach's alpha coefficient of internal-consistency reliability (Cronbach, 1951) depend upon sample variability and may be attenuated due to the high level of candidate preparedness in criterion-referenced credentialing assessment. Many candidates perform very well on several test items. While eliminating these items can increase the alpha estimate, they are included because subject matter experts have determined that the information assessed is essential to minimal competence. Similarly, adding additional items, especially more challenging items, can increase the estimate of alpha, but are not included since the purpose of the examination is to assess minimal competence, rather than discriminate among candidates with very high levels of knowledge and ability. Other indicators, such as Peng-Subkoviak  $P_{\theta}$  estimates of classification consistency (Peng & Subkoviak, 1980) and the Brennan-Kane  $\Phi(\lambda)$  index of dependability (Brennan & Kane, 1977), provide insight into the reliability of pass-fail outcomes.

Estimates of alpha are moderately high, with values of 0.68 and 0.70 for Form A and B, respectively. Dependability index values, which take item variance into account, are high, with values of 0.93 and 0.92, while classification consistency values are even higher, with values of 0.98 and 0.97, since mean scores are far above the passing score (i.e., raw score of 74), making misclassification less likely. Passing percentages per form are 96.5% and 95.4%. The overall passing percentage is 95.9%. A chi-square analysis was conducted to assess the comparability of pass/fail outcome by form. No significant difference in pass/fail outcome was found among forms, with a chi-square value of 0.13 and  $p_{exact} = 1.00$  ( $df=2$ ,  $N=172$ ,  $\alpha = 0.05$ ). The  $p$ -value reflects Fisher's exact test, since the number of unsuccessful candidates at this early point in the testing season is small and the chi square table has two cells with expected frequencies of less than five. The expected number of failures was 3.5 for both forms; the observed number failures was three (3) and four (4) for Forms A and B, respectively.

Table 9. Indicators of Overall Test Functioning by DH OSCE Test Form: July 7, 2020, 172 Attempts

	Form A	Form B
<i>N</i> Attempts	85	87
Raw Score (1 to 106)		
Mean ( <i>SD</i> )	86.27 (6.35)	85.80 (6.53)
Median	85	86
Minimum; Maximum	70; 98	66; 99
Scale Score (1 to 100)		
Mean ( <i>SD</i> )	84.6 (5.00)	84.2 (5.27)
Median	84	84
Minimum; Maximum	71; 94	67; 95
Rasch Ability Estimate <sup>a</sup>		
Mean ( <i>SD</i> )	1.80 (0.51)	1.93 (0.53)
Median	1.64	1.89
Minimum; Maximum	0.69; 2.95	0.60; 3.31
Standard Error of Measurement (SEM)	3.59	3.60
Conditional Standard Error of Meas. (CSEM)	4.26	4.24
$\alpha$ Reliability Estimate (Cronbach's alpha)	0.68	0.70
$\Phi(\lambda)$ Index of Dependability	0.93	0.92
$P_0$ Classification Consistency	0.98	0.97
Passing Percentage	96.5%	95.4%

<sup>a</sup> In logit (log-odds) units

Additional analyses are conducted routinely and ad hoc in addition to the analyses summarized in this report. For example, as the season progresses, analyses to confirm the consistency of electronic scoring procedures, evaluate candidate performance on examination retakes, and compute end of season passing percentages will be conducted. The committee will also be preparing replacement and additional test forms to ensure on-going security, in case COVID-19 related conditions continue and the need for an extension of the interim examination into the 2021 examination season is determined.

All indicators of test functioning and candidate performance reported here will be updated throughout the season for reporting to the DH OSCE examination committee, the Dental Hygiene

Examination Review Board and Board of Directors, as well as state licensing boards. Additional details and information regarding any aspect of development, administration, or psychometric and statistical analyses are available upon request.

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**Agenda Items (5)(c) and (5)(d)**

**ADEX:**

**Letter from President of ADEX  
- William G. Pappas, D.D.S.**



**AMERICAN BOARD OF DENTAL EXAMINERS, INC.**

**William Pappas, D.D.S., President**  
**Jeffery Hartsog, D.M.D., Vice-President**  
**Conrad McVea, III, D.D.S., Secretary**  
**Renee McCoy-Collins, D.D.S., Treasurer**  
**Bruce Barrette, D.D.S., Past President**

April 29, 2020

Nevada State Board of Dental Examiners  
D Kevin Moore, DDS, President  
6010 S Rainbow, Blvd, Suite A-1  
Las Vegas, NV 89118

Dear President Moore:

On April 2, 2020, the ADEX Dental Examination Committee evaluated the results of a mode effects study evaluating the CompeDont™ tooth as a potential restorative simulated examination platform. The research design of the mode effects study was developed in collaboration with independent psychometricians, and six dental schools throughout the United States. A mode effects study is the appropriate required methodology when proposing an alternate examination process. The tooth has been in development for over three years, and the attached report contains the results of that study. This project was not undertaken in response to the COVID-19 pandemic and was scheduled to be reported to the ADEX member dental boards this August, but since the results have been finalized, they are being provided to you. As a result of the study outcomes, representatives from 30 ADEX member dental boards voted 29-1 to allow the restorative procedures in the ADEX Dental Examination process to be completed on either a live patient or the CompeDont™ tooth.

As part of this process all of the other available typodont teeth, both with and without caries, were evaluated and found to be an inadequate examination simulation. Unlike the CompeDont™ tooth, which has enamel of the same hardness and character of a natural tooth, caries which are variable, transitioning from infected dentin to affected to dentin to sclerotic dentin, and propagates along the DEJ as in a natural tooth, the other available typodont teeth were the same or similar to teeth used in D1 and D2 preclinical training and do not simulate a natural tooth. The CompeDont™ tooth allows administration of the ADEX examination, and all restorative criteria evaluated, just as with the patient.

We know many of our member dental boards are being petitioned to alter examination standards and content. In addition, graduation requirements may be reinterpreted and adjusted which might allow reduced clinical training. ADEX understands that the psychomotor performance examinations become even more important in this environment. ADEX would not consider an off-the-shelf solution which would not offer an examination that would identify the competency issues that are currently tested, or merely reproduce an exercise used in pre-clinical training in dental school. We are pleased to be able to offer for consideration a valid non-patient alternative for those dental boards that would want such an alternative. There would be no PPE requirements, no infectious aerosol, but all of the grading criteria, including preparation modification evaluation, remain in place. The CompeDont™ will provide a challenge in both preparation and restoration for the Class II and the Class III, and are available only to the ADEX testing agencies, the Commission on Dental Competency Assessments (CDCA) and the Council of Interstate Testing Agencies (CITA).

For the Dental Periodontal Scaling Exercise and the Dental Hygiene Clinical Examination (including periodontal probing, calculus detection and calculus removal), the psychometric analysis for a feasibility study will be presented to the ADEX Board of Directors for evaluation and possible adoption of manikin examinations to serve those needs at a properly noticed meeting on May 15, 2020. ADEX will provide you with the analysis and the results of that meeting as soon as possible after that meeting.



If you choose to utilize the CompeDont™ for these challenging times or you would like to move to a patient free examination, the ADEX examination offers the most widely accepted, independent examination for the dental profession. Please contact the ADEX office or our testing agencies, CDCA and CITA, for more information on how to bring the CompeDont™ to your state.

Very Truly Yours,

A handwritten signature in black ink, appearing to read "William G. Pappas". The signature is fluid and cursive, with a long horizontal stroke at the end.

William G. Pappas, D.D.S.  
President, ADEX

Attachment

WGP/kk

**Agenda Item (5)(c):**

**ADEX:**

**Use of Typodont in Dental  
Hygiene and Dental  
Periodontal Scaling**

## ADEX™ Approves Use of Typodont In Dental Hygiene and Dental Periodontal Scaling Clinical Licensure Examinations

2020 ADEX™ Press Release

For Release: May 18, 2020

Email Inquiries: [office@adexexams.org](mailto:office@adexexams.org)

**LAS VEGAS, NEVADA** — The American Board of Dental Examiners, ADEX™, has approved the use and offering of a selected typodont as an option in the dental hygiene licensure examination and the dental periodontal scaling challenge. The typodont selected will be used in calculus detection, calculus removal, and periodontal probing exercises for the ADEX Dental Hygiene Patient Treatment Clinical Examination after completing a feasibility study under the supervision of ACS Ventures, LLC. This will offer dental hygiene licensure boards/agencies the choice to accept this non-patient professional proficiency demonstration or continue to accept the patient required participation for dental hygiene.

Further, the feasibility study included analysis of periodontal scaling proficiency utilizing the selected typodont and was accepted by the ADEX Board of Directors to be offered as an option for the periodontal scaling exercise part of the ADEX Dental Licensure Clinical Examination. This too would give licensure boards, that intend to accept a non-patient clinical assessment of candidates for licensure, an option for such acceptance of demonstrated proficiency.

“While facing circumstances as a result of the COVID-19 crisis, ADEX has endeavored to critically and psychometrically provide licensing jurisdictions options given the current conditions in delivery of dental education, dental treatment, and independent dental skills evaluation. With the previous addition of the CompeDont™ to the ADEX™ dental testing repertoire, licensure boards and agencies have additional non-patient assessment modalities upon which to aid in licensure evaluation during these unprecedented times. These hands-on skill assessments are joined by our computerized Objective Clinical Simulated Examination (OSCE) in both dentistry and dental hygiene, the longest running, continually maintained OSCE in the dental profession in North America,” said ADEX President William G. Pappas, D.D.S. “ADEX™ has taken additional steps in dental hygiene by approving and offering both patient and non-patient demonstration options, if desired by licensing boards, to meet the current unique obstacles presented by the COVID-19 crisis,” added Beth Jacko-Clemence, R.D.H, and Chair of the ADEX Dental Hygiene Examination Committee. This committee utilized practicing licensed hygienists, hygiene educators, and hygiene students to conduct the feasibility study prior to acceptance and adoption of the use of this particular typodont for examination purposes.

The offering of the typodont based dental hygiene examination and typodont based dental periodontal scaling exercise will commence this summer in the examination series currently scheduled to resume by both The Commission on Dental Competency Assessments (CDCA) and the Council of Interstate Testing Agencies (CITA). As always, it will be at the discretion of state licensing boards/agencies whether to accept these additional offerings in testing modality.

For any questions about the ADEX™ examination please contact: ADEX™ at [office@adexexams.org](mailto:office@adexexams.org) For questions about the administration of ADEX examinations, please contact The Commission on Dental Competency Assessments at: [www.cdcaexams.org](http://www.cdcaexams.org) or the Council of Interstate Testing Agencies at [www.citaexam.com](http://www.citaexam.com)



## **CDCA Typodont Evaluation Report for the ADEX Dental Hygiene Examination**

May 29, 2020

**Prepared by:**

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## Introduction

In April 2020, the Commission on Dental Competency Assessments (CDCA) conducted a product evaluation of a simulated patient (i.e., typodont). The evaluation was designed to determine the suitability of the typodont for use in a clinical skills (i.e., psychomotor skills) assessment for dental hygiene candidates. The results of the evaluation include the summary judgements of 30 subject matter experts (SMEs) who were each provided a typodont and a web based survey for data collection on their experience and perceptions. The CDCA identified ACS Ventures, LLC (ACS) to assist with the design of the product evaluation study and then independently analyze the results. This report summarizes the methodology, results, and conclusions of the study.

## Study Method

To determine the feasibility of using a typodont in the assessment of prospective dental hygienists, multiple sources of validity evidence were collected and analyzed. This evidence consisted of a review of the content and response processes, reliability, and fairness. Content and responses processes were specifically aimed at the degree to which the typodont represents actual practice and the degree to which tasks and scoring criteria remain consistent between modes. It is both pragmatic and a matter of industry expectations (AERA, APA, & NCME 2014) to evaluate the effect of adding or transitioning to a new administration mode. The use of a typodont in the assessment represents a potential, additional mode option if jurisdictions are not able to administer the current examination.

The pursuit of the validity evidence is in service to two evaluation questions: Does the proposed mode result in technical characteristics that are comparable to the current mode? Does the proposed mode yield comparable evidence to support conclusions about entry level competency?

The study consisted of 30 SMEs who served as field test participants. They completed periodontal probing before and after treatment (i.e., instrumentation), calculus detection, and calculus removal skills on the typodont. These field testers included students, dental hygiene faculty, and practitioners.

## Quantitative Data Analyses and Summary

The quantitative data collected were with respect to the amount of agreement among SMEs regarding the pocket depth determined both pre- and post-treatment, and the presence and size of calculus deposits prior to scaling. These data were evaluated for the percent of interrater agreement on each of these skills and were observed to be relatively high (from 82% to 95%). This source of reliability informs readers as to the consistency of the SME judgements for each skill evaluated in this study. In addition, historical reliability data regarding probing, detection, and removal were used to check the reasonableness of the new findings. These data are presented in the following table.

**Table 1 – Periodontal probing, calculus detection, and calculus removal agreement results**

	Field Test	2018	2016
Perio probing – Pre-treatment (+/- 1 mm)	93%	96%	95%
Perio probing – Post-treatment (+/- 1 mm)	95%	N/A	N/A
Calculus detection – Presence and absence (S/M/L)	82%	85%-91%	86%-90%
Calculus detection – Presence and absence (M/L only)	85%	N/A	N/A
Calculus detection – Presence and absence (L only)	92%	N/A	N/A
Calculus removal	92%	91%	N/A



As shown in the table, the calculus detection analysis was performed for different combinations of deposit sizes. Small, medium, and large deposits are represented by the letters S, M, and L, respectively. The least amount of agreement was found in the calculus detection activity when all three sizes of deposits were included in the rate. This rate represents a relatively high rate of agreement and is within 4% of the historical rates of comparison. When deposits were limited to just the medium and large, or just large, the level of agreement increases. Additional discussion of deposit size is included in the next section of this report.

The periodontal probing analysis was performed as a strict interrater agreement rate using the most prevalent examiner rating (i.e., mode) as the reference criterion. For this analysis, SMEs were determined to have agreed when they agreed with each other to a tolerance of plus or minus one millimeter. This metric was chosen as an alternative to a measure of agreement with the intended pocket depth suggested by the typodont manufacturer given. In approaching the analysis in this way, we were able to replicate the current practice on the patient-based examination.

## Qualitative Data Analysis and Summary

Field testers were also asked to complete a qualitative survey regarding their experience with and perceptions of the typodont. This survey consisted of three question types: dichotomous questions for which a yes or no choice must be made; a 5-response option Likert rating from strongly disagree to strongly agree; and open ended comment questions, some of which were prompted by a “No” response from questions of the first type.

The survey aimed to collect data in six categories: Calculus Detection; Calculus Removal; Tissue; Periodontal Probing; Typodont Teeth; Ultrasonic Usage. The data were analyzed by category, response type, and SME type (non-student and student). The yes or no questions were with respect to the operational aspects of the typodont and were generally answered favorably across all categories. The Likert items were designed to measure the degree to which the SMEs believed the experience was realistic. The most prevalent responses to these survey questions were “Agree” and “Not ideal, but sufficient.” Finally, the open-ended comments were coded and counted. The recurrent comments were split between favorable and unfavorable across categories expressing a neutral disposition toward the typodont.

The following highlights the qualitative survey results:

### Calculus Detection

- Realistic feel of calculus deposits? – Yes (73%), No (27%)
- Realistic placement? – Yes (87%), No (13%)
- Detection similar to that of a patient? Agree (30%), Sufficient (37%), Disagree (33%)
- Respondent Comments:
  - Calculus is too smooth
  - Stiffness of the tissue limited accuracy
  - Calculus deposits difficult to detect
  - Burnished/small deposits were difficult to detect

### Calculus Removal

- Deposits come off in layers? – Yes (80%), No (20%)
- Realistic using hand instruments? – Yes (77%), No (23%)



- Removal similar to that of a patient? Agree (57%), Sufficient (23%), Disagree (20%)
- Respondent Comments:
  - Tooth material came off with hand scaling
  - Calculus behaved realistically
  - Teeth became loose/fell out
  - Teeth were soft

#### Tissue

- Did the sulcus remain intact after scaling? – Yes (90%), No (10%)
- Could you damage the tissue while hand scaling? – Yes (60%), No (40%)
- Tissue simulates the gingiva found with a patient? Agree (33%), Sufficient (33%), Disagree (33%)
- Respondent Comments:
  - Impressed with tissue
  - Tough/rubbery tissue
  - Not realistic
  - Realistic tissue

#### Periodontal Probing

- Distinguish between enamel and cementum? – Yes (53%), No (47%)
- Mobility during scaling? – Yes (37%), No (63%)
- Teeth similar to that of a patient? Agree (37%), Sufficient (27%), Disagree (36%)
- Respondent Comments:
  - Tooth/teeth came out
  - Teeth are soft
  - Teeth did not move when scaled
  - Did not have gloss or sheen as expected

#### Typodont Teeth

- Distinguish between enamel and cementum? – Yes (53%), No (47%)
- Mobility during scaling? – Yes (37%), No (63%)
- Teeth similar to that of a patient? Agree (37%), Sufficient (27%), Disagree (36%)
- Respondent Comments:
  - Tooth/teeth came out
  - Teeth are soft
  - Teeth did not move when scaled
  - Did not have gloss or sheen as expected

#### Ultrasonic Usage

- Eleven SMEs in the study an ultrasonic scaler.
- Was there any negative effect on the tissue with the ultrasonic? Yes (0%), No (100%)
- Was there any damage to the tooth surface by the ultrasonic? Yes (36%), No (64%)
- Calculus removal experience was similar to a patient? Agree (55%), Sufficient (37%), Disagree (9%)
- Respondent Comments:
  - Teeth are soft
  - Realistic



## Conclusions

Regarding the technical characteristics of the current mode, examiner agreement for probing, calculus detection, and calculus removal was comparable with historical rates. Regarding the degree to which the mode yields comparable evidence to support conclusions about entry level competency, the study found that small and some medium deposits were more difficult to detect and may not represent entry-level skills.

The qualitative data indicated that, with some caveats noted in ratings and comments, the typodont was realistic. Field tester responses to the survey questions were a mixture of favorable and unfavorable ratings which were significantly skewed towards favorability. Therefore, the collection of evidence supports use of this typodont in ADEX examination exercises for jurisdictions that may want to offer both a psychomotor performance examination and a fully non-patient licensure pathway. Notwithstanding this conclusion, the data also suggests that a patient-based demonstration of clinical skills remains a superior comparative option.

## References

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## **CDCA High Fidelity Restorative Simulation Mode Effects Study**

April 20, 2020

**Prepared by:**  
Susan Davis-Becker, Ph.D. &  
Chad W. Buckendahl, Ph.D.

## Introduction

In 2019, the CDCA began data collection for a study to evaluate a new type of simulated tooth – the CompeDont™ DTX High Fidelity tooth – as a possible alternative for the demonstration of skills in the ADEX dental licensure examination. Although development of the tooth had been occurring for a few years prior, this was the first larger scale effort to review the performance in a testing setting. The CDCA identified ACS Ventures, LLC (ACS) to evaluate the fidelity of this tooth through a mode effects study where use of this CompeDont™ tooth in an examination setting was compared to traditional examination results. A mode effects study is designed to evaluate examinees' performance on knowledge, skills, or abilities that are administered in more than one format or mode. Common types of mode effects studies are ones that compare a testing program that is administering a test using paper-pencil and computer-based formats. For a clinical skills demonstration, the administration modes being compared in this study are a simulated tooth in a typodont versus a natural tooth in a patient. Specifically, this evaluation compared candidate performance, types of errors, and rater agreement. This report summarizes the results of this study.

## Data and Analyses

In Fall 2019, the CDCA partnered with six dental schools to conduct pilot administrations of the Anterior Restoration procedure (inclusive of preparation and restoration) of the ADEX examination using the CompeDont™ tooth. In total, 548 examinees completed the Anterior Restoration. Examinees represented a diverse group of students from schools selected from multiple geographic regions. In addition, 238 of these examinees (43%) also completed the Posterior Restoration part of the ADEX examination on a patient (i.e., standard administration conditions) as a point of comparison. Across the six administration sites, 66 trained and calibrated examiners participated in the study by evaluating the performance on CompeDont™ and/or natural teeth.

## Posterior Restoration

Because this was a pilot exam set up for the mode effects study, the first focus of the analysis was on the Posterior Restoration tasks that 43% of the examinees completed using a patient as they would in the current operational examination. The purpose of including this element in the study was to determine how performance in the pilot exam compared to an operational exam environment. Specifically, the results from this administration allow for a direct comparison to the results from the 2019 and 2018 operational examination results (e.g., pass rate, types of errors). The results (see Table 1) indicate the pass rate for the pilot exam was slightly lower than the 2019 examinations (5% lower) and the 2018 examinations (3% lower). This observation may be due to variation in the sample of examinees relative to the population. In addition, this may also be somewhat influenced by the timing of the study occurring a few months earlier in the training program than when candidates generally take the examination.

Looking closer at the performance of examinees, the most frequent errors were identified from each administration mode. For the preparation part of the task, the same three errors (Caries, Gingival Contact, Adjacent Tooth Damage) were the most frequent for both the pilot exam and the operational examinations. For the restoration part of the task, there were two consistently frequent errors – interproximal contact and margin excess. Finally, the rater agreement (i.e., how often ratings were confirmed) was consistently high between the operational administrations and the mock exam. This collection of evidence suggests that examinees performed similarly in this pilot exam as they would on an operational examination with a slightly lower pass rate. Therefore, even though the new CompeDont™ tooth was tested in a pilot exam (not an operational one), the results are likely to be comparable to those from an operational exam.

**Table 1. Comparison of Posterior Restoration Results – Pilot Exam vs. 2018/2019 Operational Exams**

	Mock Exam	2019 Operational Exam	2018 Operational Exam
Pass Rate	90%	95%	93%
Most Frequent Errors – Preparation	Caries Gingival contact Adjacent tooth damage	Caries Gingival contact Adjacent tooth damage	Caries Gingival contact Adjacent tooth damage
Most Frequent Errors – Restoration	Interproximal Contact- open/irregular Margin Excess Centric/Excursive Contacts	Interproximal Contact – open irregular Margin Excess Margin Deficiency	Interproximal Contact – open/irregular & closed Margin Excess Margin Deficiency
Rater Agreement	98%	98%	98%

**Anterior Restoration**

All Anterior Restorations were performed on the CompeDont™ tooth and, given the comparability of the pilot exam results for the Posterior Restoration, the results of this administration were compared to those from the 2018 and 2019 operational administration (see Table 2). The pass rate for the CompeDont™ tooth was meaningfully lower than the 2019 and 2018 examinations (15% and 14% lower, respectively). When examining performance on the preparation task, two types of errors (Caries Remaining and Outline Extension) were the most common for both the CompeDont™ tooth and operational administrations. For the restoration task, the same three errors were common between modes: Margin Excess, Interproximal Contact, and Margin Deficiency. Finally, the rater agreement was consistently high between the operational administrations with the patient and the pilot exam with the CompeDont™ tooth. This collection of evidence suggests that the CompeDont™ tooth was a similar, but more challenging, task for the examinees. Additional analysis to understand the differences in pass rates is described in the next sections of this report.

**Table 2. Comparison of Anterior Restoration Results – CompeDont™ Tooth Pilot Exam vs. 2018/2019 Operational Exams**

	CompeDont™ Tooth – Pilot Exam	2019 Operational Exam	2018 Operational Exam
Pass Rate	80%	95%	94%
Most common Errors – Preparation	Caries Remaining Outline Extension Axial Walls	Caries Remaining Unrecognized Exposure Outline Extension	Caries Remaining Gingival contact Adjacent tooth damage Outline extension
Most common errors – Restoration	Margin Excess Interproximal contact – open/irregular Margin Deficiency	Interproximal Contact – open/irregular Margin Excess Margin Deficiency	Interproximal contact – open/irregular Margin Excess Margin Deficiency
Rater Agreement	97%	98%	98%

To better understand the differences observed in the pass rates, the results from the CompeDont™ tooth were further explored to determine why 20% of the examinees in the sample failed the Anterior Restoration task. Table 3 shows the specific frequency by which the most common errors were observed for the preparation and restoration tasks between the CompeDont™ tooth-mock exams and the 2018 operational exam. The most notable difference is in the frequency by which a Caries Remaining error was

observed in the preparation task – 15% with the CompeDont™ tooth compared to less than 1% in the 2018 operational exam. To ensure this was not an artifact of the pilot exam situation, the frequency of Caries Remaining was evaluated for the Posterior Restoration. The 2018 operational administration resulted in 1% of examinees having a Caries Remaining error while the pilot exam showed 2.5% having a Caries Remaining error. Therefore, the difference observed in Table 3 is not an artifact of the study but rather likely due to intended design characteristics of the tooth that are further discussed next.

**Table 3. Comparison of Error Frequency – CompeDont™ Tooth Pilot Exam vs. 2018 Operational Exam**

	CompeDont™ Tooth – Pilot Exam	2018 Operational Exam
<b>Preparation</b>		
Caries	15%	<1%
3 Sub Rule: Outline Extension, Gingival Clearance, Axial Walls	7%	<1%
<b>Restoration</b>		
Margin Excess	2%	<1%
Interproximal Contact	1%	<1%

An important design feature of the CompeDont™ tooth is that carious lesions are presented in a way that is more representative of how caries are observed and treated in practice within a typical patient population. Specifically, the CompeDont™ tooth was designed to have varying degrees of average or moderate levels of caries present. This design characteristic requires candidates to exercise their clinical judgment in addition to their psychomotor skills. As a result, it was expected that virtually all CompeDont™ teeth would require modification from an ideal preparation to perform the procedure because of where the caries would be observed. This is different from the current examination where candidates bring their own patients and that a much smaller percentage of these require modifications.

During the examination, candidate requests for modification from an ideal preparation are handled procedurally through a review and approval process. As part of this study, candidate performance was further evaluated based on whether they requested a modification in the pilot exam and these results were compared to the 2018 operational exam. As shown in Table 4, there were many more modifications with the CompeDont™ tooth as compared to the operational exam (74% compared to 31%). As noted above, because the goal with the simulated tooth was to be more representative of job-related practice, this was expected. In fact, an even higher percentage of modifications for the CompeDont™ tooth were expected as compared with the current examination data. In the 2018 results, the pass rates between those who had a modification and those who did not are very similar (94% and 96%). However, the pass rates for the CompeDont™ tooth were much higher for those who had a modification compared to those who did not (83% compared to 73%).

**Table 4. Comparison of Exam Results by Modification (Yes/No) – CompeDont™ Tooth Pilot Exam vs. 2018 Operational Exam**

	CompeDont™ Tooth – Pilot Exam	2018 Operational Exam
<b>Modifications (any approved)</b>		
Count (%)	408 (74%)	1018 (31%)
Pass Rate	83%	94%
<b>No Modifications</b>		
Count (%)	140 (26%)	2264 (69%)
Pass Rate	73%	96%

A follow up question to this finding was whether the pass rate differentiation for the CompeDont™ tooth was due to examinees not knowing when to request a modification (when one was needed) or requesting the wrong modification. The results in Table 5 include the pass rate by whether examinees had any modifications approved and/or denied. The results show that most examinees either had all their modification requests approved (group 1) or did not request any modifications (group 4). The other two smaller groups were those that had at least one modification request denied (and at least one accepted – group 2, or none accepted – group 3). These results indicate that the highest pass rate was observed for those examinees who had one or more modification requests accepted (i.e., they understood what to request and when to request). In addition, 26% of examinees did not request a modification with their pass rate being notably lower (73%).

**Table 5. Comparison of Exam Results by Modification Request Status**

Modification Status	Count	Pass Rate
1. One or more approved (no denials)	325 (59%)	85%
2. One or more accepted & one or more denial	52 (9%)	77%
3. One or more requested – all denied	31 (6%)	71%
4. No modifications requested	140 (26%)	73%
<b>Total</b>	<b>548</b>	<b>80%</b>

## Results and Conclusions

The purpose of this mode effects study was to evaluate the feasibility of the CompeDont™ tooth as a possible alternative to a patient for the ADEX Dental restoration examinations. Data were collected from pilot examinations administered to over 500 dental students from six different schools evaluated by over 60 examiners. The results of this analysis suggest the feasibility of the simulated tooth administered in a typodont as comparable to the operational examination based on the comparison of the Posterior Restoration results from previous administration results. Focusing on the Anterior Restoration, the results indicate that use of the CompeDont™ tooth was sensitive to identify the same critical deficiencies identified in the patient-based examinations. An additional feature of the use of the CompeDont™ tooth is that the normal variation observed in practice by dentists can be modeled to further evaluate candidates' clinical judgment in addition to their psychomotor skills.

Although limitations of the simulation include a lack of some of the patient-based characteristics (e.g., saliva, tongue, patient anxiety), the benefit of additional standardization of the environment for candidates and better representation of job-related characteristics of the tooth may outweigh these limitations. The lower pass rate observed during the pilot examination for the simulated tooth suggests that its use does not offer an easier pathway to licensure and may currently be more challenging. The question is whether it is a fair approach to measuring the clinical judgment and psychomotor skills needed for restoration procedures. The difference in pass rates may be explained in part by the timing of the pilot exam (e.g., examinees taking the exam at an earlier date than normal). However, most of the difference can be attributable to the lack of recognition of caries and a need to modify a preparation from the ideal when it is warranted. Evidence of high examiner reliability provides a source of support. When compared with the current examination where candidates select a patient on which to perform the procedure with rates of modification being relatively low, the CompeDont™ tooth may be a better representation of the job-related environment to measure the important clinical judgments and skills that candidates will need to demonstrate in practice.

**Agenda Item (5)(c)**

**ADEX:**

**Non-Patient Clinical  
Examination Option for  
Dental Hygiene**



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## **ADEX Approves Non-Patient Clinical Examination Option for Dental Hygiene**

For immediate release, May 21, 2020 | Linthicum Heights, MD

Direct inquiries to [sheeler@cdcaexams.org](mailto:sheeler@cdcaexams.org)

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### **Exam Provides Psychomotor Performance Evaluation**

The Commission on Dental Competency Assessments (CDCA) will soon be able to offer dental hygiene licensure candidates a new option to demonstrate readiness for practice. The American Board of Dental Examiners (ADEX) approved the use of a typodont for clinical examinations last week after reviewing an analysis and feasibility study. Read the ADEX announcement [here](#).

The ADEX Dental Hygiene Committee approved the manikin-based option for use in the Patient Clinical Treatment Exam (PTCE) is a response to the COVID-19 crisis should states wish to require a psychomotor demonstration of skills in the absence of patients. The ADEX Examination for Dental Hygiene licensure is made up of two parts, the PTCE and the Computer Simulated Clinical Examination OSCE (CSCE OSCE). Examinations using the approved typodont will be available in early July through CDCA.

Earlier this spring the ADEX Dental Examination Committee approved use of the CompeDont™, a psychometrically validated simulated tooth, for use in the Restorative Examination for dentistry.

At least 11 states already permit the use of a manikin for dental hygiene examinations and/or accept the CSCE OSCE only for licensure. States seeking support in making these decisions are encouraged to contact the CDCA as representatives will be made available to participate in conference calls and meetings. The typodont is also approved for use in Periodontal Scaling assessments for dental licensure candidates.

**Agenda Item (5)(d)**

**ADEX:**

**Restorative Exam -  
CompeDont vs. Patient Based**





## **Restorative Examination Performance: *CompeDont*<sup>™</sup> vs. Patient Based**

2020 Patient Based Restorative Candidates (n=2600+)

- Anterior Restorative = **94%** Pass Rate
- Posterior Restorative = **94%** Pass Rate
- Average = **94%** Pass Rate

2020 *CompeDont*<sup>™</sup> Restorative Candidates n=880)

- Anterior Restorative = **95%** Pass Rate
- Posterior Restorative = **93%** Pass Rate
- Average = **94%** Pass Rate

\*Data Courtesy of CDCA

**Agenda Item (5)(e)**

**WREB:**

**Interim Clinical Dental Exam**

## **WREB Dental and Dental Hygiene Licensing Examination COVID-19 Options for 2020**

WREB is an independent testing agency that develops, administers, and reports the outcome of practical clinical examinations administered to candidates for licensing in dentistry and dental hygiene. While aware of the needs of students and dental education programs, WREB's sole purpose is to provide state boards with examinations that have high reliability and are supported by a strong validity argument—examinations state boards can rely on to inform licensing decisions. For this reason, WREB is highly responsive to the needs and wishes of state boards that recognize its examinations.

- WREB Dental Examination options are described below (pp. 1-4).
- WREB Dental Hygiene Examination options are described on pp. 5-6.

### **WREB Dental Licensing Examination COVID-19 Options for 2020**

Following are options state boards could consider in response to COVID-19:

#### Dental Examination without Change

WREB's standard dental examination which includes two simulations (Endodontics and Prosthodontics) and two patient-based sections (Operative Dentistry and Periodontics) in addition to the Comprehensive Treatment Planning (CTP) section will continue to be offered as soon as test sites again are able to schedule this type of examination. This option may not address the needs of state boards attempting to respond to the concerns of dental candidates and schools who wish to complete the licensure process within the next several months. Even when re-established, examination administration may be subject to interim restrictions. States that specifically require two patient-based restorative procedures and wish to reduce the burden on licensure candidates imposed by COVID-19 could safely accept WREB's Operative Section as it is scored and validated, which has demonstrated that candidate competency can be reliably assessed with more than 40% fewer patient-based procedures.<sup>i</sup>

#### CTP Only

WREB's CTP (Comprehensive Treatment Planning) Section<sup>ii</sup> is an ASCE (Authentic Simulated Clinical Examination) which requires the candidate to construct responses (as opposed to an OSCE in which the candidate selects responses from options, locations, or choices provided). The CTP ASCE is open-ended and graded by independent, anonymous examiners. It reveals candidate thinking and requires candidates to perform tasks that dentists perform and to make decisions that dentists make, all without choices they can select or cues of any kind. If acceptance of only an OSCE examination is being considered, then acceptance of WREB's CTP ASCE which is an even more authentic demonstration of relevant candidate knowledge, skill, and ability, should be considered.

### COVID-19 Alternative Performance-based Simulation

Patient-based assessment has high fidelity. WREB is not abandoning patient-based assessment but continues to evaluate the validity and viability of assessment alternatives, including simulation. WREB has been developing simulations that soon may be able to replace patient-based assessment for Operative Dentistry and Periodontics, the last two patient-based sections of its current dental examination. These simulations are in development and undergoing review.

In the meantime, the advent of COVID-19 has placed students and their education programs in a difficult and frustrating position. Students need to graduate, move on, obtain employment, or begin their advanced dental education residencies; their education programs need them to graduate and move on in order accept a new entering class and appropriately advance the classes below them. COVID-19 associated risk and social distancing currently completely obstruct student ability to challenge the traditional, patient-based examination. While WREB understands that COVID-19 is creating a crisis for students, for dental education programs, and even for the profession, its singular purpose is to support the needs of state boards in their regulatory role and charge to protect the public.

Students and program directors recently have appealed to state boards and, not knowing exactly how long COVID-19 risk and need for social distancing might continue, state boards in a few states now have appealed to WREB for potential solutions they might consider along with suggestions they've received that include waiving clinical examination requirements altogether, waiving the patient-based sections of the clinical examination, granting a provisional license until the applicant is able to complete the full examination, acceptance of the DLOSCE in lieu of a practical demonstration of clinical skills, and variations of these.

In response and in addition, WREB has field-tested an alternative, performance-based simulation that could be required in lieu of its traditional patient-based Operative Section. This alternative included the field-testing of social distancing for both candidates and examiners.

In the simulation, each candidate is required to successfully perform both preparation and finish of a conventional Class II restoration on a molar and a Class III restoration on a central incisor. All procedures are performed, like they are for the Endodontics and Prosthodontics sections, in full simulation and with rubber-dam isolation. Results are assessed using established Operative Section criteria. Certain critical errors are preserved, and the passing cut-point remains unchanged. The simulation involves social distancing for both candidates and examiners and uses materials (simulation teeth and arches) which are readily available and with which candidates and their programs already are familiar.

This alternative for the Operative Section is intended to be a provisional solution for 2020 (COVID-19) only and is intended neither to replace WREB's patient-based Operative Section in 2020 for states that continue to require it nor to be the simulation WREB intends to offer in the future

when social distancing is not a concern and the validity of a more realistic and involved simulation can be demonstrated.

The second patient-based section of the current WREB dental examination is the Periodontics Section. This section assesses a candidate's understanding of periodontal diagnosis and ability to physically perform initial periodontal therapy (periodontal scaling and root-planing). However, this section already is elective, is not required for licensing in some states, and tests a physical skill that, increasingly, dentists do not themselves perform.<sup>iii</sup> The Periodontics Section, while valued by many states, is, by far, the least discriminating section of the entire examination.<sup>iv</sup> Also, important aspects of periodontal diagnosis and treatment decision-making (things dentists do and are expected to know how to do) already are well covered in the unique CTP Section of WREB's dental examination. State boards may decide to waive or postpone the patient-based Periodontics section until such time as it again may become available to applicants.

These are dental examination options that WREB currently is making available for state board consideration in this highly unusual year. It is assumed that any waiver or exception a state grants due to COVID-19 might be restricted to matriculated students of CODA accredited dental education programs graduating in the spring of 2020 and would not necessarily set a precedent for future years or apply to any other group of applicants. WREB recognizes that all these and related decisions reside with the state and depend on the Board or on the Board's advice to the state authority empowered to grant a variance due to current, emergent COVID-19 circumstances.

Logistic detail regarding the implementation of WREB's dental examination or any of the described alternatives depends on the capacity, limitations, and COVID-19 restrictions imposed by or on any host site where an examination is conducted.

WREB's standard dental examination which includes the fidelity associated with two simulations (Endodontics and Prosthodontics) and two patient-based sections (Operative Dentistry and Periodontics) in addition to CTP will continue to be offered as soon as test sites again are able to host this type of examination.

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<sup>i</sup>Fewer patient-based procedures were required to determine 4,457 candidate pass/fail outcomes for the Operative Section in 2018 (42.0% fewer) and 2019 (41.1% fewer). No significant difference was found between first and second procedure performance for candidates who scored at or above the cut-score on the first procedure. The second procedure added no significant contribution to the assessment of these candidates. Only four of these candidates failed the section despite demonstrating competence on the first procedure; all four scored close to the cut-score and three have already passed upon retake.

<sup>ii</sup>The CTP Section is the most comprehensive section of the WREB Dental Examination. It tests candidate knowledge, skills and abilities that cannot be readily sampled in other ways and includes assessment of meaningful aspects of every other section of the Examination. The CTP Section is designed to integrate the disciplines of dentistry in a practical, clinical way. The construction of appropriately sequenced treatment plans and item responses requires broad understanding of diagnostic, preventive and restorative dentistry, of endodontics, periodontics, and prosthodontics, as well as oral surgical, radiological, pediatric dentistry, and patient-management procedures, and understanding of the relationships between these procedures and their clinical application under various patient conditions.

The CTP Section is open-ended; it's an authentic simulated clinical examination (ASCE)—a practical, performance-based examination. It requires candidates to construct their responses unaided by cues, choices, or locations they can select. In many instances it requires candidates to perform the very tasks dentists perform and, for this reason, has extraordinary fidelity for a computer-based examination. Rigorous examiner training and calibration contributes to high outcome reliability for the CTP examination. And the large reservoir of examination cases, frequent case modification, and the permutation of cases in the forms used every year significantly enhance test security for the CTP examination. All combine to create a strong validity argument for using results of WREB's CTP examination to inform licensing decisions.

<sup>iii</sup> In 2013 74.6% of general practitioners in solo practice employed one or more dental hygienists. For general practitioners in nonsolo practice (including various forms of group practice, "corporate" practice, etc.) 92.2% work in situations where dental hygienists perform scaling and root-planing services. -ADA, Science and Research – Health Policy Institute, Data Center, Dental Practice.

Authors Thomas Wall, M.A., M.B.A.; Albert H. Guay, D.M.D. in their article *Very Large Dental Practices Seeing Significant Growth in Market Share*. Health Policy Institute – Research Brief. August 2015. Point out that:

- From 2002 to 2012, market share increased for dental firms with 20 employees or more, while dental firms with fewer than five employees experienced a decline in market share.
- During the same period, very large dental firms – those with 500 employees or more – also saw increases in number of establishments, number of employees and annual receipts.

The national 2018 Dental Practice Analysis conducted jointly by WREB and CRDTS suggests that dentists, themselves, now are performing very few scaling and root-planing procedures compared to dental hygienists. The 2017 Dental Hygiene Practice Analysis survey specifically asked how often certain procedures were performed by the dentist and 84.6% of respondents said the dentist performed these tasks Rarely or Never.

The average of all general dentists employing dental hygienists in 2013 was 77.2%. From 1990 to 2013 the average number of dental hygienists per dentist in the primary practice (among dentists employing dental hygienists) steadily increased. This trend has been continuing. More and more dentists are having dental hygienists perform basic periodontal services and are using more dental hygienists per capita to do this. Dentists, themselves, are doing fewer and fewer of these tasks. Assessing these skills for dentists, now, may not be supported by the practice (task) analyses that underpin the design of a valid dental licensing examination.

<sup>iv</sup> Evidence in favor of non-requirement includes exceptionally high proportions of candidates performing extremely well on the Periodontics section. Most of the candidates who do fail the Periodontics section multiple times have also failed at least one other section multiple times. Only four (4) out of almost 13,000 (i.e., 0.03%) candidates from 2011 to 2016 remained unsuccessful due to Periodontics Section failure.

**WREB Dental Examination Options Under COVID-19**

Option	Exam Type	Description	Availability
WREB Comprehensive Treatment Planning Exam	Written Authentic Simulated Clinical Examination(ASCE)	Constructed response exam requiring students to perform tasks and make decisions with high fidelity to dental practice. For states considering an OSCE examination only as a pathway to licensure WREB's CTP ASCE is a more authentic demonstration of relevant candidate knowledge.	Most candidates completed this exam in the Fall of 2019. For those that have not, they can complete it as soon as Prometric Testing Centers open again. Projected to be May 1, 2020.
Traditional WREB Patient Based Examination	Traditional exam requiring demonstration of skills on a mannikin for Endodontic and Prosthodontics and on a patient for Periodontics and Operative and the written CTP (ASCE) exam.	Although many states require completing two procedures for the Operative section WREB has demonstrated that candidate competency can reliably assessed with 1 patient. For states that require 2 procedures currently they could relax the requirement to require only one procedure.	Depends on the event line of COVID-19; circumstances will vary widely across sites and require willing patients and available volunteers, freedom of air travel, available lodging, etc.
COVID-19 Alternative Performance Based Simulation	Written Authentic Simulated Clinical Examination(ASCE) exam and mannikin based Operative, Endodontics and Prosthodontics sections	Candidate is required to successfully perform both preparation and finish of a conventional Class II restoration on a molar and a Class III restoration on a central incisor. All procedures are performed, like they are for the Endodontics and Prosthodontics sections, in full simulation and with rubber-dam isolation. Results are assessed using established Operative Section criteria. Certain critical errors are preserved, and the passing cut-point remains unchanged.	Can begin as soon as June depending on CDC recommendations, local conditions, etc. Will be administered utilizing appropriate social distancing protocols

**WREB Dental Hygiene Examination Options Under COVID-19**

Option	Exam Type	Description	Availability
Dental Hygiene Clinical Examination	Patient Based Examination	WREB's standard dental hygiene examination includes the following components: Patient Qualification; Extraoral/Intraoral examination, Calculus detection and removal, Tissue Management, Periodontal Assessment and Professional Judgment.	Depends on the event line of COVID-19; circumstances will vary widely across sites and require willing patients and available volunteers, freedom of air travel, available lodging, etc.
Comprehensive Dental Hygiene OSCE	Written Exam	The WREB Dental Hygiene OSCE is a multiple-choice written component that assesses these multi-faceted components of dental hygiene care. This is a comprehensive overview of dental hygiene knowledge, radiographic interpretation, AAP staging and grading, extra and intra oral assessment and risk assessment, care plan development, and assessment and treatment of the periodontium. The exam is an avenue to test the skills of an entry-level student, either replacing either replacing the current clinical examination or to be administered in conjunction with a clinical licensure exam should a state board want an additional assessment examination.	Can be administered beginning in June of 2020.



# **WREB Interim Clinical Dental Examination: COVID-19 Performance-Based Simulation Examination**

## **Psychometric Overview**

**May 6, 2020**





**WREB Interim Clinical Dental Examination:  
COVID-19 Performance-Based Simulation Examination  
Psychometric Overview**

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## **WREB Interim Clinical Dental Examination: COVID-19 Performance-Based Simulation Examination**

### **Psychometric Overview**

#### **Introduction**

Results from standardized assessments are one source of evidence used by licensing bodies to make decisions about a candidate's readiness for practice. Licensing examinations must be developed and administered in a valid, reliable, and legally defensible manner. The purpose of this report is to provide test users with an overview of descriptive and technical documentation regarding the nature and quality of the WREB Interim Clinical Dental Examination to support inferences based on examination results.

WREB examinations are developed, administered, and scored in accordance with the *Standards for Educational and Psychological Testing* (AERA, APA, NCME; 2014) and *Guidance for Clinical Licensure Examinations in Dentistry* (AADB, 2005). An overview and description of activities conducted to evaluate the technical quality of the WREB Interim Clinical Dental Examination, with a focus on the new Operative Simulation Section, are provided, including psychometric and statistical results of field-testing. Details of additional activities and research studies relevant to the Interim Clinical Dental Examination are also maintained and available for review by test users, test takers, and other stakeholders.

#### **Background and Overview of the Interim Examination**

WREB has been researching and evaluating the validity and viability of alternatives to patient-based assessment for several years. For example, simulations that could substitute for Operative Dentistry and Periodontics, the two patient-based sections of WREB's standard dental examination, are currently in development and undergoing review. WREB had not planned to implement any of these assessment alternatives during the 2020 dental examination season.

The advent of health risks due to the COVID-19 (SARS-CoV-2) virus and the social-distancing directives that have been in place since March of 2020 has put pressure on many state licensing boards to consider temporary alternatives to the traditional patient-based dental

examination. Several state licensing boards have requested that WREB propose temporary examination alternatives that could be administered during the COVID-19 crisis.

WREB has developed an interim alternative examination that includes existing simulation sections (i.e., Comprehensive Treatment Planning [CTP], Endodontics, and Prosthodontics) and a new, field-tested, restorative dentistry simulation that can serve as a temporary replacement for the patient-based Operative Section while the challenges posed by COVID-19 limit patient-based options. A brief overview of temporary changes to existing examination sections will be provided, followed by a more detailed description of the development and collection of validity evidence for the new Operative Simulation Section.

### **Existing Examination Sections**

**Comprehensive Treatment Planning (CTP) Section.** WREB's existing Comprehensive Treatment Planning (CTP) Section is a performance-based ASCE (Authentic Simulated Clinical Examination) which requires the candidate to construct responses (as opposed to an OSCE in which the candidate selects responses from options, locations, or choices provided). The CTP Section is open-ended and graded by independent, anonymous examiners. It reveals candidate thinking and requires candidates to perform tasks that dentists perform and to make decisions that dentists make, all without choices they can select or cues of any kind. The construction of appropriately sequenced treatment plans and item responses requires broad understanding of diagnostic, preventive, restorative, endodontic, periodontal, prosthodontic, oral surgical, radiological, pediatric dentistry, and patient-management procedures, as well as the relationships between these procedures and their clinical application under various patient conditions. The CTP examination can result in failure if a candidate commits a critical error, i.e., constructs a response that could result in life-threatening harm, such as administering more than the upper limit of a safe dose of local anesthetic for the weight of a pediatric patient. The CTP Section has been administered to dental licensure candidates since 2014 and will be a required, unchanged section on the WREB Interim Clinical Dental Examination. Details and results of technical analyses and candidate results for the CTP Section have been documented in annual technical reports (e.g., WREB, 2019a).

Over 2,000 dental candidates have already completed the CTP examination for the 2020 season, including 1,035 from dental schools in Nevada and its neighboring states (i.e., California,

Oregon, Utah, and Arizona). For any candidates who have not yet challenged the CTP Section, Prometric testing centers are opening for testing in May 2020 and have established guidelines for social distancing and safety (<https://www.prometric.com/corona-virus-update>).

**Endodontics Simulation Section.** WREB's existing Endodontics Section is a performance-based clinical simulation examination. The candidate is required to perform two endodontic procedures on simulated teeth mounted in a segmented arch which is mounted in a manikin that is positioned to simulate working on a patient. Candidates must maintain the simulated patient position and adhere to Standard (Universal) Precautions throughout the examination. The anterior tooth procedure requires treatment of a maxillary central incisor simulated tooth, including access, instrumentation and obturation. The posterior tooth procedure requires access of a mandibular first molar simulated tooth. Access of the posterior tooth must enable grading examiners to identify all canal orifices. Like all WREB Dental Examination sections, the Endodontics Section is graded by independent, anonymous examiners. The Endodontics Section has been administered since 1985 and will be a required section on the WREB Interim Clinical Dental Examination. Details and results of technical analyses and candidate results for the Endodontics Section have been documented in annual technical reports (e.g., WREB, 2019a).

The only changes to the Endodontics Section are specific COVID-19-related social distancing and infection prevention protocols that must be followed to ensure the safety of all individuals involved in the examination and examination-related activities. Besides adhering to the simulation protocol for patient position and Standard (Universal) Precautions, candidates also are required to follow any additional social-distancing and infection-prevention protocols imposed by the exam site.

**Prosthodontics Simulation Section.** WREB's existing Prosthodontics Section is a performance-based clinical simulation examination. The candidate is required to perform two prosthodontic procedures (three preparations) on simulated teeth in a mounted articulator and manikin that is positioned to simulate working on a patient. Candidates must maintain the simulated patient position and adhere to Standard (Universal) Precautions throughout the examination. Candidates are required to prepare an anterior tooth for a full-coverage crown and prepare two abutments to support a posterior three-unit fixed partial denture prosthesis (i.e., bridge). The three-unit bridge

must have a path of insertion that allows full seating of the restoration. Like all WREB Dental Examination sections, the Prosthodontics Section is graded by independent, anonymous examiners. The current version of the clinical Prosthodontics Section has been administered since 2018 and is required by most states accepting the WREB Interim Clinical Dental Examination. Details, technical analyses, and candidate results are documented in annual technical reports (e.g., WREB, 2019a).

As with the Endodontics Section, the only changes to the Prosthodontics Section specific COVID-19-related social-distancing and infection-prevention protocols that must be followed to ensure the safety of all individuals involved in the examination and examination-related activities. Besides adhering to the simulation protocol and Standard (Universal) Precautions, candidates also are required to follow any additional social-distancing and infection-prevention protocols imposed by the exam site.

**Periodontics Patient-Based Section.** WREB subject matter experts (SMEs) on the Operative and Periodontics Examinations Committee have recommended that due to COVID-19 the patient-based Periodontics Section of the Clinical Dental Examination be waived for 2020 since WREB is unable to demonstrate that a valid replacement is viable. The following evidence supports the decision to recommend temporary waiver or postponement of the Periodontics Section: a) critical aspects of periodontal diagnosis and treatment decision-making are covered throughout the CTP examination, b) the patient-based Periodontics section is the least discriminating section of the Dental Examination due to the very high rate of examination success, and c) recent practice analyses conducted jointly by WREB and CRDTS (WREB, 2019b; WREB, 2020) found that while the practices assessed on WREB's Dental patient-based Periodontics Section and Dental Hygiene Examination continue to be rated as frequently performed and important, these practices are most frequently performed by dental hygienists and rarely or never performed by dentists. Still, the ability of dental candidates to demonstrate competence on a valid, clinical examination of Periodontics continues to be valued by many states, and the patient-based Periodontics Section of WREB's standard patient-based Dental Examination will be available again when it can be administered safely.

### **Operative Simulation Section: Development and Field Testing**

WREB has field-tested an alternative, performance-based restorative dentistry simulation (i.e., Operative Simulation Section) that could be required temporarily in lieu of the traditional patient-based Operative Section. The validation process for the simulated examination included the field-testing of social distancing for both candidates and examiners. The pre-planning and guidelines practiced with the social-distancing and infection-prevention protocols employed in the Operative Simulation Section field tests are described later and will be applied to other simulation sections (i.e., Endodontics and Prosthodontics) of the WREB Interim Clinical Dental Examination.

In the Operative Simulation Section, each candidate is required to successfully perform both preparation and finish of a conventional Class II restoration on a molar and a Class III restoration on a central incisor. All procedures are performed, like they are for the Endodontics and Prosthodontics sections, on simulated teeth, mounted in arches on a manikin with proper operational posture, appropriate employment of Standard (Universal) Precautions including Personal Protective Equipment (PPE), and with rubber-dam isolation. Results are assessed using established Operative Section scoring criteria. Certain critical errors are preserved, and the passing cut-point remains unchanged. The simulation involves social distancing for both candidates and examiners and uses materials (simulation teeth and arches) which are readily available and with which candidates and their programs are already familiar.

WREB maintains the position that any clinical restorative simulation testing, at this time, remains limited with respect to fidelity, which is a critical type of validity evidence. Even with a simulated tooth that attempts to replicate the hardness, texture, disease process, and internal anatomy of human teeth, the simulation does not fully replace the spontaneous judgments, patient management skill, and cognitive-motor coordination involved in treating a live human patient who exhibits an authentic response to local anesthesia, unpredictable movements, and has the ability to feel pain and discomfort. The alternative Operative Simulation Section that WREB is offering for 2020 is intended to be a provisional solution for COVID-19 only and is intended neither to replace WREB's patient-based Operative Section in 2020 for states that continue to require it nor to be the simulation WREB may offer in the future when the validity of a more realistic and involved simulation can be demonstrated.

The following sections will describe several aspects of the Operative Simulation Section, including a) administration procedures reflecting the additional precautions required to minimize



exposure to the COVID-19 virus, b) restorative content assessed, c) grading and scoring, d) examiner preparation and evaluation, and e) the results of field-testing conducted in early 2020.

### **Interim Social Distancing and Infection Prevention Protocol**

Preventing infection by COVID-19 that may arise from airborne transmission or contact with potentially virulent surfaces is critical to ensuring the safety of candidates, dental school personnel, examiners and agency personnel during examination and examination-related activities. Field-testing for the Operative Simulation Section included broad attention to ensuring that a) individuals participating in the examination were sufficiently distant from each other at all times, b) individuals used appropriate PPE, and c) materials and areas remained clean and disinfected. Social-distancing and infection-prevention protocols were field tested for the Operative Simulation Section and will be implemented for all clinical sections of the WREB Interim Clinical Dental Examination. These protocols include but are not limited to the following examination features:

- Limits on numbers of personnel and candidates assigned to the examination at one time and in one location
- Distribution, required completion, and collection/review of a self-assessment survey instrument immediately prior to the examination (e.g., regarding symptoms, recent contact with suspected or known patient with COVID-19, and recent travel)
- Required capture and logging of each participant's temperature
- Assignment of separated arrival times
- Set-up, preparation, and monitoring for entry to the facility and examination area (e.g., survey completion and approval, donning face mask and eye protection, temperature capture, hand sanitization, etc.)
- Installation of floor and location markings throughout examination areas to ensure adherence to social distancing
- Location of assigned simulation stations that conform to social distancing guidelines
- Pre-provision of supplies and examination materials at simulation stations to reduce unnecessary movement

- Specific instructions regarding how to move around laboratory when necessary, how to turn in materials, and how to leave space and building upon completion without congregating
- Monitoring of social distancing, use of PPE, and contact with objects and surfaces throughout the simulation
- Appropriate cleaning and disinfection of all simulation stations and involved surfaces immediately before and following every simulation session

The features described reflect protocols that were in place for the March 30 – April 2 field-tests. These examination protocols may be augmented according to updates for infection prevention from the Center for Disease Control (CDC) or more stringent school-specific requirements. In any case the protocols employed will reflect or exceed CDC guidelines. If the test site has stricter guidelines than the CDC, then the protocol employed will reflect the test site requirements. For example, the CDC guidelines for social distancing stipulated maintaining a minimum distance of at least six feet from other individuals; one of the field-test sites required a minimum distance of ten feet, which was implemented throughout the field test.

WREB will coordinate with each site hosting an examination to develop a document communicating the social-distancing and infection-prevention protocol for that examination site. Prior to the exam this document will be provided to candidates, on-site examiners, and any other individuals who will be involved in examination. Candidates will be expected to conform to the social distancing and infection prevention protocol and may risk dismissal and failure of the examination for gross, willful, or repeated protocol violation.

Scoring sessions where grading examiners evaluate candidate performance on the submitted arches also will be subject to social-distancing and infection-prevention protocols. Similar safety features, including self-assessment and screening, number of grading examiners per room and building, social distancing, surface and material disinfection, and specific instruction regarding safe entry, movement, task performance, and exit of the facility will be provided.

### **Administration and Security**

Time allocated for the simulation is three and one-half (3.5) hours. Candidates are allowed an additional 30 minutes to set up before the session begins.

At the exam site, candidates must provide two valid, non-expired forms of personal identification. Admittance to the exam does not imply that the identification presented was valid. If it is determined that a candidate's identification is fraudulent or otherwise invalid, WREB will report to the appropriate governing agencies or board. Any candidate or other individual who has misreported information or altered documentation in order to fraudulently attempt an examination, will be subject to dismissal and reporting.

Candidates report to the assigned simulation area at the appointed time and must bring with them their personal handpieces, burs, and anything else needed to complete preparations or restorations on the simulated teeth, including the ModuPRO® One opposing arch or equivalent needed to complete the simulation.

Candidates may bring the Operative Simulation Candidate Guide and Dental Exam Candidate Guide into the simulation lab for reference. Notes, textbooks, or other informational material must not be brought into the simulation lab. No magnification other than loupes is allowed. All electronic devices, including cell phones and smart watches, are prohibited in the simulation lab. Unique markings are applied to each arch to prevent manipulation and reinforce examination security.

Assistants are not permitted for the Operative Simulation Section. Candidates may not assist each other. This includes critiquing another candidate's work or discussion of treatment. All candidates are expected to pass the examination on their own merit without assistance.

WREB provides the maxillary arches containing the teeth needed for preparation and restoration. The candidate provides everything needed that is not provided by the test site (school), including a suitable opposing arch. Following preparation, the arch containing the prepared teeth is submitted for grading and a second arch is provided with teeth already prepared for restoration. When placement of the finish restorations is completed, the second arch is submitted for finish grading.

Candidates are to work independently, observe Standard (Universal) Precautions, and work in a manner that simulates performing procedures on a patient throughout the simulation. Any unprofessional, unethical, or inappropriate behavior could result in immediate dismissal and failure of the Operative Simulation. If, after receiving notice of a violation, a candidate repeatedly violates simulation protocol, Standard (Universal) Precautions, or the social distancing and infection

prevention protocol for the exam site, they will be dismissed from the simulation and will fail the Operative Simulation Section.

Additional details of administration procedures and security guidelines are included in the Operative Simulation Candidate Guide, Dental Exam Candidate Guide, Operative Simulation Examiner Manual, and Dental Exam Examiner Manual.

### **Operative Simulation Test Specifications and Grading Criteria**

The Operative Simulation Section consists of one extended examination session during which two (2) operative (restorative) procedures are performed on simulated teeth. The procedures are:

1. Preparation and restoration of a conventional Class II (MO) in tooth 14.
  - The candidate may choose the restorative material (amalgam or composite).
  - The preparation can but need not cross the tooth's oblique ridge.
2. Preparation and restoration of a Class III (ML) in tooth 9 with composite.

The procedures are performed on simulated teeth mounted in a manikin positioned to simulate working on a patient. The simulated tooth has the same anatomy and polymers as the teeth that are required for the Prosthodontics Simulation Section. Vendor supply is available for both testing and candidate practice despite current factory closures. The teeth have no artificial decay that could introduce testing variables not encountered in candidates' current curriculum and training. Additional field testing and candidate clinical experience will be necessary for reliable implementation with artificial decay.

No modification requests are needed, which supports social distancing and infection prevention measures by reducing the handling of materials and number of examiners required to be onsite. Candidates are asked to prepare the teeth as they ideally would for minimal caries requiring restoration and so that their preparations satisfy WREB criteria for a score of "5" and then stop. The Class II preparation design must be conventional and include a pulpal floor. Both preparation and restoration (placement of the restorative material) must be accomplished with a rubber dam. When treatment is completed the arch containing the prepared or restored teeth is submitted for grading. Occlusion is not functionally evaluated.

Current dental terminology (CDT) codes that reflect the range of procedures that may be attempted are listed in Table 1.

Table 1. *Simulated Operative Section Procedure Options with CDT Codes*

<b>Operative Section Restorative Procedure</b>	<b>CDT Code(s)</b>
Direct posterior Class II amalgam restoration (MO, DO or MOD)	D2150, D2160
Direct posterior Class II composite restoration (MO, DO or MOD)	D2392, D2393
Direct anterior Class III composite restoration (ML, DL, MF, DF)	D2331, D2332

WREB examines candidates with varying educational backgrounds and schools may teach different preparation and restoration techniques. WREB does not look for one specific technique and scores performance according to the Operative Simulation scoring criteria described later in this section.

The scoring criteria are based on the scoring criteria employed for the conventional patient-based Operative examination section, with minor revisions, reviewed and approved by the SMEs on the Operative examination committee. The preparation criteria are Outline and Extension, Internal Form, and Operative Environment. The finish criteria are Anatomical Form, Margins, and Finish, Function and Damage. Each grading criterion is defined at five levels of performance for each procedure, with a grade of "3" representing minimal competence. A grade of "5" is defined generally to represent optimal performance, with grades of 4, 3, 2, and 1 corresponding to appropriate, acceptable, inadequate, and unacceptable performance, respectively. The performance level definitions for each type of preparation (i.e., Class II amalgam, Class II composite, and Class III composite) and for the restoration finish are published in the candidate guide and provided in Figures 1 through 4.

OPERATIVE SIMULATION CLASS II – COMPOSITE PREPARATION					
SCORING CRITERIA RATING SCALE					
	5–Optimal	4–Appropriate	3–Acceptable	2–Inadequate	1–Unacceptable
OUTLINE & EXTENSION	Outline is generally smooth and flowing and does not weaken tooth in any manner.	Outline is slightly irregular but does not weaken tooth. Isthmus is slightly wider than required.	Outline moderately weakens marginal ridge or a cusp. Isthmus is too wide or too narrow.	Outline severely weakens marginal ridge or a cusp. Outline is misshapen and/or forces improper angle of exit.	Outline is grossly improper and/or lacks any definite form.  Unapproved surface prepared.
	Proximal and gingival extensions are visually open less than 1.0 mm	Proximal and/or gingival extensions are slightly overextended.	Proximal and/or gingival extensions are moderately overextended.	Proximal and/or gingival extensions are in contact or obviously overextended.	Proximal and/or gingival extensions are grossly overextended.
	Optimal treatment of fissures.	Near optimal treatment of fissures.	Adequate treatment of fissures. Neither the tooth nor restoration is compromised.	Inadequate treatment of fissures will compromise the tooth or restoration.	Lack of treatment of fissures will seriously compromise the tooth and restoration.
	Proximal cavosurface angles are equal to or slightly greater than 90°. The integrity of both tooth and restoration is maintained.	Cavosurface angles are not optimal, but do not compromise the integrity of the tooth or restoration. Cavosurface has small areas of minor roughness.	Cavosurface angles possibly compromise the integrity of the tooth or restoration. Cavosurface is moderately rough but will not adversely affect the final restoration.	Improper cavosurface angles or rough cavosurface will cause the final restoration to fail.	Cavosurface angles are grossly improper. Cavosurface has multiple major areas of roughness and/or enamel weakness that will cause the restoration to fail.
INTERNAL FORM	Pulpal floor depth as determined by the lesion or defect does not exceed 2.0 mm from the cavosurface. Axial wall depth at the gingival floor is 1.0 mm-1.5 mm.	Pulpal floor and/or axial wall is slightly shallow or deep.	Pulpal floor and/or axial wall is moderately shallow or deep.	Pulpal floor and/or axial wall is critically shallow or critically deep.	Walls and/or floors are grossly deep. Gross removal of tooth structure jeopardizes the tooth or pulp.  Unapproved surface prepared.
	<b>Conventional design:</b> Internal form is smooth and flowing and has no sharp angles that could weaken or cause voids in the final restoration.	<b>Conventional design:</b> Internal form is mostly smooth and flowing, but some minor roughness and/or sharp angles are present.	<b>Conventional design:</b> Internal form is generally smooth and flowing, but some moderate roughness and/or sharp angles are present.	<b>Conventional design:</b> Internal form is rough and unfinished with major areas of roughness or sharp angles that will lead to restoration failure.	<b>Conventional design:</b> Internal form is grossly rough and/or has gross sharp angles that will lead to restoration failure.
OPERATIVE ENVIRONMENT	No damage to the adjacent tooth.	Minor damage to the adjacent tooth can be removed by polishing without changing the shape of the contact.	Damage to the adjacent tooth can be removed by polishing, but the shape of the contact will be changed.	Damage to the adjacent tooth will be difficult to polish out and still maintain appropriate proximal contour. The adjacent tooth will likely require restoration.	Damage to the adjacent tooth will require restoration.

Figure 1. Scoring criteria definitions for the Simulation Class II Composite Preparation, 2020.

OPERATIVE SIMULATION CLASS II – AMALGAM PREPARATION					
SCORING CRITERIA RATING SCALE					
	5–Optimal	4–Appropriate	3–Acceptable	2–Inadequate	1–Unacceptable
OUTLINE & EXTENSION	Outline is generally smooth and flowing and does not weaken tooth in any manner.	Outline is slightly irregular but does not weaken tooth. Isthmus is slightly wider than required.	Outline moderately weakens marginal ridge or a cusp. Isthmus is too wide or too narrow.	Outline severely weakens marginal ridge or a cusp. Outline is misshapen and/or forces improper angle of exit.	Outline is grossly improper and/or lacks any definite form.  Unapproved surface prepared.
	Proximal and gingival extensions are visually open less than 1.0 mm	Proximal and/or gingival extensions are slightly overextended.	Proximal and/or gingival extensions are moderately overextended.	Proximal and/or gingival extensions are in contact or obviously overextended.	Proximal and/or gingival extensions are grossly overextended.
	Optimal treatment of fissures.	Near optimal treatment of fissures.	Adequate treatment of fissures. Neither the tooth nor restoration is compromised.	Inadequate treatment of fissures will compromise the tooth or restoration.	Lack of treatment of fissures will seriously compromise the tooth and restoration.
	Proximal cavosurface angles are approximately 90°. The integrity of both tooth and restoration is maintained.	Cavosurface angles are not optimal, but do not compromise the integrity of the tooth or restoration. Cavosurface has small areas of minor roughness.	Cavosurface angles possibly compromise the integrity of the tooth or restoration. Cavosurface is moderately rough but will not adversely affect the final restoration.	Improper cavosurface angles or rough cavosurface will cause the final restoration to fail.	Cavosurface angles are grossly improper. Cavosurface has multiple major areas of roughness and/or enamel weakness that will cause the restoration to fail.
INTERNAL FORM	Proximal walls are clearly convergent occlusally.	Proximal walls are barely convergent occlusally.	Proximal walls are parallel or divergent in one area.	Proximal walls are critically divergent occlusally.	Proximal walls are grossly divergent occlusally.
	Pulpal floor is 1.5 mm-2.0 mm from the cavosurface and provides adequate bulk for strength of restorative material. Axial wall depth at the gingival floor is 1.0 mm-1.5 mm.	Axial wall and/or pulpal floor is slightly shallow or deep, but still provides adequate bulk for strength of restorative material.	Axial wall and/or pulpal floor is moderately shallow or deep, but still provides adequate bulk for strength of restorative material.	Axial wall and/or pulpal floor is critically shallow or deep and does not provide adequate bulk for strength of restorative material.	Walls and/or floors are grossly deep. Gross removal of tooth structure jeopardizes the tooth or pulp.  Unapproved surface prepared.
	<b>Conventional design:</b> Internal form is smooth and has no sharp angles. Retentive grooves, if placed, are near ideal. Axial wall follows external contour of the tooth.	<b>Conventional design:</b> Internal form is mostly smooth, but some minor roughness and/or sharp angles are present. Retentive grooves, if placed, are adequate. Axial wall contour is near optimal.	<b>Conventional design:</b> Internal form is generally smooth, but some moderate roughness and/or sharp angles are present. Retentive grooves, if placed, are too deep or too shallow, or placed in an incorrect location. Axial wall contour is not optimal.	<b>Conventional design:</b> Internal form is rough and unfinished with major areas of roughness or sharp angles that will lead to restoration failure. Retentive grooves, if placed, are too deep or too shallow, or placed in an incorrect location, and will compromise the tooth or restoration.	<b>Conventional design:</b> Internal form is grossly rough and/or has gross sharp angles that will lead to restoration failure. Gross disregard for proper placement of retentive features will compromise the tooth and restoration.
OPERATIVE ENVIRONMENT	No damage to the adjacent tooth.	Minor damage to the adjacent tooth can be removed by polishing without changing the shape of the contact.	Damage to the adjacent tooth can be removed by polishing, but the shape of the contact will be changed.	Damage to the adjacent tooth will be difficult to polish out and still maintain appropriate proximal contour. The adjacent tooth will likely require restoration.	Damage to the adjacent tooth will require restoration.

Figure 2. Scoring criteria definitions for the Simulation Class II Amalgam Preparation, 2020.

OPERATIVE SIMULATION CLASS III – COMPOSITE PREPARATION									
SCORING CRITERIA RATING SCALE									
5–Optimal		4–Appropriate		3–Acceptable		2–Inadequate		1–Unacceptable	
OUTLINE & EXTENSION	Outline provides optimal convenience form (access for caries removal and insertion of restorative material).	Outline is slightly over or under extended.	Outline is slightly irregular but does not weaken the tooth.	Outline is moderately over or under extended. Outline is moderately irregular but does not weaken the tooth.	Outline is severely over or underextended.	Outline is grossly improper and/or lacks any definite form.	Gingival wall is grossly overextended.	Unapproved surface prepared.	Wholly below proximal contact area where caries would be expected.
	Gingival extension is visually open up to 0.5 mm. Facial (or lingual) extension may break proximal contact up to 0.5 mm.			Gingival margin is moderately overextended.	Gingival wall is in contact or obviously overextended.				
	Incisal contact is not broken. Includes proximal contact area.		Includes proximal contact area with slight variation.		Incisal extension has broken contact.				
	Cavosurface forms a smooth continuous curve with no sharp angles.	Cavosurface is slightly irregular and rough; no sharp angles.		Includes proximal contact area with moderate variation.	Mostly below proximal contact area where caries would be expected.				
	There are no acute cavosurface angles.	Cavosurface angles are not optimal, but do not compromise the integrity of the tooth or restoration.		Cavosurface is moderately irregular and rough. A few sharp angles are present.	Cavosurface is severely irregular and/or with sharp angles.				Cavosurface has multiple gross irregularities that will cause the restoration to fail.
INTERNAL FORM	Axial wall follows external contour of tooth.	Axial wall generally follows external contour of tooth.	Axial wall does not follow contour of tooth.	Axial wall depth exceeds 2.0 mm beyond the DEJ.	Gross removal of tooth structure jeopardizes the tooth or pulp.				Unapproved surface prepared.
	Depth does not exceed 1.0 mm beyond the DEJ.	Depth does not exceed 1.5 mm beyond the DEJ.	Depth does not exceed 2.0 mm beyond the DEJ.						
	Internal line angles are rounded and smooth.	Internal walls are well defined and rounded but have some slight irregularities.	Internal walls are rounded, but moderately rough, irregular, and not defined.	Internal walls are severely irregular and not defined.	Grossly irregular and sharp line angles show total disregard for the health of the tooth.				
	Internal walls are well defined.		Moderately sharp line angles are present.	Angle of walls undermines enamel, jeopardizes incisal angle, or encroaches on the pulp.					
OPERATIVE ENVIRONMENT	No damage to the adjacent tooth.	Minor damage to the adjacent tooth can be removed by polishing without changing the shape of the contact.	Damage to the adjacent tooth can be removed by polishing, but the shape of the contact will be changed.	Damage to the adjacent tooth will be difficult to polish out and still maintain appropriate proximal contour. The adjacent tooth will likely require restoration.					

Figure 3. Scoring criteria definitions for the Simulation Class III (Composite) Preparation, 2020.

OPERATIVE SIMULATION FINISH RESTORATION									
SCORING CRITERIA RATING SCALE									
5–Optimal		4–Appropriate		3–Acceptable		2–Inadequate		1–Unacceptable	
ANATOMICAL FORM	Anatomical form is consistent and harmonious with contiguous tooth structure.	Slight variation in normal anatomical form is present.	Moderate variation in normal anatomical form is present.	Anatomical form is improper. Marginal ridge is poorly shaped.	There is gross lack of anatomical form.				
	Proper proximal contour and shape are restored.	There is slight variation of proximal contour and shape.	There is moderate variation of proximal contour and shape.	Anatomy is too deep or too flat.					Grossly improper proximal contour or shape.
	Normal proximal contact area and position are restored.	There is slight variation of normal contact area and position.	There is moderate variation of normal contact area and position.	Proximal contour is poor. Embrasures are severely over or under contoured.					
	Contact is visually closed and resists the passage of lightly waxed floss.	Contact is visually closed and resists the passage of lightly waxed floss.	Lightly waxed floss will pass through the contact with slight resistance.	Contact is visually open; contour is pointed and sharp; or so broad, flat or tight that floss will not pass easily pass through the contact.	Contact is grossly open; contour terminates far from the adjacent tooth or the restoration is bonded to the adjacent tooth.				
MARGINS	There are no excesses or deficiencies anywhere along margins.	Slight marginal excesses and/or deficiencies are present.	Moderate marginal excesses and/or deficiencies are present.	A deep open margin is present, or critical excesses or deficiencies are present.	Multiple open margins, or gross excesses, or deficiencies, are present.				
				A marginal overhang catches floss.	A gross marginal overhang shreds floss.				
FINISH, FUNCTION & DAMAGE	The surface is smooth with no pits, voids or irregularities.	Slight surface irregularities, pitting, or voids are present.	Moderate surface irregularities, pitting, or voids are present.	Critical surface irregularities, pitting, or voids are present.	Gross surface defects are present and/or the restoration is grossly fractured.				
	There is no damage to hard or soft tissue.	Minor damage to hard or soft tissue is evident.	Moderate damage to hard or soft tissue is evident.	Severe damage to hard or soft tissue is evident. Open contact risks trapping food debris or overly tight contact makes flossing difficult.	Gross mutilation of hard or soft tissue is evident. Grossly open contact exposes interdental col to potential trauma or fused teeth make flossing impossible.				

Figure 4. Scoring criteria definitions for the Simulation Class II and Class III Finishes, 2020.

### Scoring and Results Reporting

Performance for each preparation and finish, is graded by three independent and anonymous examiners who are calibrated to the scoring criteria prior to every examination. Each preparation or finish is scored on the applicable criteria according to rating scales presented above. Examiners are trained to assign a particular grade on the scale only when *all* aspects of performance described for that level have been demonstrated. For example, if performance on the criterion under review meets most aspects of the definition for a grade of “3” but does not quite meet the standard for even one aspect of the definition, then the grade assigned will be a “2,” at most. This holds for all six criteria per restoration.

The median of the three examiner grades is computed for each criterion and is weighted to reflect the level of criticality relevant to minimally competent treatment, e.g., Outline and Extension accounts for 46% of the preparation score and Operative Environment accounts for only 15%. The criterion weights are provided in Tables 2a and 2b.

Tables 2a and 2b. *Operative Simulation Scoring Criteria and Weighting: Preparation, Finish*

Preparation Criteria and Weighting		Finish Criteria and Weighting	
Outline & Extension	46%	Anatomical Form	36.5%
Internal Form	39%	Margins	36.5%
Operative Environment	15%	Finish, Function & Damage	27%

The mean of the preparation and finish scores is the restoration procedure score. The mean of the two procedure scores, after any applicable penalties or deductions, is the final Operative Simulation Section score.

The passing cut score on the Operative Simulation Section is 3.00, which reflects minimally competent performance within the five-point rating scale for all criterion grades that contribute to the final section score. Each performance level definition for a score of 3.00 on a criterion has been worded to describe performance that would be deemed minimally competent via consensus of the subject matter experts on the Operative section examination committee. While methods of standard setting applied to selected-response assessment often rely on SMEs evaluating each test question based on how each SME believes a minimally competent examinee would



perform, standard setting for many performance-based assessments involves defining minimum expectations that can be observed directly in the candidate's performance. The performance level definitions (Figures 1 through 4), as developed by the examination committee, are critical to guiding examiner grading. The definitions are used to describe examples of clinical performance reviewed during examiner training and calibration, which provides performance benchmarks to facilitate examiner adherence to the criteria and a high degree of examiner agreement.

While limitations on travel and group activity size due to COVID-19 remain in effect, the grading of candidate performance will take place in grading sessions after the examination. While this reduces the number of examiners traveling to and grading at the examination site, it also prevents candidates from receiving onsite results immediately. Candidates and state licensing boards will receive results as soon as possible after grading sessions are held. Results reports will indicate clearly whether the Operative Examination was a simulation or involved the treatment of a patient. As with all WREB examinations, results of all examination attempts, regardless of pass or fail outcome, will be available to state licensing boards.

### **Examiner Training and Calibration**

Most examiners are members or designees of their state boards. A small proportion (e.g., approximately twenty percent of examiners in 2019) are dental educators. All examiners must be actively licensed and in good standing, with no license restrictions, and submit proof of license renewal annually. Under social distancing restrictions, the only examiners that may be present at the Operative Simulation Section may be the Chief Examiner and one or more Floor Examiners, depending on the layout and size of the examination environment. There will not be any grading examiners at the examination site unless social distancing and travel guidelines have been eased enough to allow this. Under the current restrictions, grading examiners will grade candidate performance in grading sessions, separate from the examination environment. Grading examiners still will need to complete examiner self-assessments and calibration testing prior to grading.

Clinical examination scores are dependent upon the judgments of grading examiners. A high degree of examiner agreement is critical to assessing candidate ability in a reliable and fair manner. As with the conventional Operative Examination, scoring judgments on the Operative Simulation Section are made by three independent examiners. The median of the three grades

assigned contributes to the candidate's score. The median is more robust to extreme grades assigned than the mean (i.e., conventional average).

Having multiple examiners helps to moderate the effects of varying levels of examiner severity; however, it is essential that all examiners are trained and calibrated to an acceptable level of agreement with respect to the scoring criteria for the examinations in which they participate. Examiners must participate in orientation and calibration sessions that take place before every examination or grading session. During calibration, examiners take assessments (tests) in which they grade examples of clinical performance according to the grading criteria. Their judgments are compared to scores that have been previously selected by the examination committees as representative of the defined levels in the criteria. The examiner team completes calibration tests until they each have demonstrated that they understand and can consistently apply WREB criteria in their assessments. All calibration tests are reviewed regularly for content and psychometric quality by WREB examination committees.

Examiners receive feedback on their performance after each examination. Examiners with low percentages of agreement, high percentages of harshness or lenience, or erratic grading patterns are counseled, remediated, and monitored to ensure increased understanding of criteria definitions. Continued lack of agreement results in dismissal from the examination pool.

The two main approaches employed to evaluate examiner performance include a review of examiner agreement which reflects the degree of exact and adjacent agreement and an estimation of examiner severity employing a probabilistic statistical model which is designed to account for and quantify potential sources of construct-irrelevant variance such as rater bias and error. With three examiners there are multiple ways to define and track examiner agreement. WREB uses a conservative computation of exact and adjacent agreement which involves comparing each examiner rating, i.e., each individual grade assigned to a particular criterion, to the mean of the other two raters' grades assigned for the same criterion, within the same examination attempt. Examiner ratings that may be adjacent to the rating of another rater may still be categorized as harsh or lenient since agreement is defined as the rating falling within one scale point of the *mean* of the other two ratings. Examiner severity is estimated using the Many-faceted Rasch Model (Linacre, 1994; Rasch, 1960/1980) and allows examiner performance to be compared to the performance of all other examiners within the examiner pool along a continuum of harshness to lenience and provides statistical information regarding rater errors such as erratic grading or

grading that shows too little discernment among performance levels (e.g., assigning all or mostly “3”s). Additional details regarding methods and results of examiner evaluation are provided in the WREB Dental Examination Technical Report (WREB, 2019a)

### **Field Testing of the Operative Simulation Section: Overview**

Two Operative Simulation field-tests were planned and conducted between March and May of 2020. A total of 79 dental students from two dental schools participated; three students attempted the examination twice resulting total of 82 attempts. These students planned in advance to challenge the field test examination twice.

The planning of the field tests included the review and revision of the Operative scoring criteria, creating a candidate guide for field test candidates, coordinating with each school to produce social distancing and infection prevention protocols, and developing examiner training and calibration materials.

One field test was conducted on March 30, 2020 at the University of Oklahoma with 20 dental students. A second field test was held on April 1 and 2, 2020 at the University of Utah with 59 dental students. WREB has already been conducting conventional clinical dental examinations at these two schools and their campuses were reasonably accessible to WREB’s dental consultants, given the limitations and recommendations regarding travel due to COVID-19. Oklahoma and Utah are the states of residence of WREB’s two consulting SME dentists, who oversee examination development and administration. The field test conducted at the University of Oklahoma used a simulated tooth constructed of a harder material which generated student concerns reflected in the post-examination candidate survey comments. The second field test, conducted at University of Utah, employed the final choice of material which did not elicit these concerns.

### **Initial Field Test Results: Faculty-graded**

The performance of the 20 field test candidates who attempted the Operative Simulation at the University of Oklahoma were initially graded by their faculty to partially fulfill program competency requirements. The 20 scores based on the University of Oklahoma faculty grading ranged from 2.94 to 4.37, with a mean score of 3.72 ( $SD = 0.41$ ). Candidate scores ( $N = 57$ ) from the same university taking the WREB Operative section during the 2019 season ranged from 3.13

to 4.87, with a mean score of 3.90 ( $SD = 0.40$ ). The field test results were not as high as the examination results from 2019, but an independent samples  $t$ -test conducted to compare the results indicated that the difference is not significant, with a value of  $t(df = 75; \alpha = 0.05) = 1.67$  and mean difference of 0.17 ( $p = 0.10$ ; 95% CI: -0.03, 0.38). The comparison is based on a small sample but provides an initial indication of comparability. There was also no notable difference between mean scores of the anterior tooth (3.73,  $SD = 0.51$ ) and the posterior tooth (3.71,  $SD = 0.44$ ) for the faculty-graded teeth.

After the examination and the grading conducted by faculty, some of the teeth that had been treated by the candidates at the University of Oklahoma field test were modified to reflect specific descriptors in the scoring criteria. These modified teeth and examples of candidate performance were then used in developing examiner training materials. The resulting preparations and finished restorations were photographed and used as exemplars in examiner training and calibration testing. The modified teeth will be graded along with the field-test performances from the other field test examination site, but will also be analyzed separately, as they do not represent the candidates' original performance.

### **Treatment Times**

Candidates were allowed up to four hours to complete the Operative Simulation Field Test. The time spent preparing the preparations and the finishes was recorded for each field-test attempt to determine if the initial time allotted was sufficient. The average total time used for the 82 field test attempts was 2 hours, 10 minutes (130 minutes). The least amount of time needed was 1 hour, 22 minutes and the longest amount of time needed was 3 hours, 52 minutes. All but four candidates (4.8%) completed their procedures in less than 3 hours and 30 minutes. The University of Oklahoma site used more treatment time due to additional time needed for set-up between the preparation and finish procedures. The need for this additional time was eliminated with the use of a single tooth material for the second field test. The time allotted for the examination going forward was reduced to 3 hours and 30 minutes. Table 3 shows the treatment times per field test site.

Table 3. Operative Simulation Treatment Times in Minutes by Field Test Site.

Field Test Site	<i>N</i> Attempts	Minimum Treatment Time	Maximum Treatment Time	Mean Treatment Time ( <i>SD</i> )
Univ. of Oklahoma	20	106 min	232 min	174 min (37.5)
Univ. of Utah	62	82 min	190 min	116 min (20.7)
Total	82	82 min	232 min	130 min (35.6)

### Field-Test Candidate Survey Results

Students who participated in one of the two Operative Simulation field tests were sent a link to an online survey. The response rate was 53% (42 out of 79 individual field-test candidates); with a slightly higher response rate for University of Oklahoma participants (65%) than University of Utah participants (49%). Survey responses assisted the development of the examination by prompting improvements to the Candidate Guide and examination schedule and by supporting the final determination of simulated tooth material.

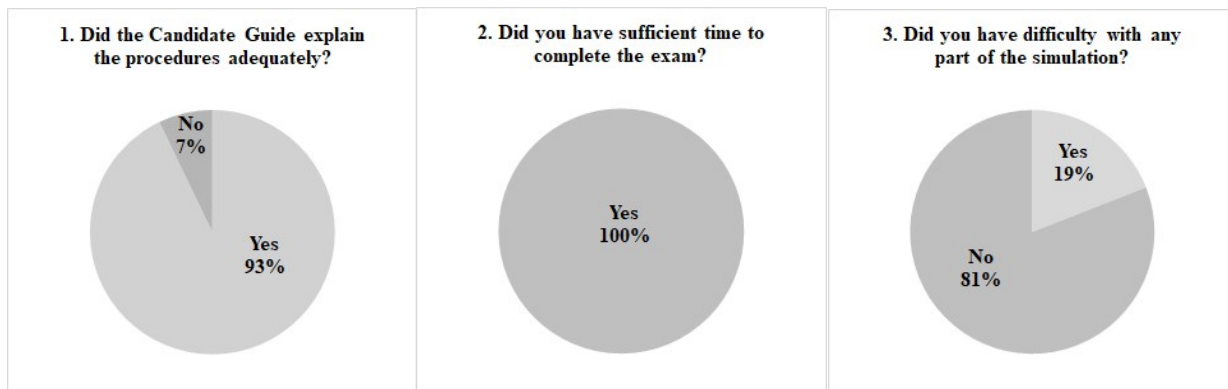
There were seven main questions and all questions offered the option to provide comments. There was a section for additional comments or suggestions at the end. Results for the seven questions are listed below, with a summary of responses and examples of comments.

The first three questions asked about the Candidate Guide, time allotted and whether the field-test candidate had any difficulty with any part of the simulation:

1. Did the Candidate Guide explain the procedures adequately?
2. Did you have sufficient time to complete the exam?
3. Did you have difficulty with any part of the simulation?

Only three of the 42 field-test candidates (93%) responded “No” to Question 1 (Figure 5a) regarding the Candidate Guide. All three noted that the guide could be more clear regarding the depth and extension of the preparation without needing to request extensions and wording to make this clear has been added to the Candidate Guide. All 42 field-test candidates responded that they

had sufficient time to complete the examination (Figure 5b). Eight of the 42 respondents (19%) expressed difficulty with part of the simulation (Figure 5c). In the optional comments, most of these concerns were about the difficulty of adjacent teeth having differing degrees of hardness; all were from field-test candidates at the University of Oklahoma, where a different tooth material was tested. The material that was employed at the second field test did not elicit these concerns and is the final choice of material planned for the Operative Simulation Section.



Figures 5a, b, c. Proportion of Yes or No responses to Field-Test Survey Questions 1, 2 and 3.

Question 4 asked about the level of challenge posed by the examination, overall.

4. Overall, was the exam easy, moderate, or difficult?"

Most respondents (37 of 42 or 88%) answered “Moderate” to Question 4 (Figure 6). Most comments offered regarding Question 4 compared the simulated teeth to natural teeth, e.g., “Going back to cutting on typodonts is always a readjustment! But definitely a valid test of hand skills. Certain aspects are more difficult and certain aspects are less difficult compared to treating human patients” and “The teeth were much softer, so probably required more dexterity than doing it on an actual person but very doable.”

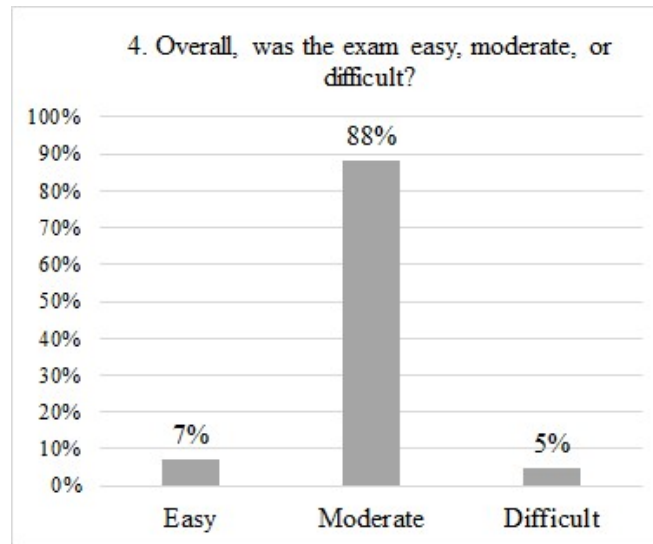


Figure 6. Proportion of different responses to Field-Test Survey Question 4.

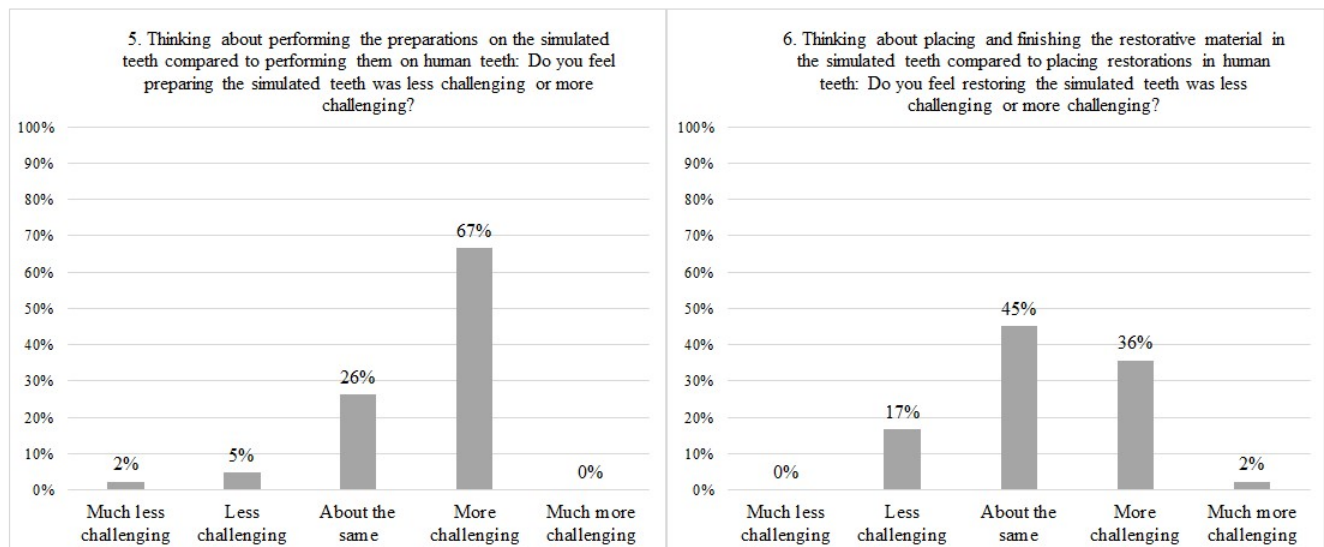
Questions 5 and 6 asked about the degree of challenge specifically regarding the preparation and the finish, respectively. Five response options were provided, ranging from Much Less Challenging to Much More Challenging.

5. Thinking about performing the preparations on the simulated teeth compared to performing them on human teeth: Do you feel preparing the simulated teeth was less challenging or more challenging?
6. Thinking about placing and finishing the restorative material in the simulated teeth compared to placing restorations in human teeth: Do you feel restoring the simulated teeth was less challenging or more challenging?

Many field-test candidates responded “About the Same” or “More Challenging” to Questions 5 and 6, with 93% (Question 5 regarding preparations) and 81% (Question 6 regarding placing and finishing) responding in one of these two categories (Figures 7a and 7b). The preparations were considered “More Challenging” by 28 of 42 (67%) and respondents’ comments were similar to those made about tooth material on Question 4, e.g., “Because simulated teeth are much softer, I feel it takes more skill, accuracy and care to complete the exam” and “You have to have a lot better hand skills on the typodont teeth due to the fact that they are softer. You have to really be good at placement and control of the burr. It also requires better restorative placement as it's easier to

accidentally remove tooth while finishing and polishing.” An example comment from one of the eleven (26%) respondents who selected “About the Same” stated, “More challenging due to the lack of recent practice on teeth with this hardness, but less challenging due to known parameters and no need for modifications.”

Nineteen of 42 (45%) respondents felt that the placing and finishing of the teeth was “About the Same” but only a few offered comments, e.g., “Less challenging due to no need for etching, more challenging from the difference in stability (possible loose screws, extremely tight contacts, no wedging ability).” The source of the loose screws was identified and remedied prior to the second field test. Most comments were associated with the fifteen (36%) responses of “More Challenging,” and involved the tooth material, e.g., “I felt placing the material was the same but polishing and removing flash was much more difficult on typodont teeth” and “Polishing composite on real teeth is MUCH easier than polishing on typodont teeth.” The few comments that accompanied the seven (17%) responses of “Less Challenging” reflected dryness and isolation, e.g., “Obviously, there isn’t any saliva, so keeping a dry field is simple” and “Better isolation.”



Figures 7a, b. Proportion of different responses to Field-Test Survey Questions 5 and 6.



Question 7 asked about the ability to maintain social distancing at the examination.

7. How difficult was it for you to maintain social distancing during the examination?

Most field-test candidates (39 of 42 or 93%) responded that it was “Easy” to maintain social distancing during the examination (Figure 8). All but one comment were associated with responses of “Easy.” Examples include “Really strict and functional rules in place. Wasn’t a problem at all” and “I was at least ten feet away from anyone else in the room at all times.” The other comment, associated with a response of Moderate, stated, “During the announcement portion of the exam, prior to the beginning, it was moderately difficult to maintain social distancing and adequately hear the announcements and questions.” Plans have been implemented for additional information to be provided early to candidates, allowing for questions by phone or email prior to the examination to reduce the need for multiple announcements and possible reasons to encourage crowding.

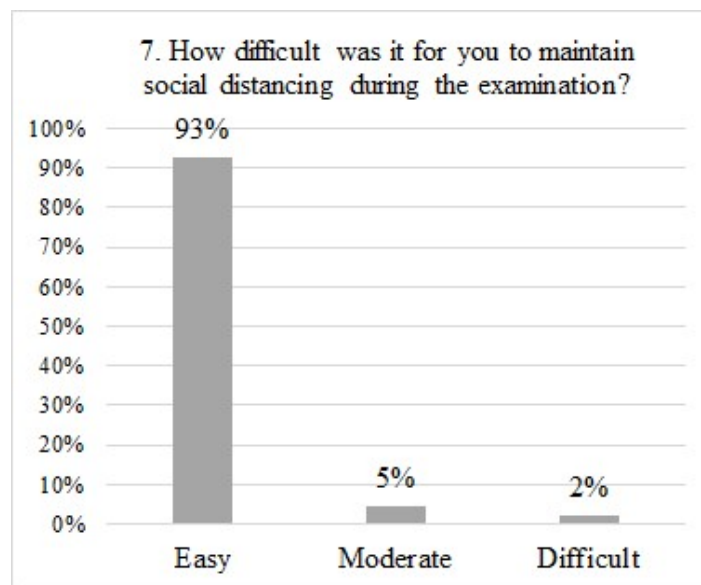


Figure 8. Proportion of different responses to Field-Test Survey Question 7.

Field-test candidates could offer additional comments or suggestions at the end of the survey. Many comments were generally positive or expressed thanks, e.g., “Overall it was great!” and several expressed their interest that this type of restorative examination be an acceptable option

going forward, e.g. “Replace patient exams with typodonts!” Some comments were concerned with the current situation related to COVID-19, e.g., “I think this is a great way to test in a safe environment given the circumstances of the class of 2020.” Most comments reinforced earlier comments regarding tooth material that, as noted above, will not apply, given the final choice of tooth material for the simulation examination. Suggestions regarding the schedule of treatment within the examination were offered by field-test candidates at the first field test; the timing in the second field-test was structured without interruption between the completion of preparations and finishes and is the final schedule planned for the examination.

### **Field-Test Grading Session Overview**

Seven examiners participated in the April 30 – May 1 Operative Simulation field-test grading session, completing calibration exercises and tests prior to grading. Social distancing and infection prevention measures were followed, to ensure the safety of examiners and staff while using electronic scoring equipment and handling arches during grading.

On the first day, five examiners were able to complete the grading of all 82 attempts on the Operative Simulation field tests, with three sets of grades per attempt. On the second day, two additional examiners regraded the attempts, resulting in a total of four sets of grades per attempt. Candidate results and examiner performance were analyzed for the first day, which reflects conventional grading procedures, i.e., three examiners per attempt, as well as with the additional sets of grades from the second day combined, to obtain additional information, statistics and feedback regarding e.g., the effectiveness of calibration, the generalizability of grading criteria, and the performance of field-test candidates.

### **Field-Test Examiner Performance**

Field-test examiner performance was evaluated via two approaches: examiner agreement statistics and examiner severity estimation. Examiner agreement was computed on the examiner team that completed grading on the first day. Examiner severity was conducted with and without the additional grades assigned on the second day. An overview of methods are described above on page 15 and in additional detail in technical reports, e.g., WREB Dental Examination Technical Report (WREB, 2019a).

Percentages of agreement were computed for the three sets of grades assigned on the first day of grading, as would be conducted for an actual examination after all three sets of grades per attempt have been assigned. Over the past ten years, percentages of agreement for the standard Operative Section have ranged from 88.4% to 89.9%, with comparatively balanced percentages of harshness and lenience. Examiner agreement over the years reflects examiner grading teams that have been selected for each examination based on their past examiner performance to ensure an optimal balance of examiner severity level. While nearly all examiners perform within recommended ranges of harshness and lenience percentages, to assign all the examiners that have performed at one end of that continuum to a single examination could introduce a systematic bias. The examiners who participated in the field-test grading session were scheduled based on location and convenience, given the conditions posed by COVID-19. The field-test examiners also included two relatively new examiners, who would not be assigned to the same examination under conventional conditions. Despite these potential threats to optimal examiner team performance, examiner agreement statistics for the field-test grading session were comparable to percentages of agreement, harshness, and lenience for the standard Operative section in previous years. Table 4 provides examiner agreement percentages for the standard Operative Section from the 2019 season and for the Operative Simulation field test grading session.

Table 4. *Percentages of Examiner Agreement, Harshness, and Lenience: Standard Operative Section and Operative Simulation Field Test*

	<i>N</i> Examiners	% Harsh	% Lenient	% Agreement
Standard Operative Section 2019 Season	110	5.5%	5.3%	89.2%
Operative Simulation Field Test Day 1	5	5.6%	5.7%	88.7%

Examiner severity estimated with the many-faceted Rasch model, is reported in Table 5, which provides summaries of results in logit, i.e., log-odds, units. High negative logits reflect more lenience and high positive logits reflect more harshness. For the standard Operative Section examination, most examiners fall within one logit unit of the mean, i.e., between -1.00 and 1.00, and within recommended ranges with respect to infit and outfit mean-square fit statistics, i.e.,

between 0.50 and 1.50. Examiner severity estimates for the first day of the Operative Simulation field test and for all Operative Simulation field-test examiners reflect smaller ranges with no outlying values. Additional details of the Many-faceted Rasch Model analyses are provided later with the results of field-test candidate performance.

Table 5. *Many-Faceted Rasch Model Examiner Severity Analysis Indicators in Logits: Standard Operative Section and Operative Simulation Field Test (Number of examiners provided below each header)*

Indicator	Standard Operative Section 2019 Season ( $N_E = 110$ )	Operative Simulation Field Test Day 1 ( $N_E = 5$ )	Operative Simulation Field Test All ( $N_E = 7$ )
Severity Measure Logit (Range)	-0.88 – 1.06	-0.41 – 0.44	-0.33 – 0.52
Standard Error (Range)	0.05 – 0.16	0.05 – 0.07	0.05 – 0.07
Severity Measure Logit Mean <sup>a</sup>	0.0	0.0	0.0
Severity Measure Logit <i>SD</i>	0.42	0.33	0.31
Infit Mean-Square (Range)	0.54 – 1.77	0.71 – 1.25	0.66 – 1.38
Outfit Mean-Square (Range)	0.52 – 1.72	0.72 – 1.22	0.66 – 1.32

<sup>a</sup> Mean of examiner severity parameters constrained at 0.

### Field-Test Examiner Survey Results

The seven examiners who participated in the Operative Simulation field test grading session were sent a link to an online survey. The response rate was 100%. There were eight main questions and all questions offered the option to provide comments. There was a section for additional comments or suggestions at the end. Results for the eight questions are listed below, with a summary of responses and examples of comments.

Examiners responded unanimously to the first five questions, which asked about materials, instrumentation provided, difficulty of the grading tasks, as well as their understanding of, and ability to follow, the social distancing protocol. Possible responses to the first five questions were

Yes or No, except for Question 3, with possible responses of Easy, Moderate, or Difficult. The first five questions and the common responses are provided in Table 6.

Table 6. *Operative Simulation Grading Session Field-Test Examiner Survey Questions 1 to 5 with Responses*

Questions 1 to 5	Unanimous Response
1. Did the Candidate Guide and Examiner Manual adequately explain the simulation and grading procedures?	Yes, 100%
2. Were the social (physical) distancing instructions clear and easy to understand?	Yes, 100%
3. How difficult was it for you to maintain appropriate social (physical) distancing while serving as an examiner?	Easy, 100%
4. Did you have difficulty with any of the grading tasks?	No, 100%
5. Was the instrumentation provided for your use, everything you needed?	Yes, 100%

Optional comments associated with the first five questions were positive, e.g., regarding ability to maintain social distancing, (Question 3), “I felt very safe” and regarding grading tasks (Question 4), “Calibration was well orchestrated and provided the preparation necessary for us as examiners to perform efficiently and effectively. Nice job!”

Question 6 asked the field-test examiners about how well the calibration exercises prepared them for grading. Figure 9 illustrates the percentages of each response. Five examiners (71%) responded “Very well.” One commented, “It was my first time actually grading so it was very helpful to me.” Two (29%) responded “Well enough” accompanied by the following two comments, “Too detailed which sometimes can create more issues than being useful” and “This was a new exam but we made do,” which suggest that continued review and refinement may be useful. The criteria has already been evaluated and edited based on examiner feedback.

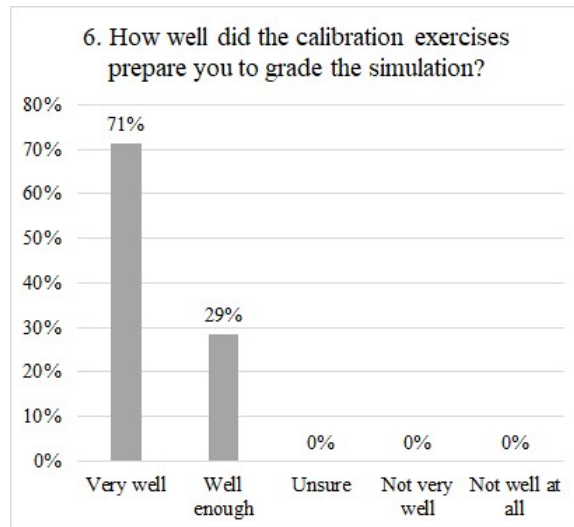


Figure 9. Proportion of different responses to Examiner Survey Question 6.

The grading criteria are nearly the same as the criteria used for the standard Operative Section, except for the removal of a few items, such as caries, pulp exposure and rubber dam isolation that do not apply for the Operative Simulation section. Question 7 asked the field-test examiners how well the modified criteria work for the simulation. Figure 10 shows the percentages of each response. Six examiners (86%) responded “Very well” or “Well enough,” evenly split between the two responses. One examiner responded “Unsure.” Only one comment was offered, “I think it’s easier to see mistakes on a manikin than in the mouth.”

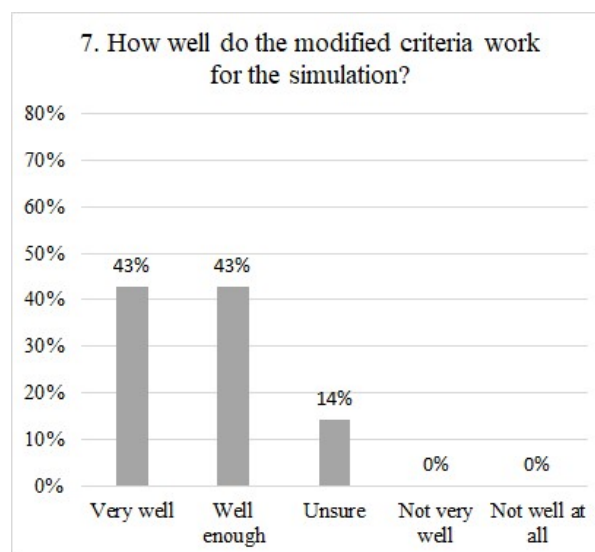


Figure 10. Proportion of different responses to Examiner Survey Question 7.

Question 8 asked field-test examiners whether they felt it was easier or more difficult to assess candidate performance with each candidate having received the same preparations. Figure 11 shows the percentages of each response. Five examiners (71%) felt it was easier, with four of them responding “Definitely easier” and one, “Somewhat easier.” Two examiners (29%) responded “About the same.” Comments included, “I would say that it levels the playing field and we still saw plenty of variation in performance for the finished restoration. Good simulation”, “It was more fair to the candidates!”, “Loved that part” and “As you see the same procedures over and over it becomes easy to compare and evaluate.”

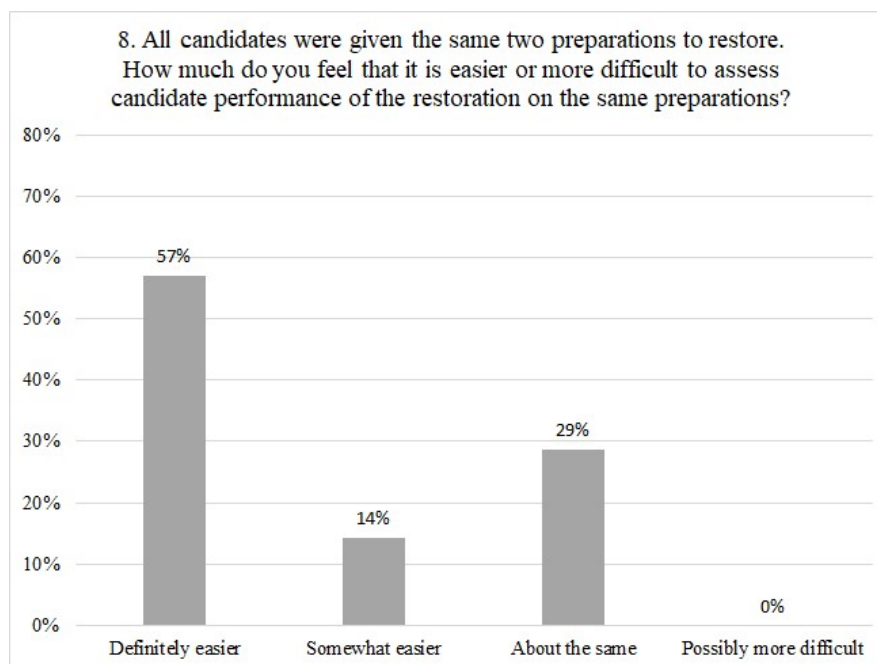


Figure 11. Proportion of different responses to Examiner Survey Question 8.

The section at the end inviting other comments or suggestions elicited one generic positive comment and two substantive comments suggesting that the Operative Examination Committee should consider including a means of failing or deducting points for examiner-validated gross open contact, e.g., “Grading for open contact is somehow still passing the candidate which I think it needs to be one of the automatic failure situations.” Changes to criteria descriptors that will impact scoring and address the suggestions made in the comments have been prepared and recommended to the committee for implementation.

### **Field Test Results: Candidate Performance and Test Quality**

Table 7 provides basic descriptive statistics for the raw and weighted means of medians computed from the three sets of examiner grades for each criterion. Direct comparisons to the standard Operative Section, particularly regarding criterion scores, are limited due to three factors. One is that only 5.5% of procedures performed for the standard Operative Section in 2019 were Class III procedures. All field-test attempts on the Operative Simulation Section included a Class III procedure. Since 2018, most states are accepting the results of performance on one Class II procedure if competence is demonstrated, so many candidates are completing Class II procedures. Years of Operative Section data have shown that the Class III is slightly, but significantly, less challenging than any Class II procedure and therefore, if completed, must be in combination with a Class II procedure. The second limiting factor is that many arches completed in the first, smaller field test, were modified to create additional exemplars of grading criteria performance levels during the development calibration materials and some performance levels may not be distributed within the sample in a comparable manner. The third factor is that the field-test host schools, which were chosen for location and convenience, given the conditions posed by COVID-19 and their students may not be a representative sample of all potential candidates.

Despite field-test limitations to direct comparison, three criteria and final scores (which include point deductions from penalties and loss of all points due to critical errors) were highly comparable. The slightly higher final score mean reflects a more negatively skewed distribution in the field test data; the passing percentage is actually somewhat lower for the field test than the standard Operative section in 2019. The significantly higher means of raw scores and some criteria for the field-tests may be related to the difference in procedure type in the comparison, particularly for Anatomical Form and Margins, which have traditionally scored significantly higher for the Class III procedure. Recent additions, since the field-test, to the criterion definitions for Internal Form related to grading examiner feedback are also expected to result in higher comparability.



Table 7. *Grading Criteria and Section Scores for Standard Operative Section and Operative Simulation Field Test: Means and Standard Deviations of Raw Unweighted Class II Median Criterion Scores, Raw and Final Scores, with t-Tests. Included are t values, probability values (p), effect size values (Cohen's d) degrees of freedom (df), and alpha level ( $\alpha$ ), i.e., significance below 0.05. Number of procedures noted as  $N_p$ , number of attempts noted as  $N$ .*

	Standard Operative Section 2019 $N_p = 2,553^a$		Operative Simulation Field Test 2020 $N_p = 164^a$		t-tests $df = 2,715; \alpha = 0.05$		
	Mean	SD	Mean	SD	t value	p value	Cohen's $d^b$
Outline and Extension	3.63	0.75	3.65	0.85	-0.27	0.79	0.02
Internal Form	3.62	0.74	3.85	0.65	-3.90	<0.01	0.33
Operative Environment	4.27	0.67	4.19	0.76	1.42	0.16	0.11
Anatomical Form	3.60	0.70	3.99	0.81	-6.86	<0.01	0.52
Margins	3.65	0.66	3.99	0.72	-6.32	<0.01	0.49
Finish, Function, & Damage	3.94	0.59	3.88	0.85	1.23	0.22	0.08
	$N = 2,166$		$N = 82$		$df = 2,246$		
Overall Raw Score	3.74	0.46	3.88	0.44	-2.76	0.01	0.31
Overall Final Score (with Penalties)	3.71	0.53	3.75	0.75	-0.69	0.49	0.06

<sup>a</sup> Only 5.5% of procedures performed in 2019 were Class III; 50% of Field test Procedures were Class III

<sup>b</sup> Generally accepted interpretations of Cohen's  $d$  effect size values are small,  $d = 0.2$ , medium,  $d = 0.5$  and large,  $d = 0.8$  (Cohen, 1988)

Table 8 provides field-test summary results from the many-faceted Rasch model (MFRM) analysis for graded criteria in logit, i.e., log-odds, values, with results from the 2019 standard Operative Section for reference. The MFRM analysis reported in Table 8 reflects the first day of grading, with complete sets of three grades per examination attempt. Mean-square fit statistics and discrimination parameter estimates are within suggested ranges. Since the criteria have multi-point

rating scales they were also assessed for category functioning, as well, in accordance with Linacre's (2002) rating scale guidelines to assess, e.g., that average parameter estimates of candidate ability increase with each category scale point.

Table 8. *Standard Operative Section and Operative Simulation Field Test: Many-Faceted Rasch Model Criterion Analysis Indicators in Logits.*

	Standard Operative Section 2019 <i>N</i> = 2,166	Operative Simulation Field Test 2020 <i>N</i> = 82
Criterion Measure Logit (Range)	-0.78 – 0.39	-0.37 – 0.43
Standard Error (Range)	0.02 – 0.02	0.08 – 0.10
Criterion Measure Logit Mean <sup>a</sup>	0.0	0.0
Criterion Measure Logit <i>SD</i>	0.50	0.25
Many-Facet Point-Biserial <i>r</i> <sup>b</sup> (Range)	0.25 – 0.32	0.23 – 0.37
2pl Discrimination Estimate <sup>c</sup> (Range)	0.92 – 1.08	0.76 – 1.10
Infit Mean-Square (Range)	0.93 – 1.07	0.85 – 1.19
Outfit Mean-Square (Range)	0.92 – 1.08	0.85 – 1.21

<sup>a</sup> Mean of criterion parameters constrained at 0

<sup>b</sup> Correlation between observations and corresponding average observations, excluding current observation

<sup>c</sup> Estimate of discrimination parameter, as calculated for two-parameter logistic IRT model; Rasch (c.f., one-parameter IRT) model fit requires values close to 1.00 (i.e., between 0.5 to 1.5 logits)

Table 9 provides summary statistics for overall test functioning, with 2019 standard Operative Section results for reference. The MFRM analysis reported in Table 9 also reflects the first day complete sets of three grades per examination attempt. Results are highly comparable, even with the large difference in sample size and limitations regarding comparisons noted earlier. The reliability estimate for the Operative Simulation Field Test is quite high for a performance-based assessment, at 0.91, which likely reflects the uniformity of the simulated teeth, in addition to high levels of examiner agreement. An additional MFRM analysis was conducted including all

examiner grades from both days of grading, yielding similar results and an even higher reliability estimate of 0.93, providing additional evidence of calibration effectiveness. (The Rasch person separation reliability estimate is the same or lower than Cronbach's alpha coefficient estimates of internal consistency reliability [Cronbach, 1951]. Minimum and maximum scores are excluded, if applicable; note that in the Many-faceted Rasch Model analysis, minimum and maximum refers to all raw grades, not median grades). Final score statistics include zero scores, which result from validated critical errors.

Table 9. *Standard Operative Section and Operative Simulation Field Test: Overall Test Summary Statistics*

Indicator	Standard Operative Section 2019	Operative Simulation Field Test 2020
<i>N</i> Attempts	2,166	82
Final Score Mean	3.71	3.75
Final Score <i>SD</i>	0.53	0.75
Minimum; Maximum	0.00; 5.00	0.00; 4.68
Standard Error of Measurement ( <i>SEM</i> )	0.21	0.23
Conditional <i>SEM</i> at Passing Score	0.08	0.09
<i>Indicators below are reported in logits.</i>		
Candidate Ability Estimate Mean	1.54	1.08
Candidate Ability Estimate <i>SD</i>	0.87	0.80
Candidate Ability Estimate Min.; Max.	-2.02; 5.04 (-5.59 <sup>a</sup> ; 5.04)	-0.71; 2.89
Person Separation Reliability Estimate <sup>b</sup>	0.85	0.91

<sup>a</sup> If minimum score(s) included: Facets software flags minimums and maximums and estimates test statistics with and without extremes

<sup>b</sup> Equivalent to alpha coefficient internal consistency reliability estimate (Cronbach, 1951), or lower than alpha, since minimum (zero) and maximum (perfect) scores are excluded

The percentage of candidates that scored at or above the passing cut score on the Operative Simulation field tests was 92.7% (76 out of 82). The passing percentage for the second, larger field test was lower than that of the first, due to penalties, including two attempts with validated critical errors (e.g., treated the wrong tooth) that lost all points. Table 10 provides passing percentages for the two Operative Simulation field tests, with the 2019 standard Operative Section passing percentage for reference.

Table 10. *Standard Operative Section and Operative Simulation Field Test: Passing Percentages*

	<i>N</i> Attempts	Passing Count	Failing Count	Passing Percentage
Standard Operative Section 2019 Season	2,166	2,079	87	96.0%
Operative Simulation Field Test 2020 - Total	82	76	6	92.7%
Field Test First Site March 30, 2020 (U. of OK)	20	19	1	95.0%
Field Test Second Site April 1-2, 2020 (U. of UT)	62	57	5	91.9%

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**23460 N. 19th Avenue, Suite 210 - Phoenix, Arizona 85027**

**Agenda Item (5)(f)**

**CE Broker Technical Proposal**

**From:** [Frank DiMaggio](#)  
**To:** [Angelica L. Bejar](#)  
**Subject:** FW: Potential Agenda Item for Nevada Dental Board  
**Date:** Thursday, August 20, 2020 11:31:14 AM  
**Attachments:** [CE Broker Proposal.pdf](#)  
[image001.png](#)  
[image002.png](#)  
[image003.png](#)  
[image004.png](#)

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Executive Director

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**From:** Donald Oliva [mailto: [REDACTED]]  
**Sent:** Monday, July 6, 2020 8:54 AM  
**To:** Frank DiMaggio; [REDACTED]  
**Cc:** Sandra Spilsbury; [REDACTED]  
[REDACTED]  
**Subject:** Potential Agenda Item for Nevada Dental Board

Good morning Mr. DiMaggio,

Hope all is well. I understand that you currently oversee the Nevada State Board of Dental Examiners, and wanted to share a bit of information regarding a potential agenda item for the Board to consider. This pertains to a new resource being used for effective monitoring and auditing of Continuing Education by professional licensing agencies.

Our organization partners with more than 120 licensing agencies in **18 states** to provide a free platform for licensing boards to monitor & enforce renewal requirements, and complete paperless CE audits. In essence, licensed professionals are able to upload CE/CME records directly online, or through our mobile applications, which are then stored securely for board staff members to access in the event of an audit. Our platform is unique in that we require no state funding, and impose no mandatory fees on the licensee.

We also have proven case-studies with a growing number of Dental Boards throughout the US - including **Florida, South Carolina, Tennessee, and Louisiana.**





Our goal is to create an environment where the board can avoid piles of paperwork in the event of an audit, and ensure that practitioners are meeting competency requirements for license renewal, without the need for mailed or faxed certificates.

Additionally, many of the records on our platform are uploaded directly from **AGD / ADA CERP** accredited educational providers (as we try to retrieve CE records directly from the source - and limit the extent to which license holders must self report).

This can truly relieve a significant amount of the burden for board staff when completing audits, as many of these records can be made available on-demand.

Furthermore, our platform is also compatible with a variety of licensing database systems. In light of this, many boards view CE Broker as somewhat of a "plug-in" application which can connect to the state licensing database and share compliance records in the background.

As with all of our projects for licensing agencies, this could be accomplished at no-cost to the state, since our platform is independently funded through a mixture of advertising revenue from CE providers and subscription services. We do not collect any fees or revenue whatsoever from our regulatory board partners.

Given this context, I was hoping to get in touch with your board to schedule a brief meeting or perhaps even a simple phone call to discuss the potential for taking the success model we've experienced with many of your regulatory peers, and applying it for Nevada.

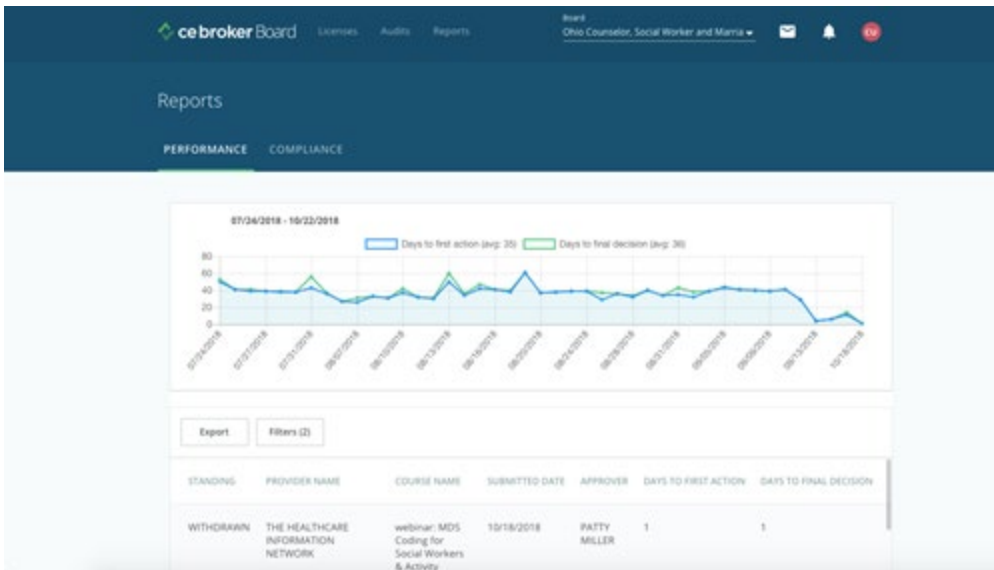
With that being said, I can only imagine you may have your hands full with other projects, so I wanted to share a quick resource below that you may review at your own convenience. If you have just a few moments to skim through the YouTube video shared below, I believe this may help you quickly determine if there would be any tangible benefits for your board.

<https://youtu.be/OFu0LxcZWB8> <---- **(Full Product Walkthrough Video)**

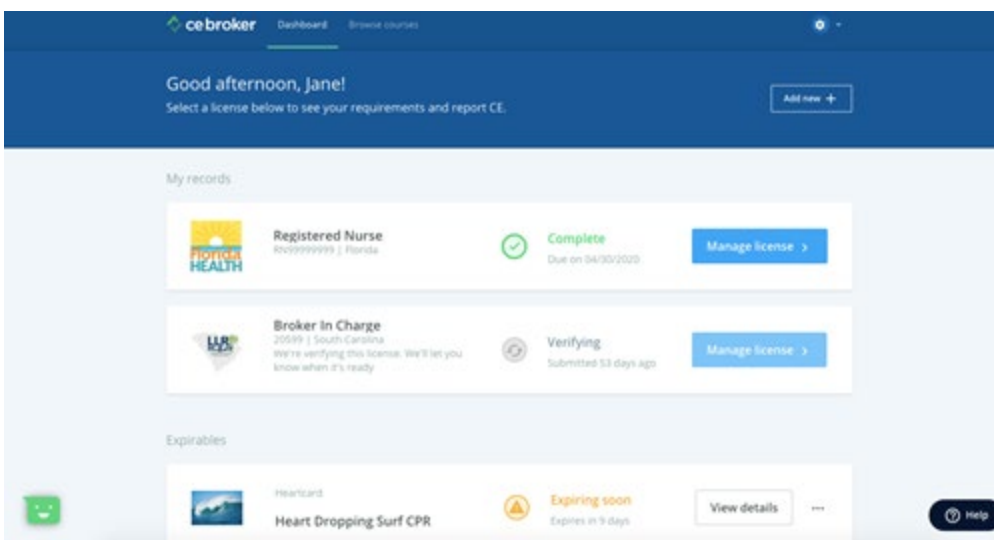
Video Timeline:

• Intro - (0:00 - 1:50) • Educational Provider Walkthrough (1:51 - 7:28) • CE Auditing Dashboard (7:29 - 14:31) • Licensee Account (14:32 - 20:55)

**1.) Board Suite** - This dashboard is used by licensing / auditing staff members to pull compliance reports, check CE Records, manage provider approvals / exemption requests, and complete audits as necessary.

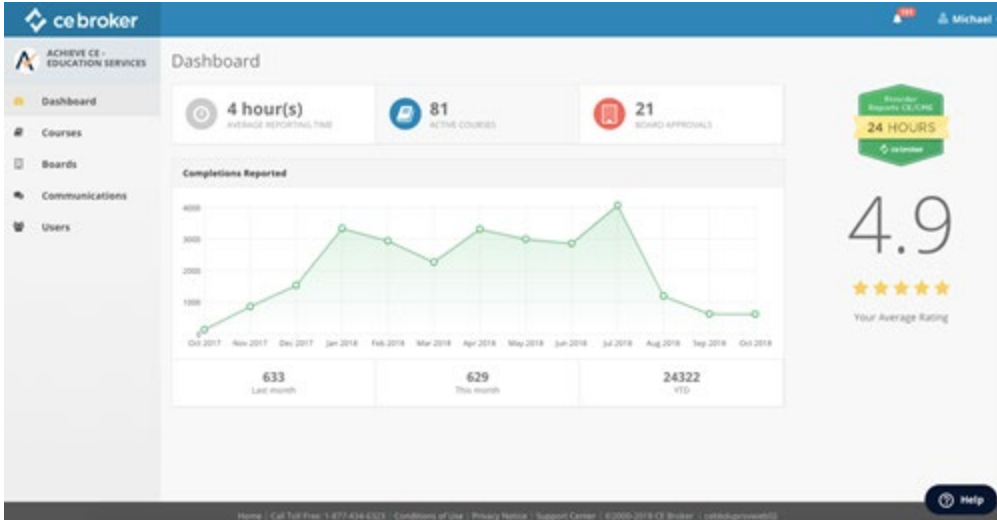


**2.) Licensee Suite** - This account is used by Licensed Professionals to manage individual, or multiple licenses. Licensees have the ability to view any Continued Competency requirements (*Including, but not limited to CE*), Submit certificates and records, respond to an audit, and find board-approved continuing education courses. This account is available online, and also through our newly redesigned mobile apps for Android and iOS.



**3.) Educational Provider Suite** - This dashboard is utilized by Educational Providers to get

courses listed on our platform, and to report attendance rosters and course completion data into the system. Any new CE Providers & Schools would have the ability to submit their application to the board for approval within this account as well. Additionally, all active courses are assigned unique identifiers for tracking, and we aggregate a variety of useful metrics like "average reporting time" that your board may review as necessary.



Hoping all of this information reaches you well, and looking forward to hearing your thoughts.

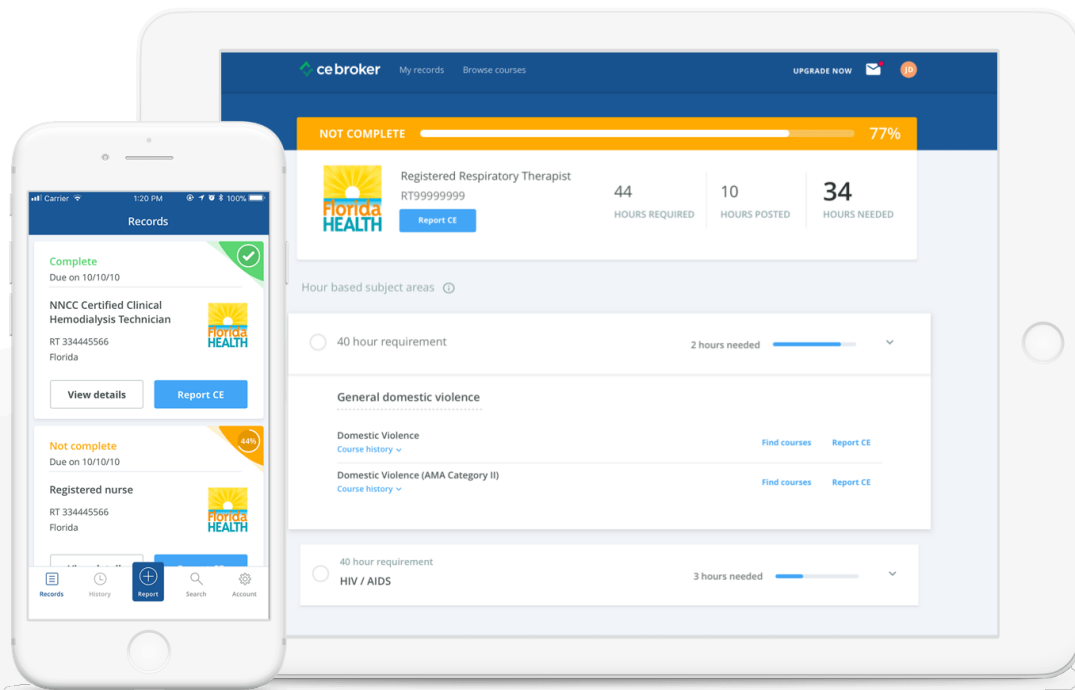
Donald Oliva  
Business Development Executive  
(904) - 746 - 3753 | 5210 Belfort Rd, Suite 320 | Jacksonville, FL 32256

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# Technical Proposal



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# CE Broker

In 2003, the state of Florida released an RFP for a system that could track CE Requirements for 28 healthcare boards, 74 different professions, and over half a million licensees. CE Broker was created as a response to this RFP and was awarded the contract.

Before beginning the project, CE Broker hired and trained a full support center to be available for requests from licensees, educational providers, and boards. Since then, our staff has grown to 75 employees across 3 states, and now offers dedicated support via phone, live chat, and email.

In 2013, the Florida Department of Health launched an initiative to enforce CE Compliance at the time of renewal, by leveraging our technology and infrastructure to integrate with their licensing database. This initiative removed the burden of conducting audits, by requiring that licensees report all continuing education into CE Broker before renewing a license. This has resulted in over \$500,000 in audit-related savings each year for the Department.\*

Since its creation, CE Broker has taken on more than 120+ regulating bodies in 18 states, and now tracks for over 2 million licensees nationwide across a wide array of professions. In this document, CE Broker's technical structure and capabilities will be explained.

*CE Broker  
tracks for over  
**2 million  
licensees**  
nationwide in  
a wide array  
of professions*



\* Source: FL Dept. of Health MQA 2014 Report: [http://www.floridahealth.gov/licensing-and-regulation/reports-and-publications/\\_documents/quarterly-reports-2nd-1415.pdf](http://www.floridahealth.gov/licensing-and-regulation/reports-and-publications/_documents/quarterly-reports-2nd-1415.pdf)

# Key Personnel



## **Brian Solano** | Chief Executive Officer

Brian provides strategic vision and leadership across all of CE Broker's web-based products with the goal of providing web-based solutions to simplify the continuing education compliance process.



## **Justin Mann** | Chief Operating Officer

Justin leads the customer support, partner success, quality assurance, software development, and HR teams at CE Broker.



## **Alex Lauderdale** | Director of Product Design

Alex is responsible for conceiving and implementing concepts, guidelines and strategies in various creative projects and overseeing them to completion.



## **Shane Hall** | Chief Strategy Officer

Shane is responsible for improving the organization's market position and financial growth while maintaining vast knowledge of current industry environment.



## **Devin Ernce** | Product Owner

Devin works directly with our software development teams to align projects with key stakeholder needs, and drive initiatives to deliver a quality user-experience on the CE Broker platform.



## **Marcia Mann** | Senior Partner Success Manager

Marcia leads our Partner Success Team, which is the primary point of contact for all licensing agencies using CE Broker today.



## **Liz Adams** | Implementation Specialist

Liz manages the initial implementation process for all of CE Broker's clients, and coordinates with QA and developers to ensure that our platform is accurately configured for each new project that we tackle.



## **Julie Stoshak** | Software Quality Assurance Manager

Julie is responsible for managing the flow of development projects, testing all software before it is released and other quality control processes.



## **Aaron Anderson** | Support Center Manager

Aaron manages and directs all aspects of inbound contact center operations.

# CE Broker's Framework

CE Broker's tracking system is a fully-hosted Software as a Service (SaaS) platform. All implementation, customization, hosting, training, maintenance, and ongoing customer support are handled by CE Broker staff without a fee to the state.

## System Design

CE Broker's design is user-driven in order to provide the best possible experience for licensees, providers, and boards.

## User Types



**Boards** | Licensing agencies can utilize CE Broker to complete paperless audits, review course or provider applications, monitor compliance reports, and enforce disciplinary educational requirements.



**Licensees** | Licensees have access to free accounts where they may report continuing education credits, respond to audits, find approved educational offerings, manage exemptions, and satisfy any competency requirements for license renewal.



**Education Providers** | Educational providers can utilize the provider suite to apply for any necessary board approvals, publish accredited offerings, and report attendance rosters or completion data on behalf of licensees.

## Scalability

CE Broker's system was designed to remain flexible and grow with state licensing agencies who face ever-changing rules and licensee populations.

Through flexible customization, fully-hosted support, and prompt response time, CE Broker is able to adjust with any board's needs. Our current infrastructure is designed to accommodate swift implementations for multi-disciplinary licensing agencies, as well as stand-alone projects for independent licensing boards—all the while ensuring that our system remains stable, scalable, and secure.



# Reporting Options



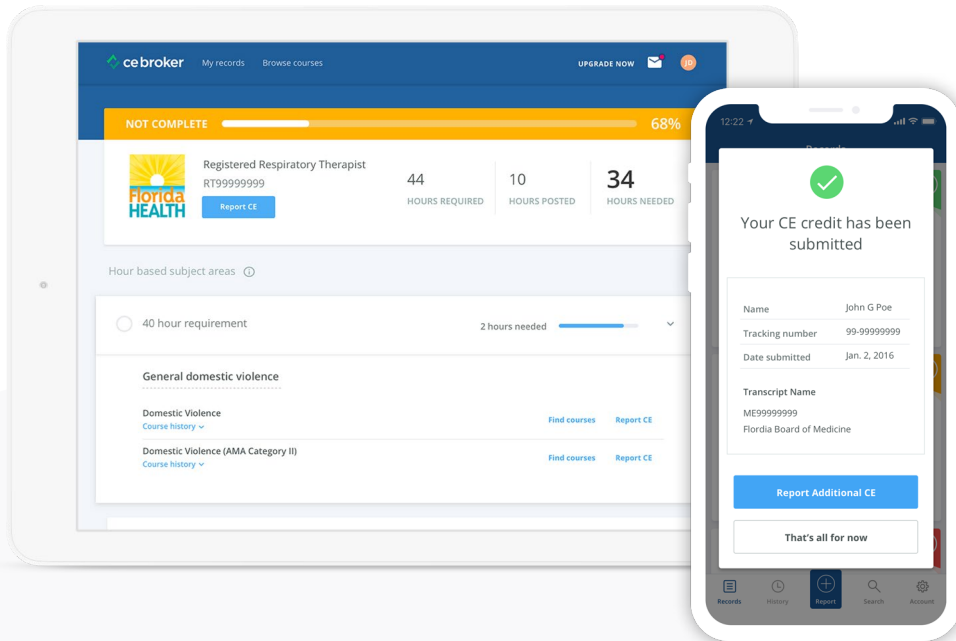
## Educational Provider CE Reporting

To accommodate a large array of educational providers, our suite supports multiple reporting options. This includes one-by-one submissions, bulk record uploads, and complete integrations for automated reporting. Our support team works with educational providers to find a solution that makes sense for them.



## Licensee CE Reporting

Licensees can easily report CE at any time from multiple devices. In many cases, educational providers will report CE on behalf of the licensee, but self-reporting is also available when necessary. During submission, the licensee must answer state-determined questions, and attach corresponding documentation to complete the submission.

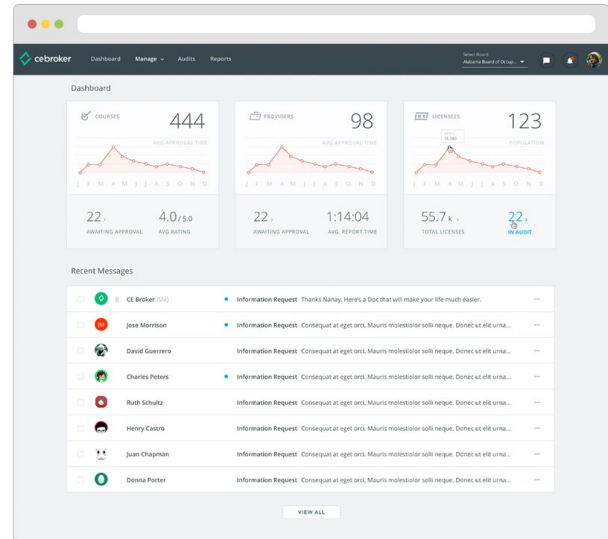


# The Board Suite

Licensing agencies have access to a secure suite of tools which allow for automated enforcement of competency requirements, and streamlined management of provider and course applications.

Tools available to board users:

- Paperless communication channels between agency staff, CE providers, and license holders
- Intuitive compliance reports on the overall licensee population
- Real time access to continuing education records and submissions
- Approval and review queues with automated reminders for course or provider applications
- Random audit functions with ability to leverage additional or disciplinary CE requirements on a case by case basis

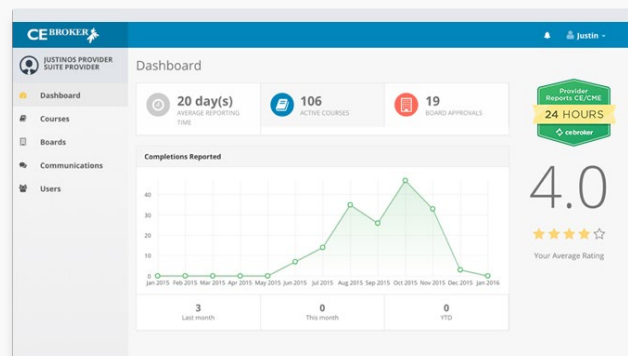


# The Provider Suite

Educational providers have access to their own secure suite of resources designed to increase efficiency, streamline approvals, and aggregate compliance data for the state.

Tools available to educational providers:

- Paperless communication between providers and agency staff or education committees
- Electronic submissions for any necessary applications
- Multiple reporting options to verify credits obtained on behalf of license holders
- Seamless tracking of approvals, national accreditations, course offerings, pending applications, and ratings from license holders.



# Auditing and Reports

All data is electronically collected from educational providers and licensees, so audits are transformed from paperwork-ridden investigations into quick, accurate verifications.

Disciplinary actions can be one of the most cumbersome functions of any audit. CE Broker's tracking system allows agency staff members to easily monitor and enforce disciplinary actions that may follow an audit. Whether the state audits licensees at the time of renewal, or as a random post-renewal audit, CE Broker enables licensing boards to efficiently audit up to 100% of the licensed population.

## AUDIT OPTION 1

### Compliance at Renewal

By integrating your licensing database with CE Broker's tracking system, your licensing and enforcement solution can query our system in real-time to verify CE compliance before renewal is permitted. Through this simple API, licensing boards have the ability to monitor up to 100% of their licensee population.

## AUDIT OPTION 2

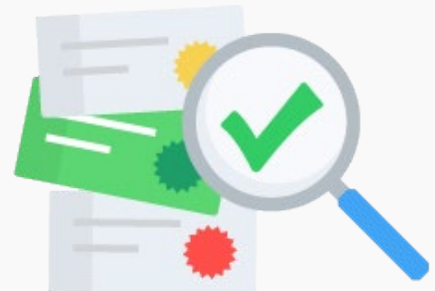
### Standard Post-Renewal Audit

Staff members responsible for completing audits have the ability to view all uploaded compliance documents and certifications before, after, and during the audit. Licensee records are immediately available upon query by name or license number. Staff members may also request additional records, send electronic notices and reminders, and complete the entire post-audit without tedious paper record requests or waiting on mailed documentation.

## Reports

CE Broker will provide the board with weekly, quarterly, and annual reports including information such as:

- Relevant statistics on licensee engagement
- Number of active educational providers
- Percentage of providers reporting
- Average reporting time
- Specific course completion metrics by category
- Detailed compliance statistics on the entire licensee population



# Licensee Account Types

## The Basic Account

We provide every licensee with a Basic Account. This account is free of charge and can accomplish any necessary task required to fulfill CE requirements.

With a Basic Account, licensees are able to:

- View your current compliance status at a glance
- Report and upload any necessary documentation to respond to an audit
- Find and compare course offerings
- Utilize our free mobile applications
- Enjoy multi-disciplinary license tracking
- View a chronological course history which details all self-submissions, along with any credits reported by educational providers
- Receive helpful notifications and renewal reminders regarding upcoming requirements and deadlines

## The Professional Account

Beyond our free account option, licensees may choose to purchase a Professional Account if they would like to further streamline the compliance reporting process.

The professional account is available for \$29/year, and offers the following functionality:

- View your current compliance status at a glance
- Report and upload any necessary documentation to respond to an audit
- Find and compare course offerings
- Utilize our free mobile applications
- Enjoy multi-disciplinary license tracking
- View a chronological course history which details all self-submissions, along with any credits reported by educational providers
- Receive helpful notifications and renewal reminders regarding upcoming requirements and deadlines
- Review a personally calculated CE Transcript, guiding the licensee through each individual requirement
- Track heart cards



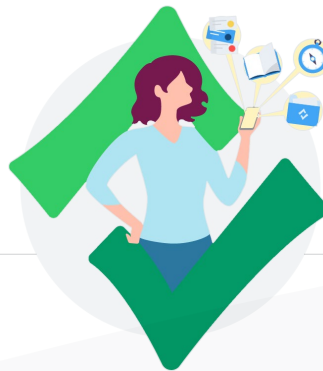
# The Concierge Account

With a Concierge Account, licensees are assigned a personal account manager who organizes, sorts, and reports all of their continuing education.

The Concierge account is available for \$99/year, and offers all of the features included in our professional account along with dedicated, and personalized support. This is primarily chosen for licensees desiring one-on-one help and guidance throughout the compliance process.



- One-on-one help
- Access to an immediate, high-priority private support line
- Personalized assistance tracking CE
- Dedicated account manager to review and assist with reporting continuing education
- Assistance with finding appropriate courses to satisfy specific renewal requirements, for any given license type
- Automated reminders on relevant deadlines or changes in requirements



*Approximately **87% of licensed professionals currently take advantage of the free Basic account**, with the remaining 13% choosing voluntary subscriptions for added convenience.*

# Full Service Support Center

CE Broker houses a fully-trained Support Center which serves our clients in multiple ways:

- Licensees and Educational Providers can call, email, or live chat with our support representatives
- Board staff members can immediately contact a designated Partner Success Manager to handle requests promptly. Board requests are routed separately from our traditional support channels, to ensure an expedited response and resolution.
- CE Broker does not outsource client support to any third parties. All client support is managed in-house, and our staff are trained on the various rules & requirements for each board prior to going live. This ensures that we can provide quality support, and alleviate burden wherever possible.

## Support Channels



**Email** | CE Broker Support Center staff reply to emails quickly and efficiently throughout the day.



**LiveChat** | Live Chat allows users to receive real-time help without having to pick up the phone.



**Phone** | Licensees, board staff, and educational providers all have access to live support over the phone, Monday through Friday, during regular business hours.

Additional Resources on our website:

- User Specific FAQ's & Tutorials
- Product demonstrations and walkthroughs for all system functionality
- Contact information for various requests & relevant details on the platform

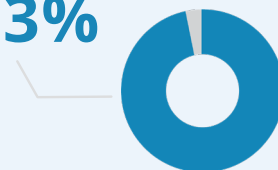
Average CSAT score is

**4.41/5**



Chat satisfaction is

**93%**

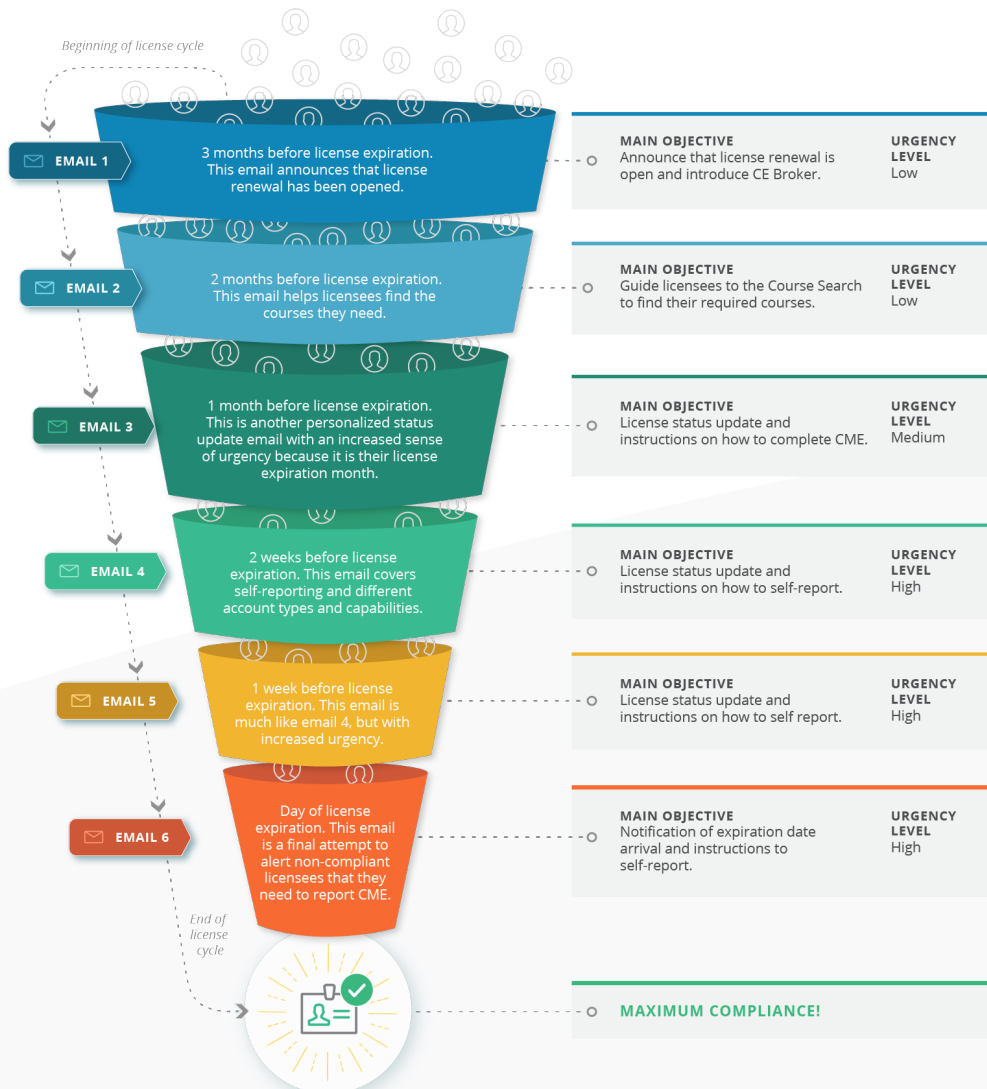


# Renewal Email System

In addition to CE Broker’s efforts to provide quality client support, we also provide a communications & marketing team to assist our clients with licensee announcements, increasing engagement, and awareness campaigns for new requirements or changes in rules and regulations.

During their renewal window, licensees receive helpful email alerts including the following:

- Personalized updates on current compliance status or requirements
- CE Reporting instructions and guidelines
- Ongoing reminders on relevant deadlines
- Links to Support Center channels and relevant knowledge articles
- Answers to frequently asked questions



*Our automated renewal reminders have increased compliance rates by more than 30%, and serve to simplify the renewal process for both licensees and boards.*

# Enterprise Grade Security

All data collected or processed through our platform is housed securely within geo-redundant data servers located in Jacksonville, Florida and Louisville, Colorado.

## CE Broker Services Uptime

No scheduled maintenance is allowed during regular business hours (M-F 8a-8p). Software updates are usually released on Sunday nights; no downtime is required. The system is monitored 24x7x365.

**99.5% Uptime**

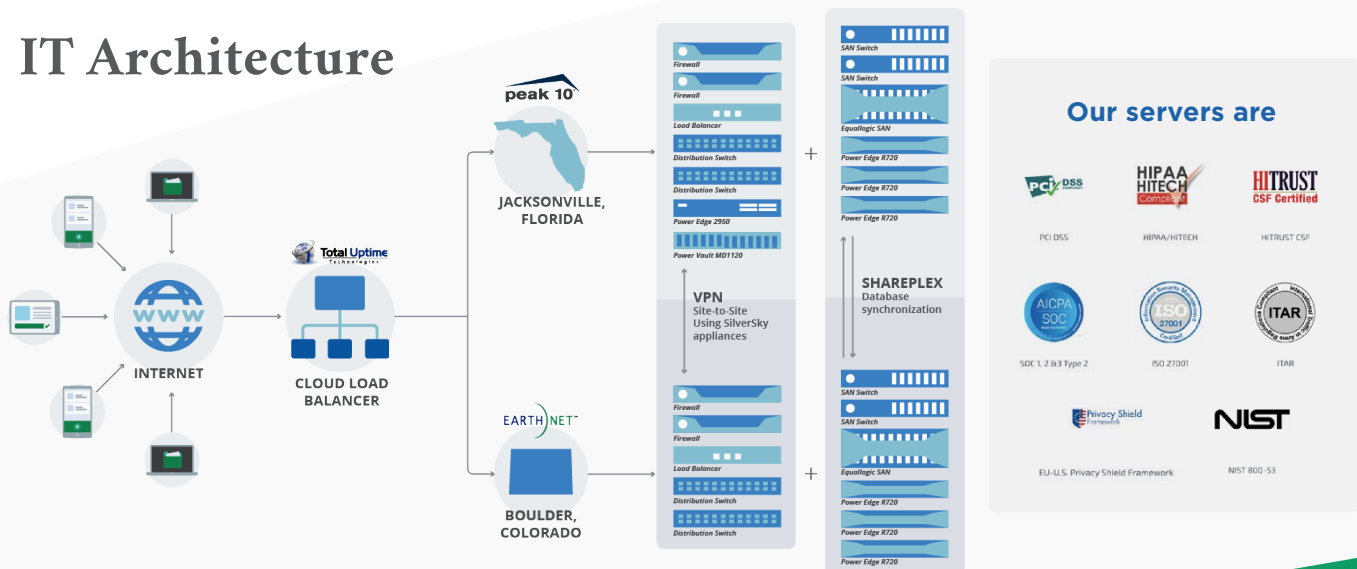
**CE Broker System**

- Public Website
- Private Website
- Authentication Services
- Web services

## System Encryption & Security

- A majority of the information collected is considered public domain, and available on license verification webpages for consumers. This would include data such as: licensee name, license number, issue date, expiration date, etc. CE Broker does not collect or require sensitive information that does not pertain to CE Requirements.
- With hosted data, CE Broker agrees to prevent disclosure of any proprietary or confidential information to any third parties. Beyond this, all of our data is encrypted at rest and in transit in accordance with Federal Information Processing Standards (FIPS)
- **Flexential** | Our Jacksonville servers boast a 100 Gbps Network backbone, scalable to 400 Gbps, with 80 on-net carriers and proactive DDoS protection. Flexential also holds a variety of certifications ranging from HIPAA and PCI Compliance to NIST Compliance, thus surpassing most network security requirements for our SLA contracts.
- **Massive Networks** | Our Louisville servers offer similarly robust network security, allowing CEB to reach or surpass 99% uptime, while being certified for SSAE 18, HIPAA, HITRUST, and PCI Compliance. Their Louisville location boasts multiple redundancies including Dual UPS (A&B Feeds), Cummins Diesel Generators, and a redundant 20-ton Liebert HVAC to help eliminate downtime for any single point of failure.

## IT Architecture





# Implementation Process



## In-Depth Rule Review

First, our Partner Success team goes through your CE Laws & Rules to identify the scope, and level of customization required for the project. Then, an Implementation Specialist begins mapping out your licensure scenarios, for every possible nuance and combination of requirements. By the end of this process, we will have effectively created 100% accurate transcripts for every license type under your jurisdiction.

## Development

We pass off the information gathered in our research and design phase over to the development team. Our developers immediately begin building out the system and handling any necessary customization requests.

## Quality Assurance Testing

Our Quality Assurance team begins hands-on work to ensure the system is ready to go-live, stable, and that every licensure scenario is reflecting properly. We ensure that your staff receive a polished product, regardless of the complexity involved for any license type.

## Training

Our Partner Success team will provide personalized training to ensure that your staff members become experts with the system, before launching. We use a combination of webinars, virtual recordings, and in-person meetings to bring your whole team up to speed.

## Go Live!

Our Marketing & Communications teams will assist your staff with the initial announcements, and ongoing outreach to licensees, providers, and associations to ensure that every stakeholder is on-board.

# CE Broker Employee, Client Base, and Office Locations

CE Broker's system was designed to be flexible and grow with state licensing agencies who face ever-changing rules and licensee populations.

**CE Broker staff includes:** 75 Total Employees

## CE Broker client base includes:

- 120 State Licensing Boards across 18 US States, including: Florida, Georgia, Tennessee, South Carolina, Alabama, Arizona, Arkansas, North Carolina, Louisiana, Mississippi, West Virginia, Ohio, Oklahoma, Michigan, Idaho, New Mexico, and the District of Columbia. We also work with the national Medical Council Board in the Bahamas.
- Over 8,000 educational providers that register their accredited courses and report course completion data.
- Over 2,000,000 licensees using the system to monitor and track their CE compliance.

## CE Broker office locations:

### Jacksonville, FL

5210 Belfort Road, Suite 320  
Jacksonville, Florida 32256  
Phone | (877) 434-6323  
Fax | (877) 349-0208

This location houses CE Broker's core operations, including partner success, business development, support center, IT, accounting and administration.

### Boulder, CO

1023 Walnut St 80302

This location houses the CE Broker executive leadership, communications, and product design teams.

