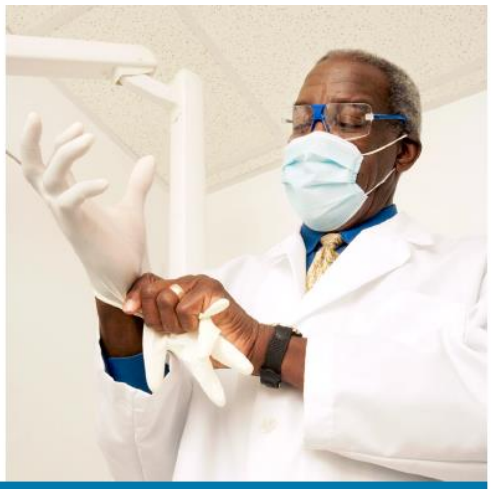
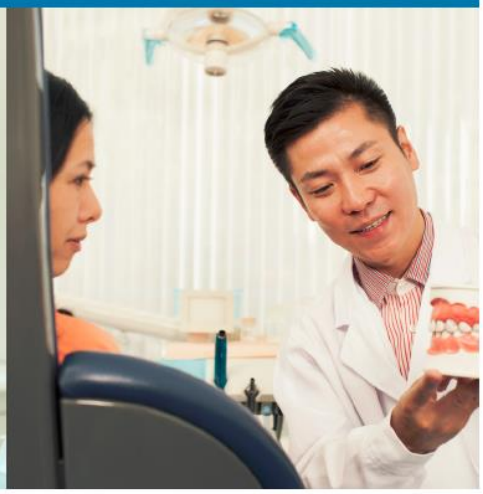
JCNDE JOINT COMMISSION ON NATIONAL DENTAL EXAMINATIONS



INBDE Item Development Guide

National Board Dental Examinations



A publication of the Joint Commission on National Dental Examinations

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NOTE: INBDE development is an innovative effort. The statements appearing in this document are practical in nature, and intended to guide INBDE development. It is expected that specific decisions may change and evolve over time, as additional information becomes available that enables the Joint Commission to optimize and fine-tune its approach. As changes are made they will be incorporated into this document.

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Introduction

This publication of the Joint Commission on National Dental Examinations (Joint Commission) provides Integrated National Board Dental Examination (INBDE) item development guidelines to INBDE Test Construction Committee (TCC) members. This Item Development Guide serves the following functions:

- helps TCC members construct high quality examination items in support of the Joint Commission's examination programs.
- informs dental and academic communities of interest concerning the item development process for the INBDE.
- encourages participation in the Joint Commission's item development and review activities.
- broadens the Joint Commission's base of item writers, item reviewers, and future test constructors.
- provides a foundation for development efforts as TCC members work to replenish the Joint Commission's item pool with current knowledge in a variety of item formats.

The INBDE is a new examination that is intended to replace Part I and Part II of the Joint Commission's National Board Dental Examinations. As such, this represents an opportunity for the Joint Commission to advance its item development practices, incorporating the latest information in dentistry as well as recent advances within the testing profession. As an INBDE Test Constructor you play a critical role in this effort, helping to create the content that will appear on examination forms.

To assist you in understanding the INBDE and how to write items for this examination, information in this guide is presented in three sections covering the following major areas:

- Section One: INBDE Fundamentals and Overview of the Item Development Process
    - The purpose of the INBDE, and the relationship between test purpose, clinical relevance, and the concept of integration.
    - The Domain of Dentistry that serves as the content domain for the INBDE.
    - The structure of the test specifications for the INBDE.
    - The INBDE item development and review process.

- Section Two: General Item Writing Principles
    - Item writing principles to inform item development.
    - Fairness and sensitivity considerations to help create items that are fair to all examinees.

- Section Three: Writing INBDE Items
    - Item presentation considerations involving INBDE content.
    - INBDE item sets and how to use the new, INBDE Patient Box.
    - Model items that serve as exemplars for INBDE item writing.
    - The type of information stored on each INBDE item, and how to make appropriate item classification decisions.

Important Note on Copyright Agreement / Confidentiality
All Joint Commission Test Constructors are expected to complete Confidentiality and Copyright Agreement forms. These forms can be found in the Appendices. Test security is critical, as the items written by TCC volunteers appear in examinations that are used to inform licensure decisions.

Section One: INBDE Fundamentals and Overview of the Item Development Process

Integration, Clinical Relevance, and Examination Purpose

The purpose of the INBDE is derived from the bylaws of the Joint Commission on National Dental Examinations, and can be stated as follows:

> The INBDE is a written examination, exclusive of clinical demonstrations, for the purpose of assisting state boards in determining qualifications of dentists who seek licensure to practice in any state, district or dependency of the United States, which recognizes the National Board Dental Examinations.

In developing the INBDE, Clinical Relevance and Integration are two key concepts that inform all decision making concerning this examination. The Joint Commission defines Clinical Relevance as follows:

> **Clinical Relevance** refers to factors that impact patient outcomes in clinical/professional contexts. This includes all aspects of patient care and also encompasses considerations involving how dentists approach the practice of dentistry (Practice Relevance), and keep up with the profession and advances that impact the profession (Professional Relevance). Broadly speaking, for the INBDE Clinical Relevance involves the actual experiences of entry-level, general dentists, practicing independently, as they work to improve patient outcomes. Clinical relevance is maximized in the INBDE when there is a strong degree of fidelity between the content of examination items, the knowledge and cognitive skills required to answer those items, and the actual experiences of entry-level, practicing general dentists.

Similarly, the Joint Commission defines Integration as follows:

> **Integration** brings to bear knowledge of basic, clinical, and/or behavioral sciences along with cognitive skills to understand and solve problems in clinical/professional contexts.

The INBDE requires examinees to bring to bear basic and/or behavioral science knowledge and cognitive skills in clinical/professional contexts in a way that informs the licensure decision for safe, independent, entry-level competency in the general practice of dentistry. Clinical relevance and alignment with test purpose are the key considerations in establishing content and the items that will appear on the examination. Integration is viewed as a means of implementing and promoting this perspective; as such, integration is secondary to clinical relevance and alignment with test purpose.

In summary, examination purpose drives all considerations, clinical relevance is the best way to achieve the exam purpose, and integration provides a strong means of achieving clinical relevance.

In keeping with this perspective, the Joint Commission has endorsed the following:

- Each item in the INBDE MUST have clinical relevance. Items that lack clinical relevance should NOT appear on the examination. Each item in the INBDE should be presented in a way that maximizes its similarity to how a general dentist might encounter the issue.
- The primary goal of integration is to establish the clinical relevance of examination content, to inform licensure decisions.
- ALL items on the INBDE must be tied to the test purpose (regardless of whether they are integrated or not).

- The foundation upon which the INBDE rests is the most recent comprehensive practice analysis. Test specifications for the INBDE are rooted in this practice analysis, which places Foundation Knowledge areas within the context of Clinical Content areas. Given this, the INBDE as a whole is integrated, given the design elements in place. By definition, all items designed to measure a Foundation Knowledge area within the context of an INBDE Clinical Content area (i.e., items that are consistent with the test specifications) are "integrated."
- Integration does NOT mean simply taking items from Part I and Part II "as is," and placing them together in a single examination.

The purpose of the exam, and the concepts of clinical relevance and integration are all intricately connected to the tasks that are performed by entry-level general practitioners and the context within which practitioners operate.

The Domain of Dentistry

The Domain of Dentistry was established to help support development efforts for the Integrated National Board Dental Examination (INBDE). As noted previously, the INBDE requires examinees to bring to bear basic and/or behavioral science knowledge and cognitive skills in clinical/professional contexts in a way that informs the licensure decision for safe, independent, entry-level competency in the general practice of dentistry. The Domain of Dentistry provides a single, integrated content domain for the INBDE, to maximize the clinical relevance of examination content.

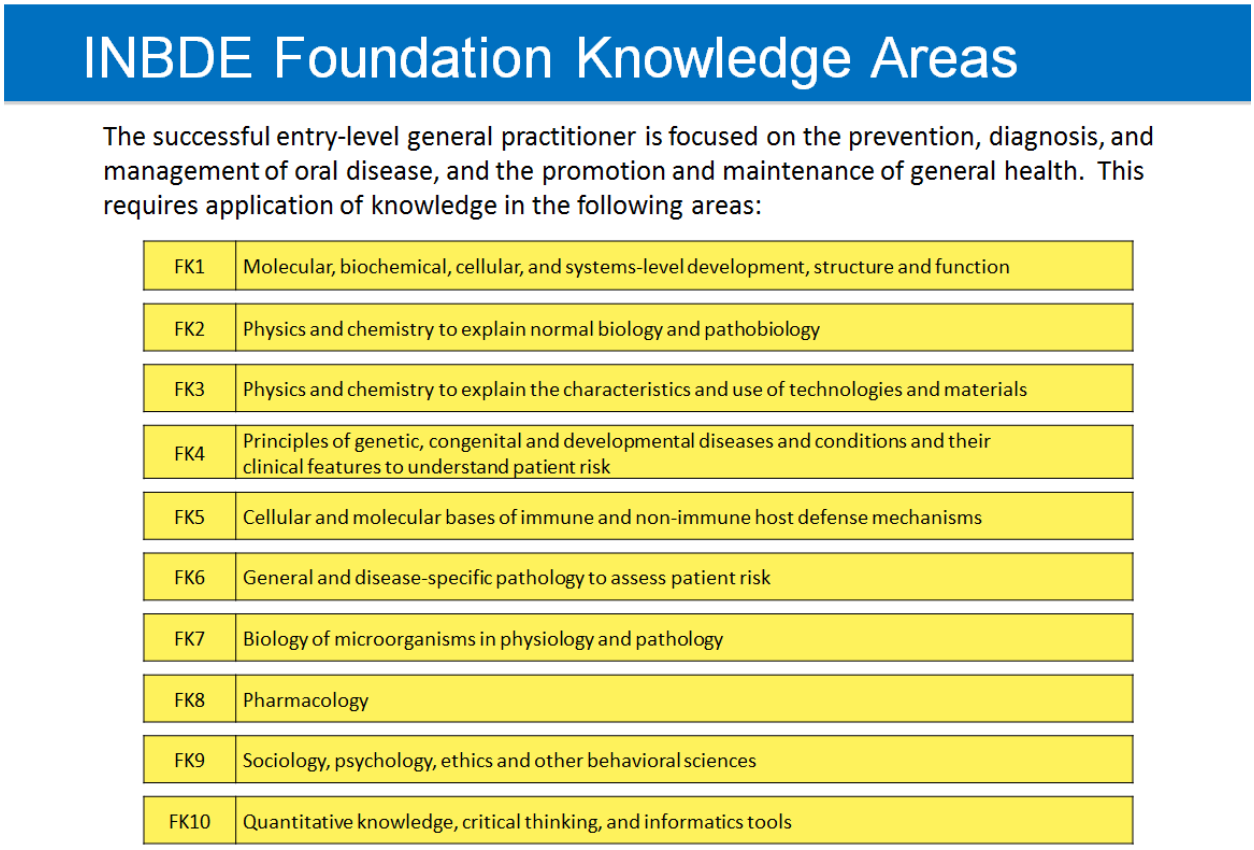
The Domain of Dentistry represents the Clinical Content areas and Foundation Knowledge areas required for the safe, independent, general practice of dentistry by entry-level practitioners. It contains 65 Clinical Content areas and 10 Foundation Knowledge areas. The Clinical Content areas are grouped into three component sections: 1) Diagnosis & Treatment Planning; 2) Oral Health Management; and 3) Practice & Profession. These Foundation Knowledge areas and Clinical Content areas are presented in Figures 1 through 4 on the pages that follow. Appendix A provides a thorough explanation of each Foundation Knowledge area, including examples of where the dental disciplines fit into this framework. Similarly, Appendix B (Spielman, 2013) illustrates how the Foundation Knowledge areas relate to NBDE Parts I and II.

The Domain of Dentistry represents a new, holistic perspective that stands in contrast to the Joint Commission's previous focus on item writing for specific dental disciplines and specific subject areas within the biomedical sciences. This new approach places these disciplines and biomedical science areas within the context of the demonstration of Clinical Content areas. This is why the INBDE is referred to as an integrated examination. It is important to note that the dental disciplines and biomedical science areas have not been lost in this process. In fact, the clinical relevance of these areas has been maximized and promoted by placing these areas within the context of the performance of Clinical Content areas.

Structure of Test Specifications

While Figures 1 through 4 depict the Foundation Knowledge areas and Clinical Content areas separately, it is important to note that these elements are intricately related. In short, the Foundation Knowledge areas describe the critical knowledge areas and skills that are required to successfully perform the tasks corresponding to those Clinical Content areas. The Joint Commission has conducted empirical studies involving this framework, to derive the test specifications for the INBDE. Figure 5 presents these specifications at an overall level, based on an INBDE form containing 450 items. During INBDE Test Construction Committee meetings your Assessment Specialist will share more detailed information that provides insight into the areas in which you are asked to write items.

Figure 1. INBDE Foundation Knowledge Areas



INBDE Foundation Knowledge Areas

The successful entry-level general practitioner is focused on the prevention, diagnosis, and management of oral disease, and the promotion and maintenance of general health. This requires application of knowledge in the following areas:

FK1	Molecular, biochemical, cellular, and systems-level development, structure and function
FK2	Physics and chemistry to explain normal biology and pathobiology
FK3	Physics and chemistry to explain the characteristics and use of technologies and materials
FK4	Principles of genetic, congenital and developmental diseases and conditions and their clinical features to understand patient risk
FK5	Cellular and molecular bases of immune and non-immune host defense mechanisms
FK6	General and disease-specific pathology to assess patient risk
FK7	Biology of microorganisms in physiology and pathology
FK8	Pharmacology
FK9	Sociology, psychology, ethics and other behavioral sciences
FK10	Quantitative knowledge, critical thinking, and informatics tools

Figure 2. Clinical Content Areas: Diagnosis and Treatment Planning

CC 1	Obtain and interpret patient/medical data, including a thorough intra/extra oral examination, and use these findings to accurately assess and manage all patients.
CC 2	Identify patient's chief complaint.
CC 3	Obtain medical, dental, psychosocial, and behavioral histories.
CC 4	Perform head and neck and intraoral examinations.
CC 5	Obtain medical and dental consultations when appropriate.
CC 6	Use clinical and epidemiological data to diagnose and establish a prognosis for dental abnormalities and pathology.
CC 7	Recognize the normal range of clinical findings and significant deviations that require monitoring, treatment, or management.
CC 8	Select, obtain and interpret diagnostic images for the individual patient.
CC 9	Recognize the manifestations of systemic disease and how the disease and its management may affect the delivery of dental care.
CC 10	Formulate a comprehensive diagnosis, treatment and/or referral plan for the management of patients.
CC 11	Discuss etiologies, treatment alternatives, and prognoses with patients and educate them so they can participate in the management of their own care.

Figure 3. Clinical Content Areas: Oral Health Management

CC 12	Manage patients in a hospital setting.
CC 13	Manage the unique needs relating to the oral health care of infants.
CC 14	Manage the unique needs relating to the oral health care of children.
CC 15	Manage the unique needs relating to the oral health care of adolescents.
CC 16	Manage the oral health care of adults, including the unique needs of women.
CC 17	Manage the unique needs relating to the oral health care of geriatric patients.
CC 18	Manage the unique needs relating to the oral health care of special needs patients.
CC 19	Select and administer or prescribe pharmacological agents in the treatment of dental patients.
CC 20	Anticipate, prevent, and manage complications arising from the use of therapeutic and pharmacological agents employed in patient care.
CC 21	Prevent, diagnose and manage pain and anxiety in the dental patient.
CC 22	Prevent, diagnose and manage temporomandibular disorders.
CC 23	Diagnose and manage periodontal diseases.
CC 24	Implement strategies for the clinical assessment and management of caries.
CC 25	Maintain function and promote soft and hard tissue health.
CC 26	Manage patients with oral esthetic needs.
CC 27	Diagnose and manage developmental or acquired occlusal abnormalities.
CC 28	Manage the replacement of teeth for the partially or completely edentulous patient.
CC 29	Restore partial or complete edentulism with uncomplicated fixed or removable prosthetic restorations.
CC 30	Manage the restoration of partial or complete edentulism using implant procedures.
CC 31	Diagnose and manage pulpal and periradicular diseases.
CC 32	Perform uncomplicated endodontic procedures.
CC 33	Diagnose and manage oral surgical treatment needs.
CC 34	Perform uncomplicated oral surgical procedures.
CC 35	Manage patients requiring modification of oral tissues to optimize restoration of form, function and esthetics.
CC 36	Prevent, recognize and manage medical and dental emergencies.
CC 37	Perform basic cardiac life support.
CC 38	Recognize and manage acute pain, hemorrhage, trauma, and infection of the orofacial complex.
CC 39	Recognize and manage patient abuse and/or neglect.
CC 40	Recognize and manage substance abuse.
CC 41	Evaluate outcomes of comprehensive dental care.
CC 42	Diagnose and manage oral mucosal and osseous diseases

Figure 4. Clinical Content Areas: Practice and Profession

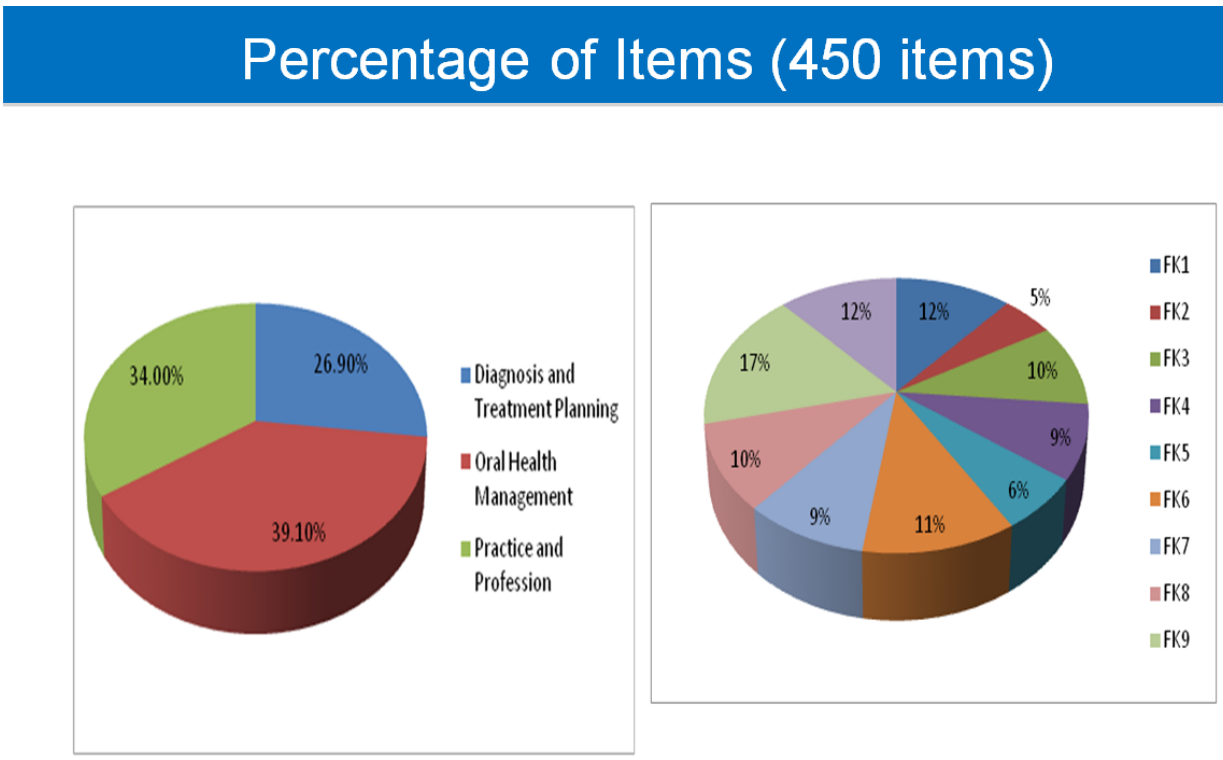
CC 43	Evaluate emerging trends in health care and integrate new medical knowledge and therapies relevant to oral health care.
CC 44	Evaluate social and economic trends and their impacts on oral health care.
CC 45	Utilize critical thinking and problem-solving skills.
CC 46	Evaluate scientific literature and integrate best research outcomes with patient values and other sources of information to make decisions about dental treatment.
CC 47	Apply advances in modern biology to clinical practice.
CC 48	Apply principles of ethics and jurisprudence to the practice of dentistry.
CC 49	Practice within one's scope of competence and consult with or refer to professional colleagues when indicated.
CC 50	Apply appropriate interpersonal and communication skills.
CC 51	Apply psychosocial and behavioral principles in patient-centered care.
CC 52	Communicate effectively with individuals from diverse populations.
CC 53	Apply prevention, intervention and educational strategies to maximize oral health.
CC 54	Participate with dental team members and other health care professionals in health promotion and disease management for individuals and communities.
CC 55	Evaluate and apply contemporary clinical, laboratory and information technology resources in patient care, practice management and professional development.
CC 56	Evaluate different models of oral health care management and delivery.
CC 57	Apply principles of risk management, including informed consent and appropriate record- keeping in patient care.
CC 58	Use effective business and financial management skills.
CC 59	Use effective human resource management skills to coordinate and supervise the activity of allied dental health personnel.
CC 60	Apply quality assurance, assessment and improvement concepts.
CC 61	Assess one's personal level of skills and knowledge relative to dental practice.
CC 62	Understand and apply local, state and federal laws and regulations pertaining to dentistry and healthcare, including OSHA and HIPPA.
CC 63	Develop a catastrophe preparedness plan for the dental practice.
CC 64	Utilize universal infection control guidelines for all clinical procedures.
CC 65	Communicate case design with laboratory technicians and evaluate the resultant restoration/prosthesis.

Figure 5. INBDE Hypothetical Overall Test Specifications

INBDE Hypothetical Overall Test Specifications for a 450-Item Examination

	FK1	FK2	FK3	FK4	FK5	FK6	FK7	FK8	FK9	FK10	Total	%
450 items												
DTP	15	9	10	15	10	17	11	12	13	9	121	26.9%
OHM	29	10	20	13	11	20	18	21	23	11	176	39.1%
PP	8	4	14	11	7	13	11	12	40	33	153	34.0%
Total	52	23	44	39	28	50	40	45	76	53	450	100%
%	11.5	5.1	9.8	8.7	6.2	11.1	8.9	10.0	16.9	11.8	100	

PS. DTP = Diagnosis & Treatment Planning. OHM = Oral Health Management. PP = Practice & Profession.



As an INBDE item writer, it is your task to represent the aforementioned integration of Foundation Knowledge areas and Clinical Content areas in the items you write, always working to maximize the clinical relevance of examination content in accordance with the overall test specifications. Your work as an item writer is critical to the overall performance of the examination.

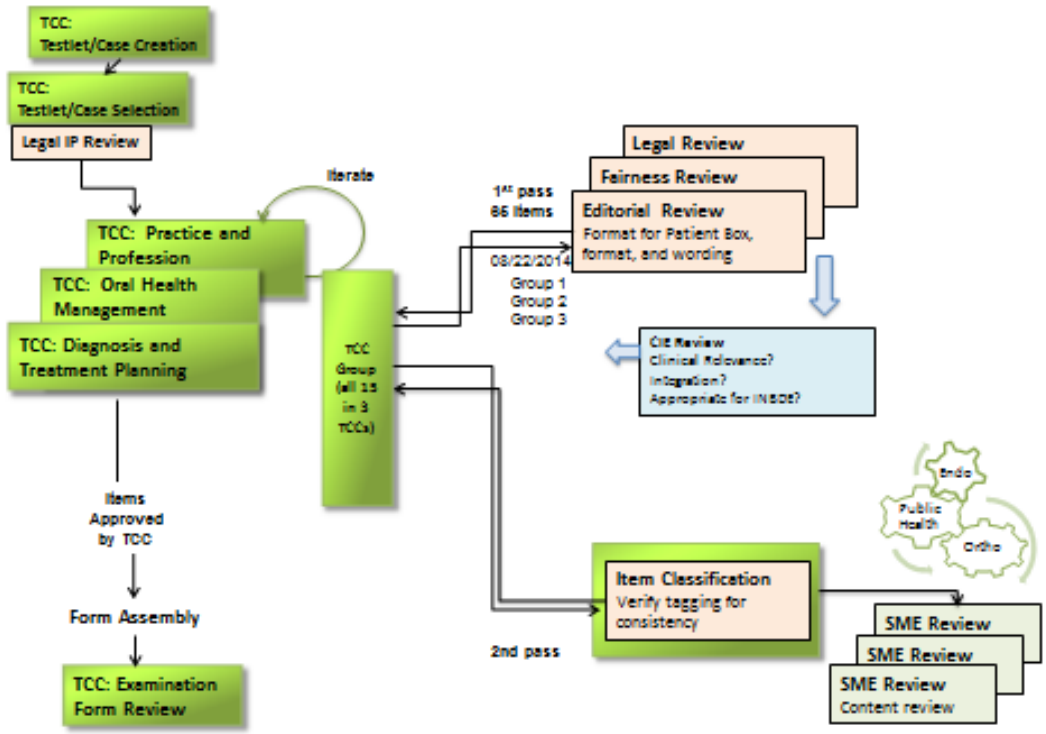
The INBDE Item Development Process

In writing items, it may be helpful for test constructors to also have a sense of the overall development process that will be employed for the INBDE. In short, to further improve the quality of INBDE items and their overall performance, the Joint Commission is increasing the comprehensiveness of its item review process. More specifically, the following reviews will take place to improve item quality and functioning:

- Content Accuracy
- Item Classification
- Editorial
- Fairness and Sensitivity
- Legal/Intellectual Property
- Item Performance
- Item Progress Review
- Case Material Quality Review
- General Dentist Review

Figure 6 presents an early illustration of the INBDE item development process.

Figure 6. The INBDE Item Development Process.



The above illustration serves as an example. The Joint Commission is currently exploring different procedures to optimize item reviews. Reviews may be conducted by either the original item writing TCC, or other TCCs and/or individuals. Each of these reviews is described below, and is subject to change based on outcomes

achieved and the decisions of the Joint Commission. It is best to think of INBDE item development as a dynamic and fluid process, as opposed to a discrete event that occurs within meetings.

Content Accuracy Subject Matter Expert (SME) Review. Subject Matter Experts (SMEs) who are external to the original item writing TCC will review items for accuracy and currency, and provide feedback to the TCC. These SME reviewers will be assigned to items based on how items have been classified. Once the areas of expertise relevant to an item are accurately identified, SMEs in that area will be asked to review that item for content accuracy.

Item Classification. Item classification reviews are performed to specify the areas of content expertise identified for the item. This review is similar to how a librarian classifies material into subject areas using a defined taxonomy. The classification review will include all metadata for the item.

Editorial Review. Items will be reviewed for grammar, style, formatting, and alignment with item-writing guidelines. Similarly, item stimulus materials must be legible and in accordance with modern dental practice. Editorial review comments and feedback will be returned to TCCs.

Fairness and Sensitivity Review. Items will be reviewed based on fairness and cultural sensitivity considerations, in alignment with the item writing guidelines. While the original Item Writing TCC will be trained on Fairness and Sensitivity considerations (i.e., a fairness and sensitivity review takes place as part of the original item writing process), a supplemental review will further improve items from this perspective as well. Comments and feedback will be returned to TCCs.

Legal/Intellectual Property (IP) Review. Joint Commission staff will seek guidance from the ADA Division of Legal Affairs concerning the articulation of any guiding principles that might be helpful to avoid legal issues involving examination content. This could include, for example, issues arising around privacy and the use of intellectual property. Individuals who submit images and materials to the Joint Commission are responsible for verifying intellectual property rights.

Item Performance Review. TCCs will review item statistics and any available examinee feedback, and make adjustments if warranted. Adjustments may cause the updated item to be considered an entirely new item. Items are continuously evaluated for statistical performance. Items that do not meet the statistical performance guidelines will be reviewed by subject matter experts (SMEs) to either edit the item or remove it from circulation. SMEs will review the item stem, distractors, and statistics to attempt to determine why the item is performing poorly using the guidelines in this booklet. Items that are edited to be republished will be considered new items.

Item Progress Review. The Item Writing TCC updates the item based on comments from the various reviews and is ultimately responsible for the item. If significant changes are made to a new item, the TCC may elect to initiate a second review cycle or request separate individual reviews. Alternatively, operating in parallel with the authoring TCC could be a second TCC of similar structure that operates independently and in parallel with the original TCC. This parallel TCC could take all item review feedback and make any necessary changes to the item; similarly, this parallel TCC is responsible for Item Performance review as well.

Case Material Quality Review. This committee's work precedes the work of the Item Writing TCCs. The committee reviews case material submissions to determine if those materials are of sufficient quality to serve as the basis for item-writing, makes a recommendation to accept or reject the materials, and then prepares accepted materials for use by TCCs. This committee structure is already in place and consists of four members who are dental experts and practitioners. An editorial/graphics function is present to support this committee. An intellectual property review is included as part of this committee's responsibility. The TCC meets in-person initially and—after at least one in-person meeting—may elect to use remote collaboration technology. This committee will require its own guidelines for selection and review of cases.

General Dentist Review. The INBDE is designed for licensure purposes, to help state boards understand whether a candidate possesses the necessary cognitive skills to enter the profession and safely practice dentistry. The general dentist is thus of focal importance to this examination program. As such, general dentists

will review items to help confirm item content is clinically relevant and applicable to the work of practicing dentists. It should also be noted that general dentists will also be enlisted to help serve as an input to the item writing process (e.g., item idea generation).

Subsequent to the above reviews, one or more **Form Assembly TCCs** will assemble test forms based on the test specifications for the INBDE.

Section Two: General Item Writing Principles

To assist you in the item writing process, it is first necessary to discuss some key considerations in writing high quality items for a high stakes examination such as the INBDE. In essence, it is important to present questions in a consistent, standard format that has been informed by research, to facilitate accurate and precise measurement of candidate dental skills. With this goal in mind, the discussion will now turn to a discussion of general item writing principles, focusing on the following topics:

- Writing effective item stems
- Writing effective item alternatives
- Applying editorial guidelines appropriately
- Considering fairness and sensitivity issues when writing items

Item writing principles provide information concerning how to approach the creation of items. There are a variety of item formats used in both large and small scale assessments. In general, the array of item formats available is conducive to a wide spectrum of cognitive tasks, from information retrieval to critical thinking and problem-solving.

Traditional multiple-choice items are considered by experts to be the most versatile and useful of objective test items. They are effective in measuring not only people's knowledge and understanding, but also more complex cognitive processes such as application, analysis, synthesis, and evaluation. In order to be effective items must be written well. The INBDE relies exclusively on multiple-choice items, some of which are presented in isolation (standalone items) while others are presented together in groups that are accompanied by a common set of stimuli (case materials, including radiographic images, etc.).

There are a few essential parts to the multiple-choice item. The *stem* is the introductory question or partial statement that the examinee must answer or complete. The stem is typically followed by three to five response *alternatives (also known as response options)*, marked by the letters A, B, C, D, and E. One of the alternatives—the key—is the correct (or best) *response* to the stem. The incorrect or inferior alternatives are known as *distractors*. In many cases, common misconceptions make excellent distractors. In general, the effective performance of a test item is directly related to the discriminating quality of the distractors.

Writing Stems

The stem of multiple-choice items provides examinees with a prompt that requires a response. Before reading any of the response alternatives, examinees should have a strong understanding of what is being asked and—depending on candidate skill levels—possible response alternatives. Examinees should not have to read the alternatives in order to understand the stem. In most cases this can be accomplished by:

1. Setting up a problem or set of circumstances within the stem or through reference to stimulus materials.
2. Making sure the stem contains at least one verb.

Questions and Incomplete Statements

Although some research indicates that stems written in the form of a question are more effective than those written as partial statements, both are acceptable for multiple-choice items. The argument for the question-form stem lies in the belief that a question communicates more completely the problem or circumstances of the item. Seeing the stem in question form helps examinees conceptualize the item's context.

The following is an example of an item written in a poorly formed incomplete sentence.

Trigeminal neuralgia (tic douloureux)

A. can be in the form of prolonged episodes of pain in one side of the face.
B. is a dull pain when pressure is applied over the affected area.
C. is a paralysis of one side of the face.
D. is characterized by sharp pain when light pressure is applied to the affected area.
E. manifests as uncontrollable twitching of one eye.

Because the stem lacks a verb, it communicates no context to the examinees. Below is the same question that has been rephrased to include a verb that provides an indication of what knowledge is expected.

Trigeminal neuralgia (tic douloureux) is characterized by

A. dull pain when pressure is applied over the affected area.
B. paralysis of one side of the face.
C. prolonged episodes of pain in one side of the face.
D. sharp pain when light pressure is applied to the affected area.
E. uncontrollable twitching of one eye.

An even more effective item might be to put the stem in the form of a complete question, as follows:

Which symptom best characterizes trigeminal neuralgia (tic douloureux)?

A. Dull pain when pressure is applied over the affected area
B. Paralysis of one side of the face
C. Prolonged episodes of pain in one side of the face
D. Sharp pain when light pressure is applied to the affected area
E. Uncontrollable twitching of one eye

Keeping It Simple

The stem should be as brief as possible, including only the information needed to solve the problem. In many cases irrelevant material should be omitted because it adds to examinees' reading time, slowing them down and reducing the number of items that can be used to evaluate performance. Below is an example of an item containing more information than is necessary.

Bruxism, the rhythmic grinding of teeth in other than chewing movements of the mandible, can result in overdevelopment of a muscle of mastication. Which muscle might be overdeveloped in a patient with bruxism?

A. Buccinator
B. Geniohyoid
C. Glossopharyngeal
D. Lateral pterygoid
E. Masseter

Below is the same item with the unnecessary information omitted from the stem.

When a patient bruxes the teeth, which muscles might become overdeveloped?

A. Buccinator
B. Geniohyoid
C. Glossopharyngeal
D. Lateral pterygoid
E. Masseter

An exception to this rule would be situations where providing additional details increases the correspondence between the content of the question and how the dentist would encounter the situation in practice. Including these details can sometimes help with clinical relevance, because in the clinic dentists must be able to quickly distinguish between 1) information that is directly relevant to the patient's condition, and 2) information that might appear relevant on the surface but is simply not germane. Good examinations and test questions appropriately balance these two competing interests.

Generally, statements of a controversial nature do not make good objective items, though there are instances when knowledge of different viewpoints on controversial issues may be important. When this is the case, the item should clearly state whose opinion or what authority is to be used as the basis for answering.

Positively- and Negatively-Worded Item Stems

Generally, stems that are worded positively are more effective than those worded negatively. However, it is sometimes appropriate to ask examinees to distinguish the one incorrect response among several correct alternatives. In these cases, *exceptions* may be used. Generally speaking, these items should be used only when other options are not available.

Each of the following is a part of the initial preparation of a periodontal treatment plan EXCEPT one. Which is the EXCEPTION?

A. Extractions of hopeless teeth
B. Home-care instructions
C. Occlusal adjustment
D. Root planning
E. Surgical pocket elimination

Note that the words "EXCEPT" and "EXCEPTION" have been capitalized. This helps the examinee to understand that the item has been worded negatively.

Making Stems Inclusive

Avoid repeating the same word or phrase in multiple response alternatives. Where possible, this information should appear in the stem. The following is an **ineffectively** written stem:

Histologically, the normal dental pulp most closely resembles

A. dense connective tissue.
B. endothelial tissue.
C. granulomatous tissue.
D. loose connective tissue.
E. nervous tissue.

The repetitive word “tissue” should have been incorporated into the stem. The following is an example:

Histologically, the normal dental pulp most closely resembles which tissue?

A. Dense connective
B. Endothelial
C. Granulomatous
D. Loose connective
E. Nervous

Writing Alternatives (Answers and Distractors)

Item writers should use the number of response options (distractors plus the correct answer) that makes sense given item content and the concept or skill to be evaluated. Items with three to five options are acceptable. The vast majority of INBDE items involve four response options. Items with three options are good for situations where there are no other reasonable options to choose. Item writers should avoid including too many response options.

Correct Responses and Best Responses

A multiple-choice item can ask for either the correct response or the best response. While both formats are appropriate, requiring examinees to choose the best alternative obliges them to make finer distinctions than that between correct and incorrect. “Best response” items can therefore assess higher levels of learning. For this format to assess at higher levels, it is particularly important that the distractors be at least plausible. The following is an example of a “correct response” item.

Which antibiotic shows an incidence of approximately 8 percent cross-allergenicity with penicillin?

A. Bacitracin
B. Cephalexin
C. Neomycin
D. Tetracycline
E. Vancomycin

The following is an example of a “best response” item.

Which statement best describes the purpose of potassium sulfate in a mix of irreversible hydrocolloid?

A. It acts as a filler material.
B. It controls consistency of the mix.
C. It helps produce a hard, dense stone cast surface.
D. It keeps the mix from separating.
E. It retards the setting of the hydrocolloid.

Alternatives, both the correct response and distractors, can be in the form of words, phrases, sentences, numbers, equations, images, or symbols.

Keeping Alternatives Similar

One of the greatest challenges for item writers involves assembling three or more homogeneous response alternatives. Writing alternatives that bear superficial resemblance to the correct response gives minimal clues to examinees and helps ensure a more reliable item. The following is an item whose alternatives might alert less knowledgeable examinees to the correct response.

In acute pulpitis, when does sensitivity to percussion occur?

A. At the onset
B. Before there is any pain
C. Only rarely
D. When the inflammation involves the periodontal ligament space

Alternative D stands out as the longest and most specific of the alternatives. While an examinee might not be sure of the particulars, the context of the alternatives may tip him/her off. The following is an item written more effectively because of its homogeneous alternatives.

Which drug is a local anesthetic subject to inactivation by plasma esterases?

A. Bupivacaine
B. Lidocaine
C. Mepivacaine
D. Prilocaine
E. Tetracaine

It is important to avoid writing a correct response and one distractor that are opposites of each other, thus, canceling each other out and eliminating the other distractors in examinees' minds. In the following example, alternatives A and B cancel each other out.

Which best determines the mechanical and physical properties of any restorative material?

A. Bonding strength
B. External structure
C. Internal structure
D. Resistance to shear

However, an item with two pairs of alternatives can be an effective testing tool. In the following item, alternatives B and C, and alternatives D and E make plausible pairs without cueing the poorly prepared examinee.

If a susceptible person were given tetanus antitoxin, what kind of immunity would result?

A. Artificial active
B. Artificial passive
C. Innate
D. Natural active
E. Natural passive

Avoiding Overlapping Alternatives

Each alternative in an item must be distinct from the others. Ranges should be mutually exclusive (i.e., non-overlapping). Ranges that overlap can potentially cause more than one response to be correct. Numbers and ranges should be listed chronologically. Ranges should be equal to one another in interval, or be based on groupings that are meaningful given the item content and the concept to be evaluated.

The following is an item written with overlapping responses (e.g., C and D overlap with regard to 3 years). Additionally, the responses are not in numerical order and have inconsistent time intervals.

During which age range should a child be brought to a dentist for a first visit?

A. 0 to 1 year
B. 2 to 3 years
C. 3 to 5 years
D. 5 to 7 years
E. 6 to 12 years

This item is rewritten more effectively as follows:

During which age range should a child be brought to a dentist for a first visit?

A. 1 to 2 years
B. 3 to 4 years
C. 5 to 6 years
D. 7 to 8 years
E. 9 to 10 years

Making Alternatives Specific

In order for distractors to be effective, they must include specific options and solutions. The distractors "*all of the above"* and "*none of the above"* should be avoided.

Writing Plausible Distractors

Because distractors are designed to tempt poorly prepared examinees, they should be reasonable though incorrect (or less correct) possibilities. Distractors are effective when they represent commonly held misconceptions about a subject. Implausible or humorous distractors do nothing to distinguish differences between prepared and unprepared examinees. The following is an item with inappropriate distractors.

The patron saint of dentistry, recognized as the patroness of those suffering from toothache, is

A. Eva Marie Saint.
B. Jill St. John.
C. Sault Sainte Marie.
D. St. Apollonia.
E. St. Joan of Arc.

The following item includes more plausible distractors.

Which legally protects health professionals who provide emergency treatment at the scene of an accident?

A. Americans with Disabilities Act
B. Good Samaritan Act
C. Health Professional Protection Act
D. Occupational Safety and Health Act
E. States' Human Rights Act

Editorial Guidelines

Avoiding the Use of Absolute Terms

Just as there are few absolutes in life, there are few absolutes in dentistry. Terms such as *always, never, all*, and *none* should be used sparingly and only to make very specific points. These terms have the potential to provide cues to the poorly prepared examinee.

Avoiding Repetition of Key Terms

Repeating a key word from the stem in the correct response will tip off unprepared examinees. The following is an item with a key word repeated.

Pulp testers used for evaluating a tooth's sensitivity to pain stimulate which receptors?

A. Cold
B. Heat
C. Pain
D. Pressure
E. Touch

The item can be improved as follows:

Pulp testers evaluate a tooth's sensitivity to which receptors?

A. Cold
B. Heat
C. Pain
D. Pressure
E. Touch

Consistent Grammar

Grammar and word use should be correct and consistent in all alternatives. The following item contains a grammar error that alerts examinees to the correct response.

> A widening of the periodontal ligament space seen along one side of a tooth represents the radiographic manifestation of an
>
> A. Burkitt lymphoma.
> B. fibrous dysplasia.
> C. metastatic breast carcinoma.
> D. multiple myeloma.
> E. osteosarcoma.

The item is improved easily by changing the indefinite article (“an”) in the stem.

> A widening of the periodontal ligament space seen along one side of a tooth represents the radiographic manifestation of a(an)
>
> A. Burkitt lymphoma.
> B. fibrous dysplasia.
> C. metastatic breast carcinoma.
> D. multiple myeloma.
> E. osteosarcoma.

Consistent Construction

Alternatives should be similar in construction and of approximately equal length. The following is an **ineffective** item since the correct response stands out as the longest, most specific response.

> Which best describes the purpose of potassium sulfate in a mix of irreversible hydrocolloid?
>
> A. Controls consistency of the mix
> B. Filler
> C. Helps produce a hard, dense stone cast surface
> D. Reactor
> E. Retarder

Below is the improved item.

> Which best describes the purpose of potassium sulfate in a mix of irreversible hydrocolloid?
>
> A. Acts as a filler material.
> B. Controls the consistency of the mix
> C. Helps produce a hard, dense stone cast surface
> D. Provides a dense stone cast surface
> E. Retards the setting of the hydrocolloid

Fairness and Sensitivity Considerations

In developing item stems and response alternatives, it is critical to present the information in a manner that treats examinees fairly and allows examinees' skills to be accurately assessed. To write valid items that appropriately address fairness considerations, TCC members should read the 2009 Educational Testing Service (ETS) report entitled "ETS Guidelines for Fairness Review of Assessments" located at the following URL: (http://www.ets.org/Media/About_ETS/pdf/overview.pdf). Material appearing below is largely derived from that source.

The following highlights the core issues involved in building fair and valid examination content. Before proceeding, it is first necessary to define a few key terms in order to properly understand the concept of fairness as it relates to testing.

Test Purpose
All tests are developed to fulfill a purpose. This purpose helps establish what content should be included in the test, what constructs will be measured, and how those constructs should be defined.

Constructs
Constructs represent specific Knowledge, Skills, Abilities, or Other characteristics (KSAOs), or sets of related KSAOs, that a test has been designed to measure. Tests are designed to yield scores on constructs of interest relative to the stated test purpose.

Variance
Variance refers to variability or differences among test scores. If all test takers receive the same score, the variance is zero. Systematic variance in scores that occurs due to individual differences in the intended, target construct is termed construct relevant variance. Testing professionals seek to maximize this source of variance. Systematic variance in scores that is unrelated to the target construct is termed construct irrelevant variance. This type of variance serves to bias outcomes, and thus testing professionals seek to minimize the factors that account for this source of variance.

Validity
Validity involves an evaluation of the available evidence that is in place to support the interpretation and use of examination scores to fulfill the purpose to which examination scores are targeted. When accumulated evidence is complete and provides coherent and plausible explanations, the corresponding validity argument in favor of test usage is strengthened.

Fairness
Fairness is a social concept that has been defined in different ways, some of which can lead to contradictory conclusions. For present purposes, tests that are regarded as fair are those that are equally valid for different groups. Efforts to improve test fairness involve working to reduce or eliminate bias due to variability in test scores that is unrelated to the construct that is the target of measurement (i.e., reducing bias due to construct irrelevant variance). Practices that reduce construct irrelevant variance help to increase the purity of construct measurement. This in turn enhances validity. It should be noted that the presence of group differences in test scores does not necessarily indicate that bias is present, unless those differences can be attributed to construct irrelevant variance.

In summary, test scores are used to make inferences about the Knowledge, Skills, Abilities, or Other characteristics (KSAOs) of test takers. In a fair and valid test, variability in test scores would only be caused by differences in the *construct-related* KSAOs of test takers. If, however, a test inadvertently measures *construct-irrelevant* factors, these factors can bias scores and potentially compromise the validity of the test. Since the purpose of the test helps define what construct(s) should be measured, this purpose can be used to ascertain

which factors contribute variance relevant to the construct(s), and which could contribute construct-irrelevant variance.

Overarching Fairness Review Directive

As established by the purpose of the respective examination, TCCs should create items that avoid all three sources of construct-irrelevant variance: cognitive, affective, and physical.

Cognitive Construct-Irrelevant Variance

When knowledge or skill not related to the construct is required or provides an advantage to correctly answer an item.

> **Example:** Literary terminology in a basic science item may interfere with a test-taker's ability to answer the item correctly, even if they have the KSAOs necessary to interpret the actual basic science content. The required comprehension of the literary terminology by the test taker introduces construct-irrelevant variance to the measurement of basic science knowledge. Conversely, if an item were intended to measure reading comprehension of a literary passage discussing a basic science, the inclusion of literary terminology could be appropriate.

Affective Construct-Irrelevant Variance

When test content evokes strong emotions that interfere with the test-taker's ability to answer an item.

> **Example:** Violent content in a case scenario or reading passage may alter the test-taker's emotional state, thereby interfering with concentration and the ability to correctly answer corresponding test items. The test-taker's exposure to the questionable content introduces construct-irrelevant variance to the measurement of case interpretation or reading comprehension skills. Conversely, if an item were intended to measure comprehension involving traumatic case scenarios, the inclusion of violent explanatory content could be appropriate.

Physical Construct-Irrelevant Variance:

When certain aspects of a test interfere with the test taker's physical ability to answer an item.

> **Example:** Visually-impaired test takers may have difficulty fully comprehending a graph with labels in a small font, even if they have the KSAOs necessary to interpret the actual content of the graph. The test-taker's inability to read the small font introduces construct-irrelevant variance to the measurement of graph interpretation skills. Conversely, if an item were intended to measure visual discrimination skills, the inclusion of small but meaningful details within the graph could be appropriate.

Appendix C provides a Fairness Review Checklist for use by TCC members, to assist in the development of fair examination items.

Section Three: Writing INBDE Items

Item Presentation Considerations Involving Content

In writing INBDE items, the following general principles apply:

- Consider the appropriate amount of information to present to the candidate to evaluate the concept to be tested. Do not include too much additional information that is irrelevant to the concept being tested.
- Conversely, additional information may be warranted to develop a typical clinical scenario, and to avoid inadvertently providing clues to a candidate concerning the correct response. An example of the latter would involve including information about patient blood pressure only for items where the correct response relies heavily on knowledge of patient blood pressure. The presence of blood pressure information in an item would alert candidates to the fact that blood pressure was important to identifying the correct response. Sometimes providing additional information can help to evaluate whether a candidate can "detect the signal from the noise."
- When making decisions concerning content, bear in mind that examinees will typically have one minute or less to read, comprehend, and respond to an item (the first item in a testlet/item set is a noteworthy exception to this rule).
- Avoid terminology that may not be consistently understood by examinees – for example, "trauma with growth and development issues." Language should be simple and concise. This exam is intended to measure dental cognitive skills, not language skills.
- Focus each item on the concept being tested. If an item looks complicated and contains multiple concepts, consider simplifying it or splitting it into multiple items. For example, if an item asks about both diagnosis and treatment, consider restructuring to ask about either the diagnosis or treatment. If an item asks about medication options and dosages, consider restructuring it to ask about either the medication or dosage.
- Dental chart presentation and notation should be consistent with what is used in current dental practice and at dental schools (e.g., a missing tooth is typically blanked out, not marked out with a "X").
- Do not number teeth in photographs and radiographs.
- Provide right and left indicators on radiographs.
- Radiographs and other stimulus materials must be of diagnostic quality.
- Radiographs and other stimulus materials cannot be used without copyright permission. Verify or obtain the copyright for any images used.
- Distractors should appear in a logical sequence. Distractors containing numbers should be ordered numerically. Where each distractor builds on a previous distractor, the shortest distractor should appear first, and each subsequent addition should be presented next. For example:
    A. Diagnose only
    B. Diagnose and treat only
    C. Diagnose, treat, and manage
- Where the distractors each represent a single letter, the letters should be presented alphabetically.
- Strive to write items that require the examinee to think critically, applying logic and reason to identify the correct response.
- Refer to a tooth as "tooth 27" as opposed to "tooth #27."
- If the Clinical Content area says "Select, obtain, and interpret diagnostic images for the individual patient" (CC8), then the image should be a real clinical image and not a drawing.
- INBDE Items should be constructed so as to measure the KSAOs judged necessary for safe, entry-level practice.

Item Sets and the Patient Box

As noted previously, the INBDE relies exclusively on multiple-choice items, some of which are presented in isolation (standalone items) while others are presented together in groups that are accompanied by a common set of stimuli (case materials, including radiographic images, etc.). The latter have been referred to in the testing literature by a variety of names, including testlets, item sets, context-dependent item sets, or case clusters. The stimulus material can include a patient problem, scenario or vignette, photograph, radiograph, lab report, chart, and/or drawing. The associated number of test items involved can vary depending upon the complexity of the underlying source material. Historically, the Joint Commission has used mixed terminology in referring to these groupings of items, referring to them as "testlets" for NBDE Part I, and as "cases" for NBDE Part II. With respect to the INBDE, the Joint Commission will be using the general term "item sets." In contrast to NBDE cases and testlets which often involve ten or more items, INBDE item sets should only involve a small number of items (three to five).

The INBDE does not at present contain a predetermined number or percentage of items to be allocated to standalones as opposed to these item sets. TCC members should select the presentation method (standalone vs. item sets) that makes the most sense given the concepts to be tested. In short, choose the type of item (standalone with Patient Box, standalone without Patient Box, member of item set) that is best to test the examinee's knowledge.

For the INBDE, the Joint Commission is introducing a new tool—the Patient Box—which has a tremendous impact on how items involving patients are presented to test takers. Figure 7 presents an example of a Patient Box, while Figure 8 presents a description of the information to be provided in each area of the Patient Box. The Patient Box is important when working with item sets.

Figure 7. The INBDE Patient Box

Patient
Female, 28 years old.
Chief Complaint
"I haven't been able to open my mouth for two days."
Background and/or Patient History
Three days prior, left mandibular third molar extraction.
Current Findings
Maximum opening is 10 mm

Figure 8. Description of Patient Box Information

Data	Description	Format / Value	Example
Patient	**Gender** and **age** of the patient. **Ethnicity** (optional)	***This section is required.*** Male or Female, *nn* years old. Ethnicity may also be included, if relevant.	Female, 28 years old
Chief Complaint	**Complaint** in the patient's (or guardian's) own words describing the main symptom or reason the patient is seeking dental care. After analysis, this may or may not turn out to be a symptom of the most urgent or critical issue. The diagnosis or treatment plan is not included in the complaint.	***This section is required.*** One or more **symptoms** and the **duration** of those symptoms. If quoted directly from the patient, enclose in quotation marks and put in the first person. If someone is speaking for the patient, attribute the information to that person (e.g., the mother of a pediatric patient).	"I've been unable to open my mouth for two days."
Background and/or Patient History	**History of medical conditions** **Current medications**. Other treatments. **History of dental diagnosis and treatment** **Allergies** **Social history**, such as tobacco use, occupation, living arrangements (e.g., for a geriatric patient)	***This section may be left blank.*** The information is assumed to be provided by the treating dentist and be factual. If the information is provided from another source, identify the source. Put data in the sequence listed when it is provided. List each condition and medication on a new line.	Three days prior, left mandibular third molar extraction.
Current Findings	Data provided by dental professionals during the current visit including: - **Height and Weight** - **Vital signs** (e.g., blood pressure, glucose level) - **Results of diagnostic tests** - **Assessment of patient condition** (e.g., swelling or lack of swelling, sites of bleeding, maximum opening)	***This section may be left blank.*** Height and weight may be included if relevant (optional). Vital signs and diagnostic tests may be summarized as "Stable" or "Within normal limits."	Maximum opening is 10 mm.

The Patient Box has a number of key benefits:

- Permits the candidate to focus on the content of the question, as opposed to how items are worded.
- Simplifies the item writing process for item writers, allowing them to focus on the concept being tested.
- Reduces bias and is fairer to examinees, by lowering language requirements and providing a purer, more valid assessment of dental skills.
- Presents concepts to be tested within the context of an actual patient, thereby increasing the correspondence between test content and the actual experiences of practicing entry-level dentists.

The Patient Box changes the game in terms of how items are written. The Patient Box facilitates development by providing a platform for asking question that greatly simplifies the process, incorporating elements that facilitate the direct assessment of examinee skill levels, avoiding unnecessary verbiage. The Patient Box can be used for both standalone items and for item sets. Examinees will be instructed to always consider the Patient Box in their responses, and a tutorial provided at the beginning of the examination will instruct examinees on how to appropriately interpret information provided in the Patient Box. Similarly, pre-examination materials (e.g., the INBDE Examination Guide) will also include information concerning the Patient Box.

The following principles apply when using the Patient Box:

- It is desirable for INBDE items to involve a patient where reasonable. Item writers are discouraged from including a patient where doing so would simply add unnecessary verbiage to an item that is already clinically relevant. Omit the Patient Box if a patient scenario is unnecessary.
- When utilized, the Patient Box should contain as much information about the patient and treatment situation as possible. Do not duplicate Patient Box information in the stem and distractors.
- Begin new information in the Patient Box on a new line and with a capital letter. The Patient Box should occupy roughly the same size on a test administration screen for all questions. However, there may be exceptions.
- Put the components of the Patient Box in the same sequence listed in the Item Writing Guidelines. For example, under *Background and/or Patient History,* consistently sequence medical history and medications prior to presenting history of dental diagnosis and treatment.
- It is not necessary to include all components in the Patient Box.
- Verify that the situation and item are relevant to a general dentist, occur in common practice, and are within the dental scope of practice. The touchstone is clinical relevance.
- Refer to medications with both generic and trade names (if applicable). Generic names are listed first and are not capitalized. Trade names follow the generic name and are shown in parentheses, capitalized, and with the trademark symbol as needed. For example: acetaminophen (Tylenol®).
- The generic name and brand name should both appear in the Background/Patient History section and should both be used in the item stem and response options.
- Exclude dosage information unless the dosage is relevant for that item. Exceptions to this rule would be specific medications that have a typical lower and higher dosage that is dependent upon the condition, and where it is important to distinguish which dosage level is used. This includes aspirin.
- If the patient appearing in the Patient Box has diabetes, then the Patient Box should include the type of diabetes. In providing the type of diabetes, use the following formatting from the American Diabetic Association:
    - type 1 diabetes (i.e., lower case ‘t’ for ‘type’).

  If the condition begins on a new line, capitalize “type.”
- Abbreviate BP and Temp. These are common abbreviations and there is little risk that they will be misinterpreted in this context. For Height/Weight, use this format: 6’ 1”, 230 lbs. It is not necessary to spell out 6 feet, 1 inch, 230 pounds.

- Verify that information in the Patient Box is consistent with the item stem, stimulus material, distractors, and the correct answer.

  Examples:

  - If the patient has an allergy to a medication, consider that the correct answer for the item may be impacted.
  - If a distractor recommends that the patient stop smoking, the Patient Box should mention that the patient is a smoker.
  - If a photograph shows a bearded patient, the patient should be presented as Male.
- Verify that enough information is provided to diagnose and treat the patient. Enough information should be provided so the examinee can provide a correct response to the item.
- For item sets, be aware that the Patient Box will be shared by all items in the group. The Patient Box should therefore include information required for all items in the set and be consistent with all of the presented item stems and distractors. If additional information needs to be provided for an item in the group, it can be provided in the stem.
- Do not refer to "this patient" in the wording of the stem. Examinees should **always** consider data in the Patient Box, just as they should always consider the context of the patient in practice.
- Use the term most likely to be used by a patient in the Chief Complaint area. This is often the trade name because patients are usually more familiar with these names but in some cases it may be the generic name, For example,
  - Chief Complaint: "I am wondering if my Coumadin® prescription is causing my mouth to bleed."
  - Patient Background: Medications: warfarin (Coumadin®)
- Use currently-prescribed medications.
- The fact that the Patient Box is standardized means that any changes from what is typically presented will become very salient to the examinee, and may signal to the examinee the importance of the new information (thereby inadvertently providing clues to how to respond to the item). For this reason, it is necessary to sometimes include extraneous information in the Patient Box. For example, an item that requires the examinee to recognize an emergency blood pressure issue will stand out if it is the only item on the exam that includes information concerning patient blood pressure.

Additional Considerations when Using the Patient Box

The following provides additional considerations when using the Patient Box.

#	Statement	Primary Rationale
1	All standalone items involving a patient should include a Patient Box. Items that do not involve a patient should not have a Patient Box.	Patient Boxes reduce reading requirements. However, Patient Boxes may have the unintended side effect of making examination content less engaging.
2	Patient and other vital information should only appear in the Patient Box. This information should not be repeated in the item stem.	Reduce reading requirements. However, as noted above, item content may be less engaging.
3	The Patient Box should be presented in a format that is clear and easy to read. For example, use a table format and start each piece of information within the Patient Box with a capital letter.	Clarity. It is important to clearly show when one piece of information ends and the next begins to avoid ambiguity.
4	When utilized, the Patient Box should contain as much information about the patient and treatment situation as possible. Do not duplicate Patient Box information in the stem and distractors.	Strong consistency in item structure and wording.
5	Verify that information in the Patient Box is consistent with the item stem, stimulus material, distractors, and the correct answer. Examples: • If the patient has an allergy to a medication, consider that the correct answer for the item may be impacted. • If a distractor recommends that the patient stop smoking, the Patient Box should mention that the patient is a smoker. • If a photograph shows a bearded patient, the patient should be presented as Male.	Test examinees' knowledge without inappropriate distractions. High content quality.
6	Verify that enough information is provided to diagnose and treat the patient. Enough information should be provided so the examinee can provide a correct response to the item.	High content quality.
7	For item sets, be aware that the Patient Box will be shared by all items in the group. The Patient Box should therefore include information required for all items in the set and be consistent with all of the presented item stems and distractors. If additional information needs to be provided for an item in the group, it can be provided in the stem.	Strong consistency in item structure and wording

8	Consider the appropriate amount of information to present to the candidate to evaluate the concept to be tested. Do not include too much additional information that is irrelevant to the concept being tested. Conversely, additional information may be warranted to develop a typical clinical scenario, or so that the correct answer is not readily apparent to the examinee. When making decisions concerning content, bear in mind that examinees will typically have one minute or less to read, comprehend, and respond to an item (the first item in a testlet/item set is a noteworthy exception to this rule).	Test examinees' knowledge without inappropriate distractions.
9	Avoid terminology that may not be consistently understood by examinees – for example, "trauma with growth and development issues." Language should be simple and concise. This exam is intended to measure dental cognitive skills, not language skills. Consideration should be given to present information in a manner that can be understood by qualified international candidates.	High content quality.
10	The fact that the patient box is standardized means that any changes from what is typically presented will become very salient to the examinee, and may signal to the examinee the importance of the new information (thereby inadvertently providing clues to how to respond to the item). For this reason, it is necessary to sometimes include extraneous information in the Patient Box. For example, an item that requires the examinee to recognize an emergency blood pressure issue will stand out if it is the only item on the exam that includes information concerning patient blood pressure.	High content quality. *Note that this issue is present at the examination form level (i.e., it is important for the set of all items that are selected to appear on a form to contain this varied information – even if varied information exists at the item level in an item bank, it doesn't guarantee that that variability will be present in the final examination form). In short, this is a form assembly issue/consideration.*
11	Present the Patient Box so that it is consistent and easy to read. Use a table format with some blank space around the edges.	Strong consistency in item structure and wording.
12	Rules for consistency and readability of the Patient Box: - Begin new information in the Patient Box with a capital letter, unless medications are being listed (in which case the generic name would appear in lower case). - Each new piece of information should use a new line.	Strong consistency in item structure and wording
13	Put the components of the Patient Box in the same sequence listed in the Item Writing Guidelines– for example, under *Background and/or Patient History*, consistently use the following sequence: History of medical conditions Current medications History of dental diagnosis and treatment Allergies Social history It is not necessary to include all components in the Patient Box.	Strong consistency in item structure and wording

14	Omit the Patient Box if a patient scenario is unnecessary. For example, calculating the half-life of a drug is clinically relevant but does not need to be put into the context of a specific patient or medication.	Test examinee's knowledge without inappropriate distractions.
15	Verify that the situation and item are relevant to a general dentist, occur in common practice, and are within the dental scope of practice. The touchstone is clinical relevance.	High content quality.
16	Focus each item on the concept being tested. If an item looks complicated and contains multiple concepts, consider simplifying it or splitting it into multiple items. For example, if an item asks about both diagnosis and treatment, consider restructuring to ask about either the diagnosis or treatment. If an item asks about medication options and dosages, consider restructuring it to ask about either the medication or dosage.	Test examinee's knowledge without inappropriate distractions.
17	Choose the type of item (standalone with Patient Box, standalone without Patient Box, item set) that is best to test the examinee's knowledge.	Test examinee's knowledge without inappropriate distractions.
18	Refer to medications with both generic and trade names. Generic names are listed first and are not capitalized. Trade names follow the generic name and are shown in parentheses, capitalized, and with the trademark symbol as needed. For example: acetaminophen (Tylenol®).	Strong consistency in item structure and wording.
18.1	Omit medication dosages unless that is what is being tested. As an exception, dosages of aspirin should be included since it is commonly prescribed at different dosages depending on the underlying condition.	Focus item wording on the concept being tested.
19	Use currently-prescribed medications.	High content quality.
19.1	Use the term most likely to be used by a patient in the Chief Complaint area. This is often the trade name because patients are usually more familiar with these names, but in some cases it may be the generic name.	Consistent with current dental practice.
20	Refer to a tooth as "tooth 27" as opposed to "tooth #27."	Strong consistency in item structure and wording
21	Verify or obtain the copyright for any images used.	Do not use the intellectual property of others without permission.
22	Strive for items that require the examinee to think critically, applying logic and reason to identify the correct response.	High content quality.
23	Distractors should appear in a logical sequence. Distractors containing numbers should be ordered numerically. Where each distractor builds on a previous distractor, the shortest distractor should appear first, and each subsequent addition should be presented next. For example: A. Diagnose only B. Diagnose and treat only C. Diagnose, treat, and manage Where the distractors each represent a single letter, the letters should be presented alphabetically.	Strong consistency in item structure and wording.
24	Do not refer to "this patient" in the wording of the stem. Examinees should **always** consider data in the Patient Box, just as they should always consider the context of the patient in practice. Using the Patient	Strong consistency in item structure and wording. High content quality.

	Box will be emphasized in pre-examination materials and in the exam tutorial.	
25	With respect to the Patient Box, information should be presented concisely using a "bullet point approach" (minus the actual bullet points). There is no need to present fully composed sentences.	Additional wording would only increase the reading time for each question.
26	Language used in the Patient Box should be consistent with what is heard and used in practice in real world clinical settings.	Consistent with current dental practice.
27	In working with the bullet point approach, the following convention applies: If there is not a full sentence, there will not be a period. If there is a full sentence, there should be a period.	Ease of reading.
28	The goal is for the Patient Box to maintain the same size for all questions, however, there may be exceptions. Dependent upon administration vendor capabilities, the white space in the patient box should be adjusted (i.e., dynamically re-sized) to reflect how much information is presented in the patient box.	Ease of reading.
29	Do not use periods for common abbreviations. (e.g., US, BP, ADA)	Ease of reading.
30	For technical terms outside the scope of dentistry (e.g., psychological /behavioral science terms), avoid using the technical term if possible, and describe the concept instead.	The focal consideration is that dentists should be able to understand and apply the underlying concepts.

Images and Item Set Materials

For the INBDE, there is no requirement that each item set must be presented with the full set of case materials currently required for NBDE Part II (e.g., full mouth series, dental charts, clinical photographs). Item sets can simply present the images necessary to answer the questions presented. This position is consistent with recent guidelines indicating that the selection of images for a given patient should be targeted toward patient needs. Similarly, with respect to the submission of case materials to the JCNDE, the JCNDE now accepts single images from submitters, in addition to accepting full sets of case materials.

Images can vary with respect to the information they are capable of providing. In constructing items, the fundamental question to ask for each item is as follows:

> **Would an entry-level candidate who possesses the necessary knowledge be able to answer this question correctly, given the quality of the image presented?**

Images appearing on the Joint Commission's examinations should be of sufficient quality to enable examination results to properly reflect candidate skill levels. Image quality and acceptability involves numerous factors, such as the following:

- Resolution
- Size
- Clarity/sharpness
- Contrast
- Color accuracy

In viewing images on screen during item development, TCC members should bear in mind that candidates do not have the same level of control when working with images during test administration sessions. For example, candidates have no ability to adjust image contrast or lighting in the test center, and candidates do not have the ability to change image size (e.g., zoom). This must be considered when writing items involving images.

Model Items

The preceding discussion has highlighted important information necessary to develop high quality items for the INBDE. To assist item writers, Appendix D presents model items that illustrate the concepts and principles that have been discussed. Item writers can rely on these model items as exemplars when writing INBDE items.

Item Information and Classification Decisions

INBDE items are stored in the Joint Commission's item bank. Item banks serve as a repository for examination items, and include a tremendous amount of information concerning each item. The Joint Commission's item bank for the INBDE will include information such as the following for each item:

- Unique item identifier
- Item stem
- Item response options
- The correct answer (i.e., the key)
- Foundation Knowledge area associated with item
- Clinical Content area associated with item
- Concept tested by item
- Cognitive level associated with item
- References to associated stimulus materials
- Item performance information (e.g., item difficulty, item discrimination)
- Changes to item over time

In considering the INBDE, the Joint Commission has specifically required that items be classified based on the Foundation Knowledge area and Clinical Content area tested, as well as the concept tested, item type, and cognitive level. Item classification decisions are made to enable the Joint Commission to track content coverage and provide flexibility for reporting results (e.g., to failing candidates).

Assigning Foundation Knowledge Areas and Clinical Content Areas

INBDE items must adhere closely to the test specifications approved by the Joint Commission. The assignment of items to Foundation Knowledge areas and Clinical Content areas represents an important task that enables the Joint Commission to ultimately assemble test forms that properly reflect the content domain and comply with test specifications. The following general principles apply when assigning Foundation Knowledge areas and Clinical Content areas to items:

- Items should be classified consistently, in a manner that facilitates operations and is consistent with the test purpose.
- An item can relate to multiple Foundation Knowledge areas and, by extension, multiple disciplines.
- An item can relate to multiple Clinical Content areas.
- Each item will be assigned a single Foundation Knowledge area and a single Clinical Content area, for test specification purposes. Items relating to multiple Foundation Knowledge areas and/or Clinical Content areas will be assigned a single Foundation Knowledge area and a Clinical Content area at the discretion of the Test Construction Committee.

Concept Tested and Item Type

Information concerning the Concept Tested focuses on the specific topic area or piece of knowledge that is being evaluated by a given test question. The concept tested reflects the point of the question. This information is helpful in honing the item so it is focused purely on its intended evaluative target. It is also very helpful to item reviewers. The concept being tested may appear clear to the individual who wrote the item; however, an external

item reviewer may see something completely different. The concept tested can help external reviewers to refine an item so that it more closely matches its intended purpose.

Cognitive Level

A level is assigned to each item to gauge the thought processes and level of cognition required to respond. Cognitive levels reflect the manner in which knowledge is being assessed, rather than the empirical difficulty of the content. The cognitive level is based on the tasks required of the examinee. Items are classified according to the following three cognitive levels:

Level 1 – Understanding. Understanding items elicit knowledge of specific facts, terminology, sequences, methodology, principles, theories, and structures in a different context.

Identifiers: acquire, define, identify, recall, recognize

Level 2 – Application. Application Items elicit the application of specific facts, terminology, sequences, methodology, principles, theories, and structures in a complex manner.

Identifiers: apply, choose, classify, develop, relate, organize, differentiate

Level 3 – Reasoning. Reasoning items elicit understanding or the ability to identify and interpret specific data, terminology, sequences, methodology, principles, theories, and structures.

Identifiers: analyze, synthesize, interpret, evaluate

In assigning a cognitive level to an item, the item writer must consider the cognitive skills of an entry-level dentist. Mislevy (1993) cautions that item writers, as experts, use different cognitive strategies in responding to a problem or circumstance than a novice. An expert works from an extensive knowledge base and often processes information in a less complex manner (e.g., recognition of problem elements and recall of a solution, as opposed to complex analysis to derive the solution). In turn, the novice uses more complex cognitive operations to address a problem. In item development, the item writer should be sensitive to the cognitive skills of the entry level professional, and should code the cognitive level correspondingly.

Conclusion

The Joint Commission hopes that the material presented in this Item Development Guide is helpful to item writers as they construct INBDE items. Feedback on this guide and the INBDE development process is welcome, and can be submitted to the Joint Commission via the following email address: jcndecie@ada.org.

Submission of Items and Case Materials

As noted previously, all INBDE Test Constructors are expected to complete Confidentiality and Copyright Agreement forms. The required forms appear in Appendix E. If you would like to submit items for the Integrated National Board Dental Examination, or if you have any questions, please contact the Department of Testing Services at the following address:

Joint Commission on National Dental Examinations
Department of Testing Services
211 East Chicago Avenue
Chicago, IL 60611-2637

A Final Note of Thanks

The Joint Commission appreciates the significant contributions of the many individuals who spend numerous hours writing items for the Joint Commission's examination programs. The contributions of these individuals are extremely important, and have a direct impact on the public health. The Joint Commission thanks its Test Construction Committee members for their dedication and commitment as they work to build high quality examination items for use in Joint Commission testing programs.

If you are not currently a Joint Commission Test Construction Committee member, the Joint Commission invites you to consider participating in this vital endeavor. You can learn more about becoming a Test Construction Committee member on the Joint Commission's website: http://www.ada.org/en/jcnde/examinations/test-construction/

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Appendix A: Foundation Knowledge for the General Dentist

FOUNDATION KNOWLEDGE FOR THE GENERAL DENTIST

An outline, with selected examples, of the basic knowledge, cognitive skills and abilities for the practice of general dentistry.

FK1: Apply knowledge of molecular, biochemical, cellular, and systems-level development, structure and function to the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK1 include: Gross and Head and Neck Anatomy, Regional Anatomy, Dental Anatomy, Gnathology, Occlusion (including TMJ), General and Oral Histology, Embryology, Physiology, Cell Biology, Biochemistry, Molecular Biology, Genetics, Neuroscience, Nutrition, Oral Biology, General and Systemic Pathology, Cancer Biology, etc.

Clinical Science areas where FK1 may have relevance include: Periodontology, Oral and Maxillofacial Surgery, Occlusion, TMD, Ergonomics, Prosthodontics, Pediatric Dentistry, Orthodontics, Implant Dentistry, Forensic Dentistry, Oral Medicine, Oral Pathology, Clinical Nutrition, etc.

FK1-1: Apply knowledge of the structure and function of the normal cell and basic types of tissues comprising the human body. (Encompasses Gross and Head and Neck Anatomy, General and Oral Histology, Dental Anatomy, Occlusion, TMJ, etc.).

Select examples include:

- structure of the human body in general and the craniofacial region in particular
- structure and function of salivary glands, including the production, secretion, content and the function of saliva
- development and structure of the deciduous and permanent teeth
- development and structure of periodontal tissues
- development, structure and function of the major muscles of mastication and facial expression
- development, structure and function of the temporomandibular joint and its supporting and accessory structures.
- anatomical and functional relationships of landmarks of the oral cavity and contiguous regions
- structure and function of oral mucosa
- structure, function, and metabolism of collagen, proteoglycans and other proteins in connective and mineralized tissue
- calcium and phosphorus metabolism, the formation of biological hydroxyapatite and its role in the mineralization of hard tissues (e.g., bone and teeth)
- calcium and phosphorus metabolism - role of osteoblasts, osteoclasts, osteocytes, as well as Vitamin D3.
- Blood coagulation systems and its control

FK1-2: Apply knowledge of structure and function of cell membranes and the mechanism of neurosynaptic transmission. (Encompasses Membrane Biology, Cell Biology, Biochemistry and Molecular Biology, Physiology, Neuroscience, etc.).

Select examples include:

- local and central mechanisms of pain modulation
- the role of ion channels in neurotransmission, sodium channel function and mechanism of action of local anesthetics
- function of specific neurotransmitters in a variety of physiological and pathologic conditions
- the role of dopamine in Parkinson's disease
- structure and function of sensory and motor pathways of the central nervous system as they relate to normal functioning of the body in general, and of the craniofacial region in particular
- innervation and anesthesia of the oral cavity
- relationships between sensory and motor innervations and the functions of the orofacial complex (mastication, salivation, orofacial somatosensation, pain, taste and smell)

FK1-3: Apply knowledge of the mechanisms of intra and intercellular communications and their role in health and disease. (Encompasses Biochemistry, Cell Biology, etc.).

Select examples include:

- mechanism of neurotransmitter and hormone signaling – i.e., pain, hormones like of insulin, thyroxin, neurotransmitters like acetylcholine, adrenaline, etc., through their cell surface receptor
- role of second messengers in muscle contraction (with implications on myofacial pain), cardiostimulation (with implications for local anesthesia), in glycogen breakdown in the liver (with implications to diabetes and nutrition), of stimulation of bone growth and breakdown (with implications for understanding implant behavior), etc.
- role of intra and intercellular signaling during osteointegration of implants
- role of cell signaling in sensitivity to drugs or bacterial toxins

FK1-4: Explain how the regulation of major biochemical energy production pathways and the synthesis/degradation of macromolecules function to maintain health, and how dysregulation in disease affects the management of oral health. (Encompasses Biochemistry, Cell Biology, Membrane Biology, Physiology, Molecular Pathology, Nutrition, Sports Medicine, etc.).

Select examples include:

- major anabolic and catabolic pathways for proteins, carbohydrates, and lipids and how energy for all activities of the body is derived
- mechanisms of biologic energy transduction
- the role of insulin in regulation of glucose and lipid metabolism, and the pathogenesis of types I and II diabetes mellitus

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FK1-5: Apply knowledge of the atomic and molecular characteristics of biological constituents to predict normal and pathological function (Encompasses Biochemistry, Cell Biology, Genetics etc.).

Select examples include:

- the role of nucleic acids, DNA and RNA, in heredity and metabolic regulation
- the role of enzymes as catalysts in bodily functions such as digestion, blood coagulation, respiration
- Metabolic turnover of lipids, carbohydrates and proteins in lysosomes and proteosomes

FK1-6: Apply knowledge of the mechanisms that regulate cell division and cell death, to explain normal and abnormal growth and development. (Encompasses Cell Biology, Physiology, Molecular Biology, Pathology, Cancer Biology, etc.).

Select examples include:

- how abnormalities in regulation of cell division and cell death result in cancer
- the role of growth factors and their receptors in uncontrolled tissue proliferation
- the role of oncogenes in the context of normal growth factor-initiated signal transduction and how this information is used to treat cancer (e.g., antibodies to EGFR in breast cancer; tyrosine kinase inhibitors in leukemia)
- the role of oncogenes as tumor supressor genes and in the context of normal growth factor-initiated signal transduction and how this information is used to treat cancer (e.g., antibodies to EGFR in breast cancer; tyrosine kinase inhibitors in leukemia)
- The role of growth factors and platelets in wound healing

FK1-7: Apply knowledge of biological systems and their interactions to explain how the human body functions in health and disease. (Encompasses Physiology, General and Systems Pathology, etc.).

Select examples include:

- basic principles of nutrition, sources of vitamins, minerals, and their importance in oral and systemic health and disease
- how osteoporosis affects the structure and function of the maxillofacial complex
- gastric acid reflux and its impact on oral structures

FK1-8: Apply knowledge of the principles of feedback control to explain how specific homeostatic systems maintain the internal environment and how perturbations in these systems may impact oral health. (Encompasses in Physiology, Systems Pathology, Oral Medicine, Pharmacology, etc.).

Select examples include:

- the hydroelectrolytic balance of the body and consequences of fluid and hemodynamic disturbances
- how loss of fluids due to trauma or due to polypharmacy can lead to xerostomia

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FK2: Apply knowledge of physics and chemistry to explain normal biology and pathobiology in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK-2 include: Physiology, Systems Pathology, and Pharmacology, etc.

Clinical Science areas where FK2 may have relevance include: Oral Medicine, Oral Pathology, Periodontology, Diagnosis and Treatment Planning, History and Physical Examination, Emergency Care, Oral and Maxillofacial Surgery, Pediatric Dentistry, etc.

FK2-1: Apply knowledge of the principles of blood gas exchange in the lung and peripheral tissue to understand how hemoglobin, oxygen, carbon dioxide and iron work together for normal cellular function. (Encompasses Physiology, Systems Pathology, Oral Medicine, Pharmacology, etc.).

Select examples include:

- diffusion to gas exchange in the lung
- normal blood chemistry and how blood chemistry assists diagnosis of common conditions such as anemia, diabetes, bleeding disorders, cyanosis, and acidosis

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FK3: Apply knowledge of physics and chemistry to explain the characteristics and use of technologies and materials used in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK-3 include: Basic Radiology, Dental Material Sciences, Biomaterials, Biophysics, etc.

Clinical Science areas where FK3 may have relevance include: Prosthodontics, Restorative Dentistry, Oral Diagnostics, Applied Biomaterials, Preventive Dentistry, Laser-Assisted Dentistry, Applied Pharmacology, Radiology, Implant Dentistry, Endodontics, Esthetic Dentistry, Cosmetic Dentistry, Radiation Oncology, Oral Oncology, etc.

FK3-1: Apply knowledge of the principles of radiation to understand radiobiologic concepts and the uses of radiation in the diagnosis and treatment of oral and systemic conditions (Encompasses Basic and Oral Radiology, etc.).

Select examples include:

- types of radiation and their impact on biologic systems
- safeguards against radiation exposure
- radiographic techniques for optimal diagnosis

FK3-2: Apply knowledge of the principles of chemistry to understand the properties and performance of dental materials and their interaction with oral structures in health and disease. (Encompasses Dental Material Sciences, Biomaterials, etc.).

Select examples include:

- advantages and disadvantages of biomaterials used in dentistry
- compatibility of dental materials both with each other and with biologic systems
- substantivity and the adhesion chemicals, drugs, dental plaque, food, etc. to dental materials or to tissues in the mouth

FK3-3: Apply knowledge of the principles of lasers to understand the interaction of laser energy with biological tissues and uses of lasers to diagnose and manage oral conditions (Encompasses Biophysics, Laser-Assisted Dentistry, etc.).

Select examples include:

- benefits and limitations of laser devices for detecting dental caries
- practical use of lasers for surgical procedures involving soft tissue and hard tissues
- safety considerations for the use of lasers

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FK4: Apply knowledge of the principles of genetic, congenital and developmental diseases and conditions and their clinical features to understand patient risk in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK4 include: Genetics, Developmental Biology, Embryology, Craniofacial Biology, etc.

Clinical Science areas where FK4 may have relevance include: Oral Medicine, Oral Pathology, Orthodontics, Pediatric Dentistry, Oral Diagnostics, Oral and Maxillofacial Surgery, Facial Prosthesis, Periodontology, Pediatric Dentistry, Radiology, Cariology, etc.

FK4-1: Apply knowledge of genetic transmission of inherited diseases and their clinical features to inform diagnosis and the management of oral health. (Encompasses Genetics, Hereditary Medicine, Developmental Biology, Teratology, etc.).

Select examples include:

- Ectodermal dysplasia, Amelogenesis imperfecta, Hereditary hemorrhagic telangiectasia, neurofibromatosis, dentiogenesis imperfecta, osteogenesis imperfecta, basal cell nevus syndrome, various bleeding disorders, osteoporosis, and other hereditary conditions

FK4-2: Apply knowledge of congenital (non-inherited) diseases and developmental conditions and their clinical features to inform the provision of oral health care. (Encompasses Genetics, Developmental Biology, Teratology, etc.).

Select examples include:

- Sturge-Webber Angiomatosis and other non-hereditary conditions
- anterior overjet and thumb-sucking

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FK5: Apply knowledge of the cellular and molecular bases of immune and non-immune host defense mechanisms in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK5 include: Immunology, Immunopathology, Microbiology, Virology, etc.

Clinical Science areas where FK5 may have relevance include: Oral Pathology, Periodontology, Preventive Dentistry, Pediatric Dentistry, Diagnosis and Treatment Planning, History and Physical Examination, Cariology, Implant Dentistry, Emergency Care, Oral Radiology, Endodontics, Oral and Maxillofacial Surgery, Clinical Laboratory Sciences, etc.

FK5-1: Apply knowledge of the function and dysfunction of the immune system, of the mechanisms for distinction between self and non-self (tolerance and immune surveillance) to the maintenance of health and autoimmunity. (Encompasses Immunology, Immunopathology, Immunobiology, Microbiology, Virology, etc.).

Select examples include:

- the role of the immune system in the pathogenesis of periodontal disease
- the effect of immunization in the prevention of infectious diseases

FK5-2: Apply knowledge of the differentiation of hematopoietic stem cells into distinct cell types and their subclasses in the immune system and its role for a coordinated host defense against pathogens (e.g., HIV, hepatitis viruses) (Encompasses Immunopathology, Immunology, Hematology, etc.).

Select examples include:

- synthesis and secretion of salivary antibodies and their use for diagnostic purposes.

FK5-3: Apply knowledge of mechanisms that defend against intracellular or extracellular microbes and the development of immunological prevention or treatment strategies. (Encompasses Immunopathology, Immunobiology, Immunology, Microbiology, Virology, Mycology, Parasitology, etc.).

Select examples include:

- the induction of antibody response to prevent influenza or hepatitis
- the development and successful use of vaccines against polio and measles
- the potential for use of vaccines for caries

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FK6: Apply knowledge of general and disease-specific pathology to assess patient risk in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK6 include: Cellular and Molecular Pathology, General and Systems Pathology, etc.

Clinical Science areas where FK6 may have relevance include: Periodontology, Oral Pathology, Oral Medicine, Oral Oncology, Oral Cancer, Oral Diagnostics, Diagnosis and Treatment Planning, History and Physical Examination, Endodontics, Emergency Care, Oral Radiology, Oral and Maxillofacial Surgery, Clinical Laboratory Sciences, Prosthodontics, Craniofacial Prosthodontics, Applied Biomaterials, etc.

FK6-1: Apply knowledge of cellular responses to injury, the underlying etiology, biochemical and molecular alterations and natural history of disease, to assess therapeutic intervention. (Encompasses Cellular and Molecular Pathology, General Pathology, etc.).

Select examples include:

- formation and removal of free radicals from cells and conditions under which tissue injury occurs due to lack of perfusion
- susceptibility of different cell types (cardiomyocytes, neurons) to the effects of anoxic injury caused by vascular compromise

FK6-2: Apply knowledge of the vascular and leukocyte responses of inflammation and their cellular and soluble mediators to understand the prevention, causation, treatment and resolution of tissue injury. (Encompasses Cellular and Molecular Pathology, General Pathology, Pharmacology, Immunopathology, etc.).

Select examples include:

- the role that arachidonic acid-derived mediators play in various steps of acute inflammation and how the inflammatory process can be moderated by use of specific inhibitors of these mediators (COX inhibitors, aspirin)
- benefits of neutralizing various immune mediators (e.g., anti-TNF in rheumatoid arthritis) in the context of specific diseases
- benefits of regulated functions of the inflammatory response (e.g., the elimination of infectious agents)

FK6-3: Explain the interplay of platelets, vascular endothelium, leukocytes, and coagulation factors in maintaining fluidity of blood, formation of thrombi, and causation of atherosclerosis as it relates to the management of oral health. (Encompasses Cellular and Molecular Pathology, General Pathology, etc.).

Select examples include:

- implications of the administration of local anesthesia with epinephrine to a severely atherosclerotic patient
- evaluation of patients for oral surgical procedures

FK6-4: Explain the impact of systemic conditions on the treatment of dental patients. (Encompasses Systemic Pathology, Internal Medicine, Medically Complex Patient, etc.).

Select examples include:

- joint replacement

- osteoporosis
- bacterial endocarditis
- diabetes
- AIDS

FK6-5: Explain the mechanisms, clinical features, and dental implications of the most commonly encountered metabolic systemic diseases. (Encompasses Systemic Pathology, Internal Medicine, Medically Complex Patients, etc.).

Select examples include:

- Diabetes
- Hyper- and hypothyroidism

FK7: Apply knowledge of the biology of microorganisms in physiology and pathology in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK7 include: Microbiology, Virology, Parasitology, Mycology, Oral Epidemiology, Oral Public Health, Statistics, etc.

Clinical Science areas where FK7 may have relevance include: Cariology, Periodontology, Oral Pathology, Oral Malodor, Oral Medicine, Oral Diagnostics, Diagnosis and Treatment Planning, History and Physical Examination, Endodontics, Emergency Care, Oral Radiology, Oral and Maxillofacial Surgery, Applied Pharmacology, Applied Epidemiology, Preventive Dentistry, Community Dentistry, etc.

FK7-1: Apply the principles of host–pathogen and pathogen–population interactions and knowledge of pathogen structure, transmission, natural history, and pathogenesis to the prevention, diagnosis, and treatment of infectious disease. (Encompasses Microbiology, Virology, Parasitology, Mycology, Pharmacology, Oral Biology, Pulp Biology, etc.).

Select examples include:

- mechanisms by which bacteria increase their drug resistance susceptibility
- use of anti-virals in the treatment of Herpes simplex infection
- emergence of antibiotic resistant bacteria
- components the oral microflora
- components of and formation of dental plaque
- the role of specific bacterial groups in the production of periodontal disease
- the role of bacteria in production of dental caries, pulpal and periapical pathology

FK7-2: Apply the principles of epidemiology to achieving and maintaining the oral health of communities and individuals. (Encompasses Epidemiology, Public Health, Preventive Medicine, Preventive Dentistry, etc.).

Select examples include:

- evaluate potential effectiveness of fluoride, varnishes, brushing, flossing, mouthwashes to prevent caries, periodontal disease and oral malodor
- evaluate patterns of health and disease to better manage community oral health
- apply the principles of universal precautions in preventing the transmission of infectious diseases

FK7-3: Apply the principles of symbiosis (commensalisms, mutualism, and parasitism) to the maintenance of oral health and prevention of disease. (Encompasses Parasitology, Microbiology, Pharmacology, Immunopathology, etc.).

Select examples include:

- the protective effect of normal oral flora and its perturbation after antibiotic treatment or immunosuppressive therapy

FK8: Apply knowledge of pharmacology in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK8 include: Basic and Applied Pharmacology, Biomedical Research, Evidence Based Dentistry, Public Health Policy, etc.

Clinical Science areas where FK8 may have relevance include: Clinical Pharmacology, Cariology, Periodontology, Endodontics, Oral and Maxillofacial Surgery, Pediatric Dentistry, Preventive Dentistry, Applied Epidemiology, Community Dentistry, etc.

FK8-1: Apply knowledge of pathologic processes and basic principles of pharmacokinetics and pharmacodynamics for major classes of drugs and over the counter products to guide safe and effective treatment. (Encompasses Basic and Applied Pharmacology, Cancer Biology, etc.).

Select examples include:

- explain modes of action of the major classes of antimicrobial drugs
- apply therapeutic strategies help minimize or prevent drug resistance
- understand the use of multiple drugs with different mechanisms of action for cancer chemotherapy
- Explain how conventional drug therapies could have side effects that impact on systemic conditions (i.e. the use of bisphosphanates and mandibular bone metabolism, the use of anti HIV protease inhibitors and caries incidence)

FK8-2: Select optimal drug therapy for oral conditions based on an understanding of pertinent research, relevant dental literature, and regulatory processes. (Encompasses Clinical and Applied Pharmacology, Public Health Policy, Evidence Based Dentistry, Biomedical Research, etc.).

Select examples include:

- explain the limitations of the claims for therapeutic efficacy and safety as reported by oral product/pharmaceutical manufacturers
- understand the process by which drugs become approved and withdrawn in the United States

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FK9: Apply knowledge of sociology, psychology, ethics and other behavioral sciences in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK9 include: Sociology, Psychology, Philosophy and Ethics, Cultural Competence, Ergonomics, Applied Nutrition, Communication Skills, Emotional Intelligence and other Behavioral Sciences, etc.

Clinical Science areas where FK9 may have relevance include: all major clinical disciplines where patient interaction is anticipated including Speech Therapy and Clinical Nutrition, Nicotine Replacement Therapy, and Practice Management including Access to Care and Patient Education and Compliance.

FK9-1: Apply principles of sociology, psychology, and ethics in making decisions regarding the management of oral health care for culturally diverse populations of patients. (Encompasses Sociology, Psychology, Ethics, Cultural Competence, Emotional Intelligence, Communication Skills, Community Health, Public Health, etc.).

Select examples include:

- understand patient responses to treatment recommendations based on beliefs associated with cultural or ethnic background
- assess community-based interventions for prevention of oral disease

FK9-2: Apply principles of sociology, psychology and ethics in making decisions and communicating effectively in the management of oral health care for the child, adult, geriatric, or special needs patient. (Encompasses Sociology, Psychology, Ethics, Communication Skills, Child Psychology, Geriatric Medicine, Patients with Special Needs, Applied Nutrition, Speech Therapy, etc.).

Select examples include:

- use of behavior modification techniques in treatment of young children
- use of appropriate methods for tobacco cessation education
- use of appropriate methods for dietary counseling

FK9-3: Apply principles of sociology, psychology, and ethics in managing fear and anxiety and acute and chronic pain in the delivery of oral health care. (Encompasses Sociology, Psychology, Ethics, Applied Pharmacology, Psychotherapy, etc.).

Select examples include:

- management of pain and anxiety in patients with history of substance abuse
- understand the implications of transference and projection in the doctor-patient relationship

FK9-4: Apply principles of sociology, psychology, and ethics in understanding and influencing health behavior in individuals and communities. (Encompasses Sociology, Psychology, Ethics, Public Health, Community Health, Medical and Dental Informatics, etc.).

Selected examples include:

- develop effective strategies for achieving water fluoridation in a community
- understand reasons for avoidance of professional dental care

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FK10: Apply quantitative knowledge, critical thinking, and informatics tools in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health.

Foundation Knowledge disciplines covered by FK10 include: Statistics, Public Health Dentistry, Descriptive and Analytical Epidemiology, Dental and Health Informatics, Evidence-Based Dentistry, Applied Research, etc.

Clinical Science areas where FK10 may have relevance include: all major disciplines associated with practicing dentistry including Practice Management.

FK10-1: Apply basic mathematical tools and concepts, including functions, graphs and modeling, measurement and scale, and quantitative knowledge, to an understanding of the specialized functions of membranes, cells, tissues, organs, and the human organism, especially those related to the head and neck, in both health and disease. (Encompasses Basic Algebra, Basic Mathematics, Analytical and Descriptive Epidemiology, Statistics, Critical Evaluation of the Scientific Literature, Evidence Based Dentistry, etc.).

Select examples include:

- interpret and apply graphical representations of drug levels as a function of dosage and pharmacokinetics
- explain the impact of diet, salivation and swallowing on salivary pH.
- analyze skeletal growth and development patterns in children

FK10-2: Apply the principles and logic of epidemiology and the analysis of statistical data in the evaluation of oral disease risk, etiology, and prognosis. Encompasses Evidence-Based Dentistry, Epidemiology, Statistics, Preventive Dentistry, Health Promotion, Public Health Dentistry, Community Dentistry, etc.).

Select examples include:

- understand the relative risk and attributable risk as useful guides to clinical and public oral health decision making with regard to caries, periodontal disease and oral cancer prevention
- understand the ability of a diagnostic test to discriminate between high and low risk of disease given the prevalence of the disease

FK10-3: Apply the basic principles of information systems, use, and limitations, to information retrieval and clinical problem solving. (Encompasses Dental Informatics, Health Informatics, Descriptive and Analytical Epidemiology, Evidence-Based Dentistry, Library Sciences, etc.).

Select examples include:

- understand and be able to access search capability of bibliographic databases (Cochrane Data Base, PubMed, and others), using at least two Boolean connectors, on a clinical topic
- utilize an electronic health record system to manage oral health care
- understand and apply the levels of evidence in the scientific literature
- understand how to formulate a PICO (Patient, Intervention, Comparison, Outcome) question for a problem in oral health

FK10-4: Apply knowledge of biomedical and health informatics, including data quality, analysis, and visualization, and its application to diagnosis, therapeutics, and

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characterization of populations and subpopulations. (Encompasses Dental Informatics, Evidence-Based Dentistry and Medicine, Health Informatics, etc.).

Select examples include:

- the role of informatics in health care quality
- the role of informatics in health policy

FK10-5: Apply elements of the scientific process, such as inference, critical analysis of research design, and appreciation of the difference between association and causation, to interpret the findings, applications, and limitations of observational and experimental research in clinical decision-making using original research articles as well as review articles. (Encompasses Evidence-Based Dentistry, Applied Research, etc.).

Select examples include:

- the value of evidence from observational versus experimental studies in determining the efficacy of therapeutic interventions.

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Appendix B: Relationship between Foundation Knowledge Areas and NBDE Parts I and II

Comparison of scientific areas covered by individual *Foundation Knowledge* (FK1-FK10) and those currently covered on either Part I or Part II of NBDE*

* Note, that a science area potentially covered by the Foundation Knowledge **does not** mean it will end up with a substantial number of questions on the new exam. The size of the circle of a specific scientific field is **not** proportional to their relative representation on the exam. This is a qualitative analysis where all fields are considered equal.

Legend: The following 10 pages represent science areas covered by the new Foundation Knowledge 1 through 10.

Color code:
In green, those also covered on Part I of NBDE
In yellow, those also covered on Part II of the NBDE
In orange those not covered on either Part I or Part II of NBDE
in blue those covered on both Part I and II of NBDE

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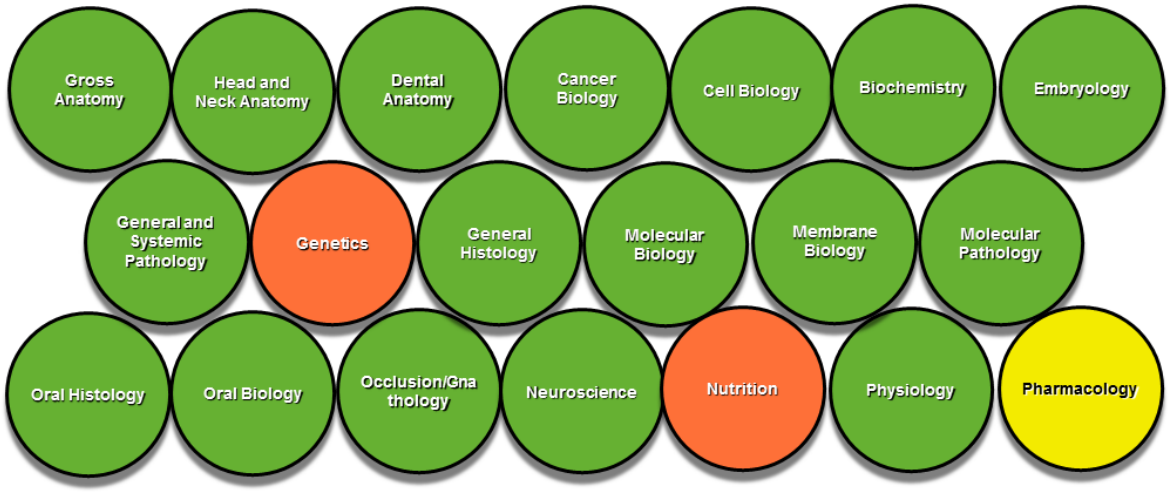
Basic and Foundation Sciences covered in part by
Foundation Knowledge 1 (FK1) (9C)

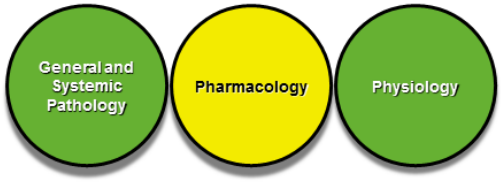
Apply knowledge of molecular, biochemical, cellular, and systems-level development, structure and function to the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
In green, those also covered on Part I of NBDE
In yellow, those also covered on Part II of the NBDE
In orange those not covered on either Part I or Part II of NBDE

Basic and Foundation Sciences covered in part by
Foundation Knowledge 2 (FK2) (1C)

Apply knowledge of physics and chemistry to explain normal biology and pathobiology in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
In green, those also covered on Part I of NBDE
In yellow, those also covered on Part II of the NBDE

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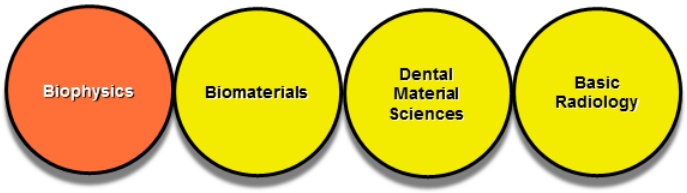
Basic and Foundation Sciences covered in part by
Foundation Knowledge 3 (FK3) (3C)

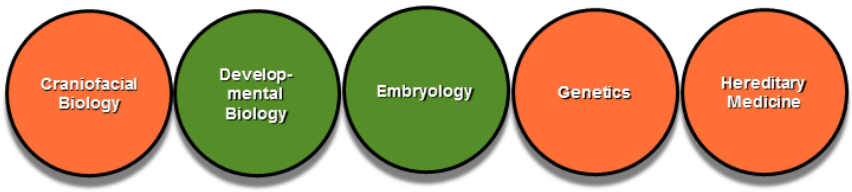
Apply knowledge of physics and chemistry to explain the characteristics and use of technologies and materials used in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
In orange those not covered on either Part I or Part II of NBDE
In yellow, those also covered on Part II of the NBDE

Basic and Foundation Sciences covered in part by
Foundation Knowledge 4 (FK4) (2C)

Apply knowledge of the principles of genetic, congenital and developmental diseases and conditions and their clinical features to understand patient risk in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
In orange those not covered on either Part I or Part II of NBDE
In green, those also covered on Part I of NBDE

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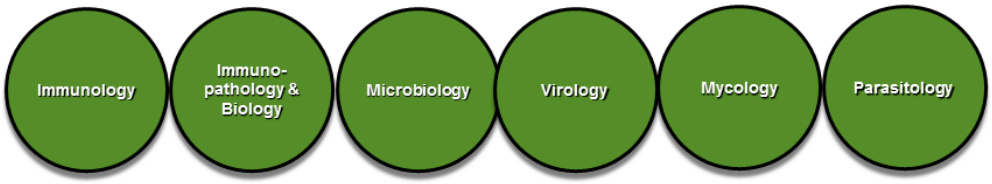
Basic and Foundation Sciences covered in part by
Foundation Knowledge 5 (FK5) (3C)

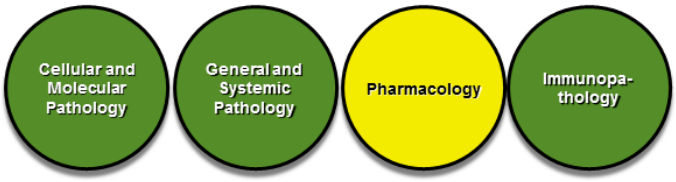
Apply knowledge of the cellular and molecular bases of immune and non-immune host defense mechanisms in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
In green, those also covered on Part I of NBDE

Basic and Foundation Sciences covered in part by
Foundation Knowledge 6 (FK6) (5C)

Apply knowledge of general and disease-specific pathology to assess patient risk in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
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In yellow, those also covered on Part II of the NBDE

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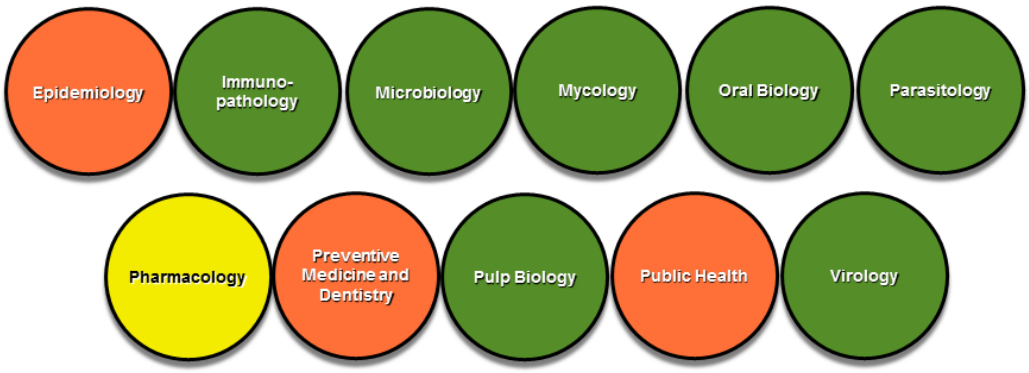
Basic and Foundation Sciences covered in part by
Foundation Knowledge 7 (FK7) (3C)

Apply knowledge of the biology of microorganisms in physiology and pathology in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
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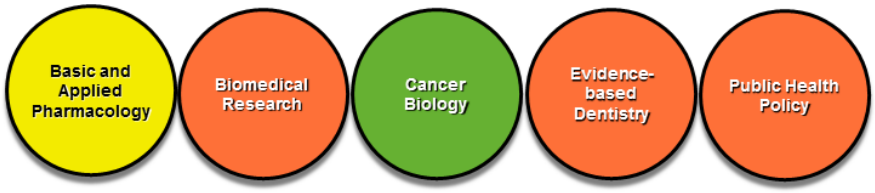
In green, those also covered on Part I of NBDE
In yellow, those also covered on Part II of the NBDE

Basic and Foundation Sciences covered in part by
Foundation Knowledge 8 (FK8) (3C)

Apply knowledge of pharmacology in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health

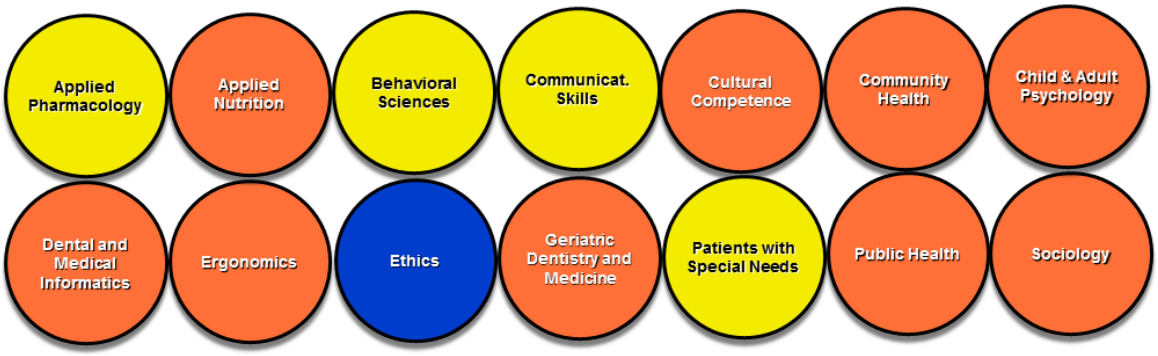


Color code:
In yellow, those also covered on Part II of the NBDE
In orange those not covered on either Part I or Part II of NBDE
In green, those also covered on Part I of NBDE

JCNDE JOINT COMMISSION ON NATIONAL DENTAL EXAMINATIONS

Basic and Foundation Sciences covered in part by
Foundation Knowledge 9 (FK9) (4C)

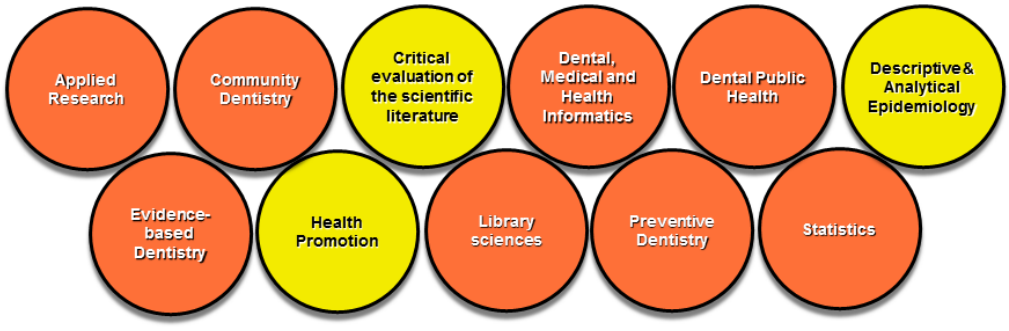
Apply knowledge of sociology, psychology, ethics and other behavioral sciences in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
In yellow, those also covered on Part II of the NBDE
In orange those not covered on either Part I or Part II of NBDE
in blue those covered on both part I and II of NBDE

Basic and Foundation Sciences covered in part by
Foundation Knowledge 10 (FK10) (5C)

Apply quantitative knowledge, critical thinking, and informatics tools in the prevention, diagnosis, and management of oral disease and the promotion and maintenance of oral health



Color code:
In yellow, those also covered on Part II of the NBDE
In orange those not covered on either Part I or Part II of NBDE

Appendix C: INBDE Fairness Review Checklist

The following provides a checklist that can be used to help develop fair examination items.

A. Avoid Cognitive Construct-Irrelevant Variance:

1. Does the item assume knowledge in subject areas not relevant to the focal construct?

   For example:
   Post-collegiate-level vocabulary in a quantitative reasoning item
   Geometric formula in a biology item
   Geographic knowledge in a reading passage
   Chemical compounds in an anatomy item

2. Does the item contain language, concepts, or objects familiar only to test takers from a certain geographical region, ethnic group, or religious affiliation?

   For example:
   political jurisdictions: borough, province, county, parish
   food: bouillabaisse, potage, gumbo, goulash
   weather: snowflakes, pack ice, riptide,
   sports: hockey, jet ski, grand slam, triple play

3. Does the item contain specialized, vocational, or professional language or terminology not relevant to the focal construct? Note: if the focal construct involves use of this language, it would be appropriate to include it.

   For example:
   Farming: combine, thresher
   Finance: arbitrage, hedge fund
   Medicine: prophylaxis, amyloidosis
   Dentistry: bruxism, debridement
   Optometry: astigmatism, emmetropia

4. Does the item employ literary devices?

   For example:
   Humor
   Irony or satire
   Double entendre

   If so, these should be present only to test understanding of such devices and when it is important for valid measurement (as in some literature tests).

B. Avoid Affective Construct-Irrelevant Variance:

1. Does the item contain subject matter (images or language) that might evoke strong emotions?

   For example:
   Accidents, illnesses, or natural disasters
   Death and dying
   Advocacy of religious or political agenda
   Children in peril
   Cruelty to animals

2. Does the item reference potentially offensive, controversial, or sensitive topics?

   For example:
   Particular holidays or activities surrounding holidays
   Tobacco, drug, or alcohol use
   Music, dancing, social dating

3. Does the item describe or refer to individuals using any of the following attributes?

   For example:
   Age, Disability, Ethnicity, Gender, National or regional origin, Native language, Race, Religion, Sexual orientation
   Socioeconomic status

   If so, and the description or reference is necessary, use correct, specific terminology.

   For example:
   Use White or Black people, instead of “Whites” or “Blacks”
   Use the phrase “sexual orientation” rather than “sexual preference.”

4. Does the item state or imply the superiority of one group over another?

   For example:
   Culturally-deprived group: implies that the majority culture is superior and that any differences from it constitute deprivation.

5. Does the item depict social situations unfamiliar to any groups?

   For example:
   Experiencing luxuries
   Frivolous spending
   International travel

6. Does the item/test depict stereotypes (either positive or negative) or repeated representations of certain societal roles (either positive and negative)?

   For example:
   Phrases such as women’s work, or man-sized job
   Repeated depictions of men or women in certain occupations
   Assumed characteristics of certain categories of individuals: Boys like to play with trucks, Asian people are smart, Native American people are in tune with nature

C. Avoid Physical Construct-Irrelevant Variance

1. Does the item contain content or utilize stimulus material (images, graphs, etc.) that may not be easily interpreted by all groups?

   For example: Small print in labeling of a graph
   Small print of superscripted mathematical symbols
   Blurred radiograph
   Colored lines in a graph

Note: The preceding checklist should not be considered comprehensive. It will be revised and updated to incorporate changes in assessment theory, societal perceptions, medical/dental practice and terminology, and additional concerns. Additionally, this checklist is not meant to interfere with test purpose or test validity. It is meant to generate talking points regarding possible occurrences of construct-irrelevant variance.

Appendix D: INBDE Model Items

[INSERT INBDE MODEL ITEMS]

Appendix E: Required Forms for INBDE Test Constructors

JCNDE JOINT COMMISSION ON NATIONAL DENTAL EXAMINATIONS

Test Constructor Responsibility for Test Security

Participation in the development of examinations carries with it serious responsibilities relative to test security. This is especially true regarding high-stakes national examinations. The Department of Testing Services, American Dental Association, emphasizes it expectations of each test constructor in safeguarding the security and confidentially of the examinations.

Test constructors are given few directives governing examination security, primarily because the test construction process takes place in the ADA headquarters building. There are, however, instances in which test constructors must be careful not to breach the security of test content through other activities. For example, a test constructor should not present a student review course in preparation for taking an examination he or she has helped to develop. A test constructor also should not contribute to a publisher's test review book regarding a test or she helped to develop.

Test constructors are **required** to decline any arrangement to assist with review courses or review books pertaining to the examinations while serving as a test constructor and for one year following their last term of appointment on a test construction committee. Further, test constructors may not share information about test content with dental or dental hygiene faculty, colleagues, students, or other individuals.

_____

Signature Date

JCNDE JOINT COMMISSION ON NATIONAL DENTAL EXAMINATIONS

Copyright Agreement

The undersigned, _____, whose address is _____, is involved in a special project for the American Dental Association that involves copyrighted or copyrightable materials. S/he acknowledges and agrees, individually and collectively, that all such materials belong solely to the American Dental Association, Joint Commission on National Dental Examinations, and that the Association holds any and all rights to obtain and retain ownership of copyrights for such materials in its own name. The undersigned represents that any and all contributions s/he makes to such materials will be original works, not copies in whole or in part of works of third parties. The undersigned hereby acknowledges and agrees that the American Dental Association is the sole owner of such materials, s/he has no ownership rights whatsoever in such materials, the Association has all rights to obtain copyrights for such materials, and such materials constitute "work made for hire" under copyright laws. The undersigned hereby assigns any and all ownership rights s/he may have to the American Dental Association, and s/he agrees that s/he will execute any additional documents necessary to effect this assignment to the Association upon request.

_____ _____

Signature Date

_____

Witness

JCNDE JOINT COMMISSION ON NATIONAL DENTAL EXAMINATIONS

INBDE New Item Form

Item ID: _____
Item Set: _____
Sequence: _____

Foundation Knowledge Area:

Primary: (Choose one) _____

Secondary: (Choose one or more) _____

Clinical Competency:

Primary: (Choose one) _____

Secondary: (Choose one or more) _____

Concept Tested: _____

Rationale: _____

Other: _____

Cognitive Level: ☐ Understanding ☐ Application ☐ Reasoning

Stimulus Material: ☐Radiograph ☐Photograph ☐Other **File Name:** _____

Author(s): _____

Patient
Chief Complaint
Background and/or Patient History
Current Findings

Stem: _____

_____

_____

_____

_____

_____

☐**Response A:** _____

_____

☐**Response B:** _____

_____

☐**Response C:** _____

_____

☐**Response D:** _____

_____

☐**Response E:** _____

_____

INBDE Preliminary Model Items 2015

In 2014, the CIE provided the Joint Commission with 21 INBDE preliminary model items for review. The intention of the INBDE model items is to be used as examples for INBDE item-writing and for the Item Writing Guidelines

Since then, the model items have been edited and enhanced by the CIE, both for format and content. The INBDE TCCs provided feedback and an editorial review was conducted.

Discussions are underway to field-test selected model items (Field Test A) to obtain feedback from individuals representative of INBDE examinees. Further revisions are anticipated as a result of field testing, INBDE item-writing, and additional analysis by the CIE.

INBDE Patient Box – FURTHER DEFINED IN 2015

Patient

Female, 28 years old

Chief Complaint

"I haven't been able to open my mouth for two days."

Background and/or Patient History

Three days prior, left mandibular third molar extraction.

Current Findings

Maximum opening 10 mm

A corner tab signifies that a Patient Box is shared by multiple items.

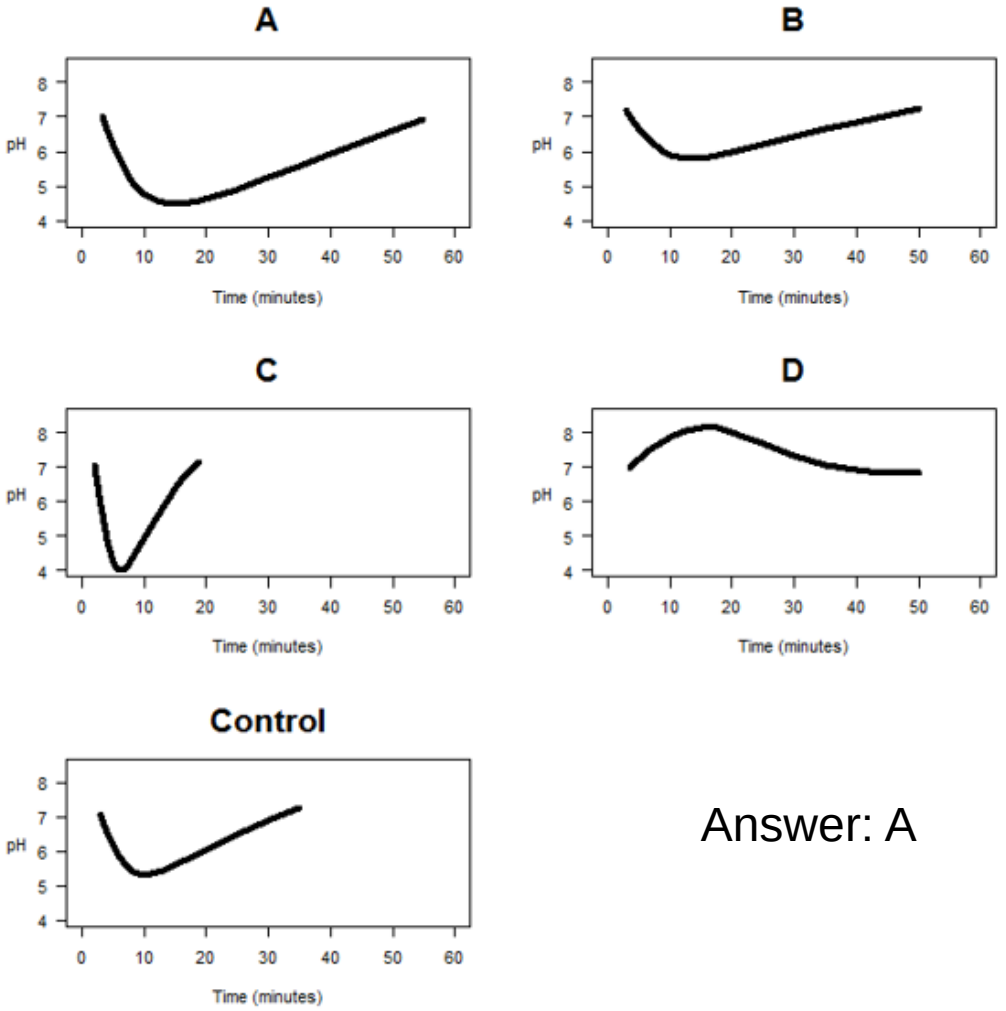
Reminder:
The actual display of the Patient Box during the examination will depend upon the capability of the selected examination administration vendor.

2015

Model Item 7

Patient
Female, 75 years old
Chief Complaint
“My mouth has been dry for over a month.”
Background and/or Patient History
Oropharyngeal cancer treated by radiation.
Current Findings

Which graph best shows the patient’s likely plaque pH response after drinking a sugary beverage?



Answer: A

2015

Model Item 5

Patient

Male, 48 years old

Chief Complaint

"I've been in pain for two days and now my face is swollen."

Background and/or Patient History

Hypertension
Type 2 diabetes
Penicillin allergy

Current Findings

Facial edema
Lymphadenopathy
Extensive apical radiolucency associated with tooth 6
Temp 100.3° F
Blood glucose 240 mg/dL
BP 150/93

Where is the infection most likely located?

A. Buccal vestibule

B. Canine space

C. Nasal cavity

D. Pterygomaxillary space

2015

Model Item 38

Patient

Male, 48 years old

Chief Complaint

"I've been in pain for two days and now my face is swollen."

Background and/or Patient History

Hypertension
Type 2 diabetes
Penicillin allergy

Current Findings

Facial edema
Lymphadenopathy
Extensive apical radiolucency associated with tooth 6
Temp 100.3° F
Blood glucose 240 mg/dL
BP 150/93

The most appropriate antimicrobial agent is

A. amoxicillin and clavulanate (Augmentin®).

B. clindamycin (Cleocin®).

C. metronidazole (Flagyl®).

D. cephalexin (Keflex®).

2015

Model Item 53

Patient

Male, 9 years old

Chief Complaint

"My son was hit in the face with a baseball and he's bleeding and missing teeth!"

Background and/or Patient History

Type 1 diabetes

Current Findings

Which question is the most important to ask the parent first?

A. "When did the injury occur?"

B. "When did the child last eat?"

C. "Do you have the teeth?"

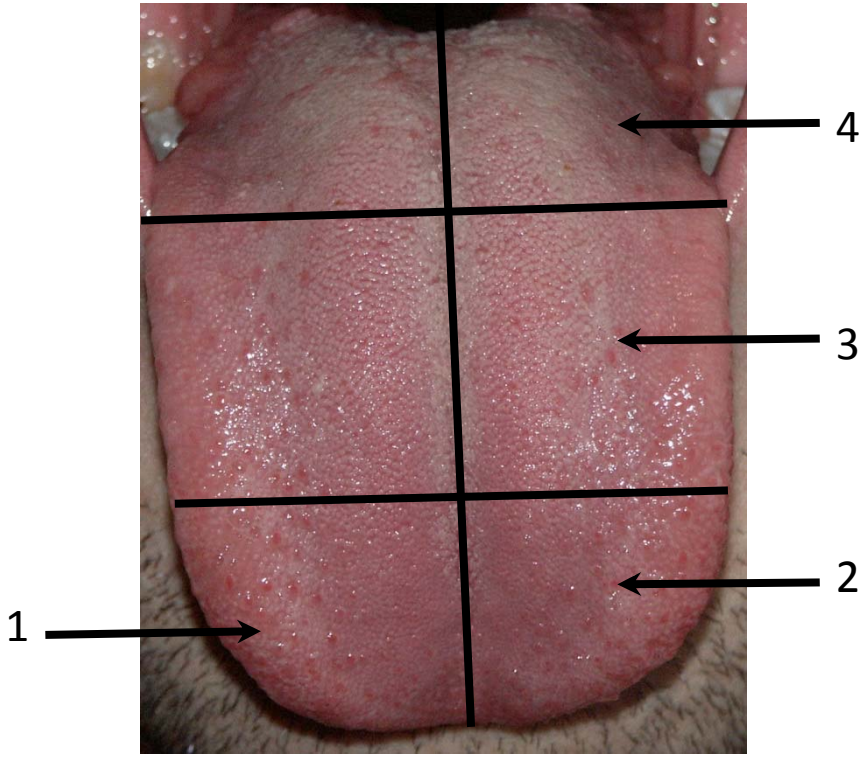
D. "Did the child lose consciousness?"

2015

Model Item 12

Patient
Male, 38 years old
Chief Complaint
"I haven't been able to taste on the left side of my tongue for the past three days."
Background and/or Patient History
Left inferior alveolar nerve block during a prior dental treatment
Current Findings

Where would a loss of taste be expected?



A. 1 and 2

B. 2 and 3

C. 3 and 4

D. 2, 3, and 4

2015

Patient
Female, 12 years old
Chief Complaint
“My mouth hurts.”
Background and/or Patient History
Four first premolars extracted 24 hours ago.
Current Findings
No swelling

Posttreatment discomfort is best managed by using

A. acetaminophen (TYLENOL®).

B. codeine.

C. ibuprofen (Advil®).

D. tramadol (Ultram®).

2015

Model Item 32

Patient

Male, 75 years old

Chief Complaint

"I'm here to have my filling done."

Background and/or Patient History

Atrial fibrillation

Medications:

dabigatran (Pradaxa®)

metoprolol (Toprol®)

Current Findings

The patient is scheduled for an MOD amalgam.

What is the correct protocol?

A. Obtain an INR the morning of the procedure.

B. Proceed without treatment modification.

C. Discontinue Pradaxa® the morning of the appointment.

D. Use lidocaine 2% with 1:50,000 epinephrine.

2015

Patient

Male, 75 years old

Chief Complaint

"I'm here to have my filling done."

Background and/or Patient History

Atrial fibrillation

Medications:

dabigatran (Pradaxa®)

metoprolol (Toprol®)

Current Findings

The procedure results in a carious exposure of the pulp. The patient chooses to have the tooth extracted. What is the next step at this appointment?

A. Prophylactic antibiotics and extraction

B. Pulp cap and temporary restoration

C. Discontinue Pradaxa® for three days followed by extraction

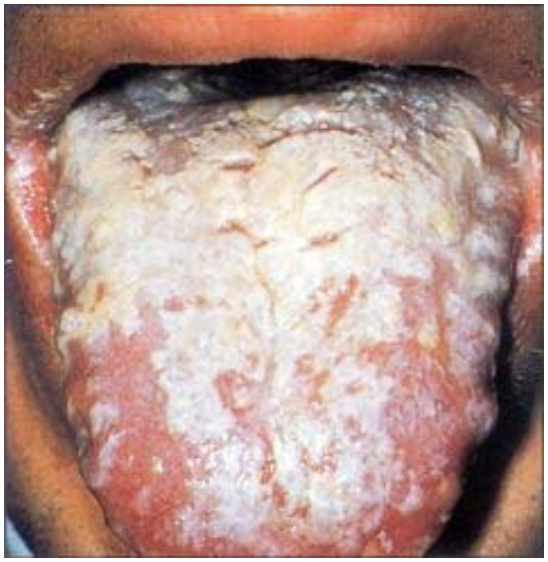
D. Immediate extraction and placement of sutures if necessary

2015

Model Item 20

Patient
Male, 37 years old
Chief Complaint
“I have white stuff on my tongue.”
Background and/or Patient History
Recurrent low grade fever, fatigue, periodically feels cold and a little ill
Current Findings
White coating can be wiped off.

What is the etiology of this condition?



A. Bacterial infection

B. Vitamin B12 deficiency

C. Viral infection

D. Fungal infection

Model Item 23

A drug has a half-life of 4 hours. What will happen when the drug is discontinued?

A. 87% will be eliminated in 8 hours.

B. 90% will be eliminated in 24 hours.

C. 94% will be eliminated in 12 hours.

D. 94% will be eliminated in 16 hours.

2015

Model Item 27

Patient
Female, 28 years old.
Chief Complaint
“It has been painful to open my mouth for the last three days.”
Background and/or Patient History
Left mandibular third molar extraction
Current Findings
No acute distress No shortness of breath No fever Maximum opening 25 mm

Which muscle is most likely the source of the complaint?

A. Lateral pterygoid

B. Masseter

C. Medial pterygoid

D. Temporalis

2015

Model Item 63

Patient

Male, 65 years old
Height: 6’ 1”
Weight: 325 lbs

Chief Complaint

“A year ago I lost the filling in my back tooth.”

Background and/or Patient History

Smokes tobacco – 40 pack years
Dental phobia
Medications:
hydrochlorothiazide (Microzide®)
rosuvastatin (Crestor®)
aspirin 81 mg

Current Findings

BP 170/100

Physician referral is most urgent for the treatment of

A. smoking.
B. anxiety.
C. hypertension.
D. obesity.