

review of basic science & clinical dentistry

volume II clinical dentistry

editors

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REVIEW
OF
BASIC SCIENCE
AND
CLINICAL DENTISTRY

Volume II | Clinical Dentistry

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The authors and publisher have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with current recommendations and practice at the time of publication. However, in view of ongoing research, changes in government regulations, and the constant flow of information relating to drug therapy and drug reactions, the reader is urged to check the package insert for each drug for any change in indications and dosage and for added warnings and precautions. This is particularly important when the recommended agent is a new and/or infrequently employed drug.

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Volume II | Clinical Dentistry

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PREFACE

At present, over 50% of the licensing jurisdictions require candidates to pass Parts I and II of the National Board Examinations. The American Association of Dental Examiners assists by distributing an outline of the subject matter covered in the questions contributed by each of the 59 dental schools. Therefore, one can say that the National Board Examinations survey aspects of American dental school curricula.

Dental educators are interested in the knowledge and skills taught in other schools as well as in sharing their own most recent academic developments. Such faculty are generally dedicated and committed individuals who strive not only to impart the "common body of biologic knowledge," but also to develop in dental students the skills and attitudes needed to deliver excellent oral health care.

However, basic science educators feel a sense of frustration. Owing to a knowledge explosion in the basic sciences as related to dentistry during the past decade, members of faculty feel that they are proceeding faster than the students are assimilating the material. Their concern is that, with little time for review, students do not retain enough content. This situation leads to *memorization* as opposed to *comprehension*. Yet, the students themselves are aware that memorization is not the approach best suited for the problem-oriented examination questions.

Dental students like to compare performances with other dental students who take the Boards. Correspondingly, they are proud of their alma mater and want their schools to compare favorably with other schools.

The primary emphasis of this volume of *Review of Basic Science and Clinical Dentistry* is to present specific content areas covered by Part II of the National Board Examinations. Authors who are well-versed in the basic principles and current practices in dentistry have been selected to write on content areas as presented in the outline from the American Association of Dental Examiners. When a dental topic is covered in more than one test, the authors will identify this distribution of content. To illustrate, the chapter on Biomaterials will incorporate the related areas in Operative Dentistry and Prosthodontics. The chapter on

Community and Preventive Dentistry will deal with DAU-TEAM which is covered in Operative Dentistry, and with diet, nutrition, and preventive dentistry which are covered in Operative Dentistry, Pedodontics, and Periodontics. The chapter on Behavioral Sciences will discuss aspects of child and parent psychology, the handicapped child, recognition of fear, methods of management, and psychological aspects of temporomandibular joint dysfunction. Further, the authors have incorporated into each chapter representative questions similar to the National Board questions, which present difficult cases and complex problems.

The authors also stress the need for students to have a positive attitude, self-confidence, and mental readiness for the problem-solving questions. A student can study this volume from the viewpoint of comprehension instead of memorization—that is, by synthesizing the principles of the basic sciences. Students may still discover content which they have not covered when they take the National Board Examinations, but they should not rationalize their lack of knowledge by blaming the faculty. Instead, they should acknowledge that there are deficiencies in their storehouse of information and accept responsibility for remedying these deficiencies.

The editors hope that this volume will reinforce existing knowledge, upgrade the present level of education in dental students, and increase self-confidence and self-respect. It will prepare students to undertake the National Board, and Regional and State Licensing examinations.

A note to the practitioner: to justify legally one's position as an expert, a practicing dentist must maintain a practical knowledge of his or her profession relative to biologic dentistry. There have been remarkable developments in dentistry over the past ten years; diagnosis, treatment, and the approach to treatment are significantly different now. For those who may be required to take state board dental examinations for relicensing, this volume will be a friend. It will be equally valuable in assessing one's own knowledge in terms of both past and present norms.

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1

HOW TO PREPARE FOR AND TAKE THE NATIONAL BOARDS:

SELF-ACTIVATION IS THE KEY TO SUCCESS

Diane M. Brown / Victor M. Coury

Because adequate and effective dental service must take into account biologic needs, students must develop a working knowledge of oral-systemic relationships in both health and disease, of the biologic significance of preventive, restorative, and prosthetic services, and of the interdependence of the dental practitioner and physician in coping with the total health needs of the patient and community. Societal trends, which assist the dental educator in the identification of dental requirements, are making the following demands upon the practitioner: 1) the individual must demonstrate in practice a thorough understanding of the structures, functions, and diseases of the mouth; 2) the individual must be able to deliver dental treatment according to published criteria for acceptable dental procedures; and 3) the individual must be able to defend the dental treatment.

It is generally agreed that the dental graduate must be able to meet certain basic objectives. For example, the graduate must be able to

1. Develop a sound diagnosis and treatment plan
2. Perform acceptable restorative procedures
3. Detect, diagnose, and manage an oral cancer patient
4. Evaluate the safety in use of dental materials
5. Detect, diagnose, and treat periodontal problems
6. Manage a dental emergency
7. Adjust occlusion for oral harmony
8. Administer myofunctional therapy for temporomandibular joint (TMJ) disorders
9. Establish safeguards against mercury vaporization, radiation scatter, and transference of hepatitis
10. Utilize auxiliaries efficiently
11. Manage dental office personnel
12. Manage patients according to established principles of human behavior

The National Board Dental Examinations aid in the evaluation of these abilities by attempting to 1) survey and evaluate the curricula of dental schools, 2) offer each student the results as to the level of his or her basic knowledge of dentistry in comparison to the national population of dental students, and 3) assess the problem-solving abilities of students. The National Board Examinations, which cover the material taught in all 59 dental colleges, are divided into two sections, the second of which has seven tests.

PART II

Operative Dentistry
Pharmacology
Prosthodontics
Oral Surgery and Pain Control
Orthodontics and Pedodontics
Oral Pathology and Radiography
Endodontics and Periodontics

Students taking Part II should be aware that the examination on Operative Dentistry includes preventive dentistry, auxiliary utilization, TEAM, dental materials, disease control, and occlusion, as well as operative dentistry. The examination on Prosthodontics includes dental materials, occlusion, partial dentures, fixed bridges, and complete dentures.

A revision in National Board regulations allows a student who fails one or more examinations to take a reexamination in individual subjects only if the student's average score is 75 or higher. Students who earn average scores below 75 are required to repeat the entire part. For example, scores of 85, 75, 78, 60, 82, 76, and 70 on the seven parts of Part II indicate that the student passed five of the seven tests. The average of these seven tests, however, is 74; the student is therefore required to repeat the entire examination.

Presently, 28 of 53 licensing jurisdictions require a student to pass both Parts I and II to be a licensed dentist. All portions of Part I must be passed before a student may take Part II; there are no exceptions.

CAN YOU PREPARE YOURSELF TO TAKE THE NATIONAL BOARD EXAMINATIONS?

Yes, you certainly can. Although this volume is not a complete dental education in itself, it is a high quality review.

To prepare for the tests you must motivate yourself and get into a frame of mind for learning. It has been demonstrated that studies initiated and pursued by an individual with a clear goal in mind are the most successful. Self-motivation is a key to success. This volume will give you the self-confidence you need to succeed.

This book will also give you the feel of the examinations. The content in this volume follows the content outline of the National Boards. The practice questions are problem-solving, multiple choice questions similar to those found in the National Boards. In answering them you will add to your knowledge by learning the correct answers. This will help you to remember much you thought you had forgotten.

There is no substitute for knowledge in the specific content areas; test-taking technique or guessing will not earn a passing score. This review will test your level of knowledge by assessing your areas of strength and weakness. Weak content areas can be explored further for new learning.

WHAT IS THE BEST WAY TO PREPARE FOR THE NATIONAL BOARD EXAMINATIONS?

The best general rule for taking any examination is to "be prepared." This means having a thorough mastery of the material and having it so well organized that you can recall it in any form requested. It means being prepared for the kind of examination you are to take and for all possible questions. It means being rested and calm.

Some students prefer to review alone, while others prefer to study in groups. Small study groups of five or six students can be beneficial, since social learning tends to promote self-esteem and self-confidence. Groups should be a mixture of average and bright students in order for this to occur. Each student needs to discover that he or she is capable of selecting correct answers. Students should practice with diagnostic- and problem-type questions from this volume and from released National Boards. Each of the alternative answers should be discussed so that you understand *why* one answer is correct and others wrong.

Reprints of the most recently released National Boards are available through the American Student Dental Association (ASDA). These tests are distributed in cooperation with the American Dental Association (ADA) Commission on National Dental Examinations, and may be ordered from

ASDA
211 East Chicago Avenue
Chicago, IL 60611

Review sessions should be frequent in order to reinforce learning, but not too long in duration. If you continue to study after mental fatigue has set in, you will be unable to recall what you have studied. You will be working against yourself. The mind functions best when it has adequate rest.

Types of Questions

You must be prepared for the types of questions included on the National Board Examinations. The Commission on National Dental Examinations has prepared a brief guide (4) to indicate the types and form of objective questions which are presently being used in the examinations.*

COMPLETION. In one type of completion the problem or situation is posed in the stem of the item. The student, therefore, knows exactly what is being asked of him. The stem plus the correct answer makes a complete sentence.

1. The most frequent cause of failure of silver amalgam restorations is
 1. improper cavity preparation
 2. moisture contamination
 3. inferior alloy
 4. improper manipulation of the amalgam

In a second type of completion the stem may include several sentences, such as in a case study.

2. A tooth with a 3-month history of occasional severe pain began to ache steadily. The pain was worse when hot liquids were in the mouth. After extraction, the tooth was split open. The pulp chamber was completely filled with pus. A few remnants of pulp tissue were found in the apical end of the root canal. The condition described is
 1. acute partial pulpitis
 2. acute total pulpitis
 3. suppurative pulpitis
 4. strangulation of the pulp
 5. chronic total pulpitis

Another type of completion question has more than one correct answer.

* Examples are taken from National Board Dental Examinations: Guide for the Construction of Test Items. Chicago, Commission on National Dental Examinations, ADA, July, 1976.

3. The tension developed by a given muscle on its tendon is determined by
- the number of muscle fibers stimulated
 - whether or not the stimulus is supermaximal for all fibers
 - frequency of stimulation of each muscle fiber
 - the wave form of the maximal stimulus
 - the prestimulation length of the muscle fibers
- a
 - a, b, and e
 - a, c, and e
 - b and d
 - c and d

QUESTION. As in the completion question the problem is posed in the stem. In this case the stem is a complete thought in the form of a question. The choices may be nouns, adjectives, adverbs, phrases, clauses, or sentences, but all are the same in any given item.

4. Which of the following substances is believed to be essential, in the process of repair, for the chemical transformation of procollagen to collagen fibers?
- Vitamin A
 - Vitamin C
 - Thromboplastin
 - Cortisone
 - Prothrombin

Some questions will have more than one correct answer.

5. Which of the following cells or tissues have a good capacity for regeneration after injury or loss?
- Collagenous fibrous tissue
 - Spinal cord
 - Epithelium of mucous membranes
 - Skeletal muscle
 - Renal glomeruli
 - Cardiac muscle
- a and b
 - a, b, and c
 - a and c
 - a, c, e and f
 - c, d, and e

CAUSE AND EFFECT. The sentences in these items consist of a statement and a reason for that statement. The student must decide if

- Both statement and reason are correct and related.
- Both statement and reason are correct and *not* related.
- The statement is correct but the reason is *not*.
- The statement is *not* correct, but the reason is an accurate statement.
- Neither* statement nor reason is correct.
- Penicillinase will reduce blood levels of penicillin *be-*

cause this enzyme renders penicillin inactive by competitive inhibition.

- Atropine is used as premedication in general anesthesia with cyclopropane *because* atropine will block reflex bradycardia.
- Epinephrine is contraindicated in patients during cyclopropane anesthesia *because* under cyclopropane epinephrine may precipitate ventricular arrhythmia.
- A patient who responds to aspirin with severe dyspnea should be given an immediate subcutaneous injection of epinephrine *because* epinephrine relaxes the bronchial spasm.

The six types of items discussed have been approved by the Commission for use in the National Board Examinations. True-false items are no longer used, and negative items are discouraged. Since the National Board Examinations are written according to test construction norms, there are few grammatical clues to the correct answer, such as the articles a, an, and the.

Rest and Relaxation

As stated previously, being prepared also means being rested and calm. It does not pay to go without food, sleep, and recreation to cram for an examination. The student who crams pushes himself beyond the point of efficiency. The learner is "wasting time in the sense of getting less return for the investment of energy" (2).

Research has shown that a good night's sleep is essential to consolidate memories (6). Scientists have known for a long time that rapid eye movement (REM) during sleep indicates periods of dream sleep which serves crucial needs, and it appears that memory is one of those needs. The evidence indicates that the student who stays up all night cramming for a test is only introducing information that really cannot be learned, because the effort involved in staying awake prevents it. The next day none of the information can be recalled, and it will be of no use in the future because it has not been fully incorporated in the student's mind. On the other hand, the student who gets a good night's sleep is consolidating the material and making it a part of his or her long-term memory.

It is wise to relax deliberately just before the examination. Do not try to do a last minute review. All you can do with last minute reviewing is to confuse yourself with details. Rather, spend the few minutes before the examination in small talk or in reading a newspaper.

HOW TO TAKE THE NATIONAL BOARD DENTAL EXAMINATIONS

The important point in taking any examination is to have a definite plan in mind. People who know what to

do and how they are going to do it seldom get upset or panicky.

The first step in beginning the examination is to read all directions carefully so that you will be able to answer in exactly the way specified. Directions such as choose the "best" or "most closely related" indicate that all alternatives are plausible, but only one is correct.

Next divide the total number of questions in a section by the time allocated for them in order to judge how much time to spend on each question. Approximately 1 min per question is allocated. It is to the student's advantage to utilize the full 3½ hours in each session. A student who finished the test quickly in a session probably did not analyze the questions carefully.

Approach each question by identifying the stated problem in the stem. It is very important that the stem and alternatives/distractors be accepted exactly as written, because each word was selected for a purpose. The meaning of each word must be precise, as defined in dental textbooks.

The examination is a straightforward test of your basic knowledge; the test items and alternative answers are not intended to trick you. Answer each question from the general principle rather than from the exception. You may have learned to respond to the exceptions on test items from your past experiences; however, this procedure is not appropriate for a test of basic knowledge like the National Board Examinations.

The test score is the total number of correct answers. Therefore it is usually best to go through the examination first, answering all the questions of which you are sure. In surveying the test, you might use a T to code those questions which will require more time for answering; and a G to code those which may require guessing. Answer the "time" (T) questions the second time through the examination, and leave the "guessing" (G) questions until last.

Concentrate on one question at a time. This ability is sometimes called "bridge-player's mentality"; it simply means ignoring the preceding and following questions unless the question at hand is a diagnostic interpretation question. The fact that "guessing" and "time" questions tend to linger in your mind and further reduce your concentration for the question at hand, is another reason why these should be coded and dealt with after you've answered questions that are easier for you.

You will probably be tempted to change some answers. If some answers are changed, be sure the first markings are completely erased. If you are uncertain between two answers, however, leave the answer you set down originally. Research has shown that when you are guessing, your first guess, based on careful reading, is likely to be your best guess.

HOW TO ATTACK OBJECTIVE QUESTIONS

You should determine a plan for dealing with those questions about which you are uncertain. Following are some comments on how to attack objective questions (5):

1. **Read everything that is written and use it.** For example, suppose there are seven questions about Mrs. Doe. Preceding the first question is a brief personal, medical, dental, and social history of Mrs. Doe. Between questions 4 and 5 is a progress note in large type which reads, "Mrs. Doe improves. Oxygen therapy is discontinued." The beginning of question 5 reads, "On the basis of the information provided about Mrs. Doe. . . ." In answering question 5, students should consider the information in Mrs. Doe's history that precedes the first question, the information given in the stems of the four preceding questions, and the information in the progress note immediately preceding question 5, plus, of course, whatever else is included in the stem of question 5. In a sense this use of cumulative information in a patient-centered test situation is analogous to a real patient's medical and dental histories, doctors' orders, and medical and dental progress notes.
2. **Do not read into items what is not there.** Focus on the question or problem as it is stated in the stem. All of the options of an item may be correct or best for some situation or patient, but only one option is correct or best in terms of the specific question or problem posed in the item's stem. If an item begins, "in general" or "as a rule," the focus is on that which is generally true, correct, or best, not that which is only rarely the case.
3. **Pay attention to words in the stems that are underlined or capitalized.** The deliberate accenting of certain words in stems is part of the design of the items.
4. **Select the best answer of those provided, even though there may be another answer just as good which is not included.** Some students become confused when they do not see their favorite answer to a particular problem. Good test construction avoids the obvious, that is, it excludes correct answers that are so common as to be clichés. In addition, the person prepared for professional life must understand not only the main or primary factors involved in a problem but also the subordinate and contributing ones.
5. **Try to select the correct answer directly; if you cannot, try to determine the answer by eliminating the distractors.** When distractors are well constructed, the indirect route to the correct answer

often requires more knowledge than the direct route, so the indirect method of selecting the correct answer to multiple choice test items is an acceptable practice.

6. **Do not add an “always,” “all,” or “every” which is not in the stem.** For example, “A great deal of bickering occurs among brothers and sisters.” This is true. Some students will mark it false, however, because their mental item read, “A great deal of bickering occurs among *all* brothers and sisters.” This is not the same question.
7. **Guard against omitting or dropping qualifying phrases such as “generally” or “to some extent.”** One way to prevent dropping a qualifying phrase is to underline “generally,” “not,” “sometimes,” “in part,” etc.
8. **Do not change the question by adding or deleting a qualifying phrase.**
9. **Be alert to double negatives.** “No one is always incorrect” does not mean “someone is always correct.”
10. **Do not change your answers.**
11. **There is no system in the listing of multiple choice answers.** Each statement must be answered on its own merit.

Guess intelligently since there is no penalty for guessing. If you can eliminate all but two alternatives, then it would be wise to flip a coin in order to obtain an unbiased choice between those two. If you knew the answer, there would be no choice to make; if you do not flip a coin, the chances are you will be snared by a word which surely introduces a bias. Flip the coin and give yourself a true 50–50 chance. If you are totally uninformed about the alternatives, randomly select one of the alternatives, making certain not to waste valuable time with such questions. You cannot pass the examination on guessing only, however. The probability of guessing 19 correct answers in a row, when given four choices, is 1 in 274,877,906,944 (Table 1-1).

A percentage of questions will fall into the category of the most difficult. When unable to answer these, do not be discouraged, but proceed with the test. No one is expected to get a perfect score. Your score will compare your performance with that of others taking the examinations.

HOW ARE NATIONAL BOARD EXAMINATIONS GRADED?

One point is given for each right answer. There is no penalty for guessing, so be sure to answer every question. The examinations are graded on a curve. The national average raw score is always equated with a standard score of 85. For example, if the national average raw score on a test were 60

Table 1-1. Probabilities for Guessing Successive Correct Answer from Four Choices

NO. OF CORRECT GUESSES	PROBABILITY*
1	$(1/4)^1 = 1/4$
2	$(1/4)^2 = 1/16$
3	$(1/4)^3 = 1/64$
4	$(1/4)^4 = 1/256$
5	$(1/4)^5 = 1/1,024$
6	$(1/4)^6 = 1/4,096$
7	$(1/4)^7 = 1/16,384$
8	$(1/4)^8 = 1/65,536$
9	$(1/4)^9 = 1/262,144$
10	$(1/4)^{10} = 1/1,048,576$
11	$(1/4)^{11} = 1/4,194,304$
12	$(1/4)^{12} = 1/16,777,216$
13	$(1/4)^{13} = 1/67,108,864$
14	$(1/4)^{14} = 1/268,435,456$
15	$(1/4)^{15} = 1/1,073,741,824$
16	$(1/4)^{16} = 1/4,294,967,296$
17	$(1/4)^{17} = 1/17,179,869,184$
18	$(1/4)^{18} = 1/68,719,476,736$
19	$(1/4)^{19} = 1/274,877,906,944$

* In general, the probability of guessing the correct answer from four choices n times in succession is $(1/4)^n$.

points, *any student who answered 60 questions out of 100 correctly would receive a score of 85.* Without attempting to go into the statistics involved, two questions generally equal one standard point. In this example, when 60 right answers equal a score of 85, 40 right answers would equal a score of 75 [1].

HOW MANY RIGHT ANSWERS DO YOU NEED TO PASS ANY ONE TEST?

This varies from year to year and from test to test. On Part II, if a test has 100 questions, *about 55 right answers are required for a passing grade*, except in pharmacology where about 40 right answers are required to pass [1].

You can see therefore why it is important to go straight through each test; you may know immediately if you have the minimum number correct.

SOME PERSONAL REMINDERS

Glasses worn for corrected vision will probably be more comfortable than contact lenses when testing extends over several hours.

When brain cells are utilized to make discriminating judgments on each question, energy is consumed which results in a feeling of fatigue upon completion of each section. The students who does not experience some degree of fatigue after taking an examination probably did not answer the written questions but read the questions to fit preset answers. The chances are this student “blew” the test.