A Clinical Report on Chairside Whitening

A Peer-Reviewed Publication
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Abstract
Patients continue to desire whiter teeth and demand for tooth whitening continues to grow. Options available include in-office tooth whitening with or without a lamp, office-dispensed home-use products, and a variety of over-the-counter products. In addition to being a procedure that patients want, tooth whitening is a great practice builder. Patients should be carefully assessed before starting a whitening treatment; this includes examinations for erosion, caries, abrasion and defective restorations. The type of stain and its cause must be determined in order to make a determination of the likely success and speed of tooth whitening. Educating patients on their options, what is involved in a tooth whitening procedure, management of potential sensitivity, and what they will need to do are important components in the decision to whiten teeth and the likelihood of patient compliance and success. With good case selection, tooth whitening is straightforward, effective and a welcome adjunctive treatment.

Learning Objectives:
The overall goal of this article is to provide the reader with information on tooth whitening procedures. On completion of this article, the reader will be able to do the following:
1. Describe the mechanism of action by which tooth whitening agents work
2. Identify and list the types of patients who may be candidates for tooth whitening procedures and considerations in this determination
3. Identify and describe potential side effects associated with tooth whitening and their management
4. List and describe the patient information and instructions that should be discussed with every patient receiving tooth whitening

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Patients continue to desire whiter teeth and demand for tooth whitening continues to grow. Options available include in-office tooth whitening with or without a lamp, office-dispensed home-use products, and a variety of over-the-counter products. In addition to being a procedure that patients want, tooth whitening is a great practice builder. Patients should be carefully assessed before starting a tooth whitening treatment; this includes examinations for erosion, caries, abrasion and defective restorations. The type of stain and its cause must be determined in order to make a determination of the likely success and speed of tooth whitening. Educating patients on their options, what is involved in a tooth whitening procedure, management of potential sensitivity, and what they will need to do are important components in the decision to whiten teeth and the likelihood of patient compliance and success. With good case selection, tooth whitening is straightforward, effective and a welcome adjunctive treatment.

Introduction
Tooth whitening has become increasingly popular. What was once called “Hollywood white” has become the new normal, and entire new dental bleach shade systems have been developed to match the new whiter white. The desire for whiter teeth has become global. When this author was in Kenya, the first service a local Masai warrior requested at the volunteer dental clinic was, “Can you make my teeth whiter?” This was in one of the most remote places in the world, where the village is off the grid and only the wealthiest residents can afford to generate their own power. The rest of the local tribesmen live in dung huts and have virtually no television, movies, Internet or cell phone contact with the rest of the world. It is probably fair to say that, with only the exception of unusual local customs, the desire for white teeth is almost universal. The demand for tooth whitening services has been on the rise since their introduction. Tooth color has a very significant impact on your perceived attractiveness, leading to a natural demand for the service. In addition, people are further encouraged to whiten their teeth by their desire to be like the myriad of high-profile people who have strikingly beautiful white teeth. The demand for tooth whitening services is high enough that, for most dentists, tooth whitening procedures are a “must have” in their dental services repertoire. One of the advantages of most tooth whitening procedures for the dental office is that they can be implemented by auxiliary staff. When properly educated, a dental assistant can perform the tooth whitening with excellent results. In this paper we intend to lay out the necessary elements of tooth whitening procedures, as well as the information needed to educate patients.

Types of whitening agents
With the popularity of tooth whitening has come an array of products and services designed to achieve the desired whitening results. These include whitening toothpastes; mouth rinses; over-the-counter (OTC) trays and pens, as well as an OTC option used with a light; office-dispensed stock trays, custom trays; an oral spray for home use; and in-office whitening treatments with or without use of a light. Whitening toothpastes are designed to remove extrinsic stains only, not intrinsic stains. These typically use gentle abrasives to remove surface stains. Naturally, with so many choices, patients will frequently ask which method is the best. The best method is partly subjective and includes consideration of the speed of whitening, whether it is done in the office or at home, convenience and cost. Tooth whitening is affected by the concentration of the peroxide in the whitening agent and the length of time it is in contact with the enamel. Generally, higher concentrations are faster but lower concentrations can achieve the same whitening results by extending the amount of time they are on the enamel. The advantage of dentist-supervised whitening is that the dentist can help guide the patient to the appropriate tooth whitening treatment for that individual by determining the cause of the stain and potential risks of tooth whitening.

In-office products contain the highest concentration of active ingredients, making them more efficient in rapidly altering tooth shades. This provides for quick tooth whitening that cannot be achieved with the use of lower-concentration home-use products. Nonetheless, the ultimate shade achieved will be the same for in-office or home-use tooth whitener, with the difference being that it will take longer to achieve that shade using a lower-concentration product.

There are two active ingredients that can be used for tooth whitening procedures, regardless of which tooth whitening procedure and product is selected: carbamide peroxide and hydrogen peroxide. Before discussing these
further, it is necessary to mention sodium perborate. Sodium perborate is recommended for internal bleaching of endodontically treated teeth, a procedure also known as “walking bleach” since the bleaching agent remains within the tooth between appointments with the restoration being placed after the tooth has lightened. (Figures 1a,b) Sodium perborate releases hydrogen peroxide and is used for a “walking bleach” procedure because it is less aggressive on the tissues; however, it is much slower acting than the peroxide whiteners used for tooth whitening. Care must be taken when performing “walking bleach” procedures as these have been associated with root resorption.4

The person implementing a tooth whitening procedure must know what is being used to whiten the teeth and how it works. It is important to know this to be able to answer fundamental questions that patients may ask, in order to maintain the trust of the patient. Carbamide peroxide is a combination of urea and hydrogen peroxide, and, once applied, breaks down into these two components, thereby releasing the hydrogen peroxide.5 The specific mechanism by which hydrogen peroxide whitens teeth is through a chemical transformation of the pigment molecules embedded in the teeth that had resulted in the intrinsic stain. This transformation happens after the hydrogen peroxide breaks down into oxygen and hydrogen peroxide anions.6 These oxygen species are free radicals that react with the chromophore molecules (pigment/stain molecules) by partially undoing some of their double bonds, which renders the molecule much less reflective of visual spectrum light. As a result of this, the teeth appear whiter.7,8 Both carbamide peroxide and hydrogen peroxide whiteners have advantages and disadvantages. The addition of urea to hydrogen peroxide, making carbamide peroxide, acts to stabilize the hydrogen peroxide and increases its shelf life. As such, carbamide peroxide is most often found in OTC whitening products as well as in some office-dispensed strength home-use products. Once applied, carbamide peroxide breaks down into its component parts: urea and hydrogen peroxide. The hydrogen peroxide released is about one-third the concentration of the original carbamide peroxide, a process that takes about four to six hours. As a result, carbamide peroxide is best used in overnight trays. In comparison to carbamide peroxide, uncut hydrogen peroxide is less stable and more potent. High-concentration hydrogen peroxide whitening agents are more appropriate for use in the office. Potential side effects associated with tooth whitening procedures will be discussed later in this article.

**Degree of whitening**

The two primary factors that control the amount of whitening that can be achieved using tooth whitening products are the concentration of the hydrogen peroxide and the total length of time it remains on the enamel. Additional variables influencing the degree to which the tooth will whiten include the thickness of the enamel and the etiology and type of discoloration.

**Whitening potential and patient education**

An important element in patient education is letting patients know how much and how fast they can whiten their teeth. The etiology of the stain must first be determined and the patient’s restorative status must be taken into account. Carbamide peroxide and hydrogen peroxide tooth whitening treatments remove both extrinsic and intrinsic stains (while whitening toothpastes, as mentioned, remove only extrinsic stains). However, the effectiveness of intrinsic stain removal depends on the type of intrinsic stain. Tetracycline stains, fluorotic stains and developmental defect stains may not whiten as effectively as other types of intrinsic stains. Tetracycline stains in particular are resistant and are known to take much longer to whiten than other types of intrinsic stains.9 To avoid possible patient disappointment, it is very important that patients be warned about this eventuality and that they understand this before deciding to whiten their teeth (or before you begin any tooth whitening procedure).

Very dark orange, brown, purple or gray stains (usually from tetracycline) may not whiten adequately even with prolonged tooth whitening procedures. If it is determined that a patient has resistant stains, this need not be a dead end for the relationship between your office and the patient. The patient can choose to whiten for longer to achieve a degree of whitening, or the patient could instead elect to have cosmetic restorations at your office. Having options will offer patients hope for achieving the smile they want to have.
Patients must be informed that depending on the origin of their stain it may take longer to whiten their teeth.

It is generally safe to predict a noticeable and pleasing outcome for patients who have yellowing teeth from aging or food stains, and darker yellow shades respond very well to tooth whitening. (Figures 2a,b)

Figure 2a. Dark shade pre-treatment

Figure 2b. Same case post-treatment

Nonetheless, patients should be informed that the effectiveness of tooth whitening varies from person to person and that, as a result, specific outcomes are hard to predict, but that they will see a noticeable and pleasing outcome. If you are performing in-office tooth whitening and the whitening treatment you use comes with take-home trays, patients can be reassured that they can achieve a more finely calibrated degree of whiteness by using the trays at home after an in-office treatment. A successful way to frame this conversation is to talk about the power whitening as a quick boost and advise your patient that to maintain or fine-tune the color, three of four half-hour sessions with whitening gel in the take-home trays is recommended.

The other main consideration for patient education prior to tooth whitening is an assessment of existing restorations. Porcelain and most composite restorations will not whiten at all. If a patient has any restorations that are visible while smiling, these restorations will not change in shade and the patient must be made aware of this – this leads to the potential to perform a tooth whitening procedure followed by cosmetic restoration replacement. In these cases, the best solution may be restorative treatment or, more likely, a combination of tooth whitening and restorative treatment. Patients should be advised. Visible white specks may become more pronounced immediately after tooth whitening or can appear where there were none. (Figures 3a,b)

Figure 3a. Pre-treatment

Figure 3b. Post-treatment

This phenomenon is the result of different rates of whitening and tooth dehydration during the whitening procedure. The white specks are hypocalcified areas in the enamel and will gradually fade back or disappear completely after a few days when the teeth have fully rehydrated. Pre-existing white specks may become less noticeable after tooth whitening because there is less contrast with the lighter background color, but they will still be present. Whitening patients can be unsettled by this experience. If you let them know this will happen before the procedure, you are a wise professional; if you tell them afterward, in their eyes you are just making excuses.

The cases below demonstrate the results with patients who were good candidates for tooth whitening procedures.

**Case 1**
The patient was a 57-year-old Seattle coffee drinker, with darker yellow shades that would respond very well and was a good case for tooth whitening. The shade was taken with the Vita Classic shade guide prior to in-office whitening. The number of shade shifts for tooth whitening is traditionally determined by the Vita classic shade guide arranged by value rather than with the standard arrangement by chroma.
Each shade tab is referred to as one change in shade, but actually each shade tab more closely represents two or three shade changes. The gingiva and exposed cervical dentin were isolated with liquid dam prior to performing the tooth whitening procedure. The teeth were treated with four 15-minute sessions of in-office whitening and with use of an in-office light. The shade was then taken a second time at the end of the appointment using the same Vita Classic shade guide. The shade shift in this case was eight shades, based on the number of shades from A3 to B1. The anterior eight to ten teeth in both arches were whitened on the labial surface only. This provides adequate coverage for all the visible areas in most smiles.

Case 2
The patient was a 16-year-old girl who wanted to have her teeth whitened. With the exception of her wisdom teeth, the permanent dentition was completely present and healthy. Note that studies have shown that whitening recently erupted teeth is safe and effective, and no apparent color differential lines appear as passive eruption occurs in the ensuing years. Light teeth will show far less shade shift, simply because there is an upper limit to whiteness. However the final result is much brighter overall, especially in the darker cervical regions of the teeth. The results of this in-office whitening can be observed in Figures 5a-c.
The patient in this case desired tooth whitening but had dark orange stains on the central incisors. The patient was first educated on tooth whitening and informed that it was likely that these stains would lighten some but would still be visible. When treated, despite a significant amount of whitening, the dark orange stains on the central incisors were still quite prominent and would require extended whitening using take-home trays or restorative correction with composites or porcelain veneers. (Figures 6a,b)

**Case 4**
The patient in this case presented with multiple visible crowns and restorations. When numerous restorations including composites and crowns are present, it will be a matter of judgment whether tooth whitening is desirable. Since porcelain and most composites do not whiten, the results will be unsatisfactory and the patient must be informed of this in advance. In this case, in addition to the presence of multiple restorations that would have needed replacement after whitening to color match for aesthetic results, the tooth contours were poor. This patient opted for a porcelain reconstruction instead, with some whitening on the non-restored teeth. (Figures 7a,b)

The clinical situations described above are illustrated in the cases below.

**Poor and complex whitening candidates**
Candidates with multiple anterior restorations or erosion are poor or complex candidates for tooth whitening. Often when the patient wants whiter teeth, it is obvious that the desired results are not possible because of yellowing composites or a porcelain crown that will not whiten. Sometimes patients will ask to replace the dental work and then whiten the teeth to match. This is ill-advised because the teeth will whiten but there is no guarantee that they will match the color of the new restorations. We just do not have that degree of control over the outcome.

It can also be difficult to whiten prior to the restorative work because of patient noncompliance. To obtain a good shade match, the patient must whiten for the prescribed period of time and then wait for a minimum of two weeks before the restorations are completed. If patients vary from these instructions, it can become a game of chasing the shade. In-office whitening is one of the best ways to control the procedures in these situations for predictable results.
Case 5
This patient presented for an examination with a request for tooth whitening. However, the patient had erosive lesions present. Patients with erosion and thin enamel are poor candidates for any kind of tooth whitening procedures. When the enamel is thin, teeth do not whiten well and sometimes the enamel is so thin that the dentin is exposed. Not only do these teeth lack sufficient enamel for effective whitening, but the large amounts of exposed dentin would become very sensitive and painful. In these situations, it is a better service to protect the teeth with porcelain veneers. (Figures 8a,b)

Potential side effects during whitening
Tissue irritation and tooth sensitivity are both potential side effects of tooth whitening. Tissue irritation can be caused by a poorly fitting tray impinging on the gingival margin, and if trays are being used these should be checked carefully prior to delivering them to patients. The use of high-concentration in-office whiteners requires the use of a liquid dam or other type of dam to prevent the whitener from contacting the soft tissues; it can also result in greater sensitivity than lower concentrations. (Figure 9) Failure to apply a dam that completely protects the gingival soft tissues can result in painful chemical burns on the gingiva. If hydrogen peroxide burns do occur, they will appear as little white patches on the gums and heal quickly, but it is important to avoid them in the first place. If they occur and are painful, topical anesthetic agents can be applied, including pain-relieving medicaments typically used for aphthous ulcers.

Figure 8a.

Figure 8b.

The second potential side effect to discuss is tooth sensitivity, which may be due to the status of the patient’s dentition or occur as a result of the process of tooth whitening. Prior to undertaking any whitening treatment, it is essential to evaluate the patient for recession, exposed dentin, leaking restorations and cavities. Any of these may be a contraindication for tooth whitening if they cannot be managed either prior to or during treatment (depending on the clinical presentation). If the whitening gel is applied directly to open margins or cavities, it can be extremely painful, and applying whitening gel to any exposed dentin also causes pain and sensitivity. The patient can still be a candidate for whitening treatment, but needs to have the cavities filled or leaking restorations replaced before tooth whitening is performed.

During the tooth whitening procedure, hydrogen peroxide diffuses through the enamel and reaches the inner dentin of the teeth. When in direct contact with exposed dentin, the peroxide breaks down microscopic debris that blocks the openings to the tubules that radiate from the pulp to the surface of the dentin. The fluid within the dentinal tubules moves backward and forward, stimulating the nerve fibers and resulting in tooth sensitivity (pain) in reaction to stimuli such as heat and cold. For in-office whitening, the most important steps in the procedure are careful placement of the liquid dam, being certain that the tissue is dry and all gingival tissue covered and that dentin is sealed. It is better to have a little bit of liquid dam on the enamel than to come up short and possibly expose dentin or gingiva.

Managing sensitivity
Tooth sensitivity is a common complaint during tooth whitening that in fact can be well managed. Much of what makes the difference between a patient’s positive or negative experience with a whitening procedure is the degree to which the patient’s tooth sensitivity can be mitigated. Sensitivity associated with tooth whitening has an acute phase of about one to three days, after which it sharply decreases in degree. Making the patient aware of this is a good first step in introducing them to the concept of sensitivity. The reason it is important to do everything possible to prevent sensitivity is that the pain of sensitivity is enough to make
people feel extremely distressed. Sensitivity results in sharp, painful impulses in individual teeth. Referring to these sharp impulses as “zingers” is a good way to subtly reassure affected patients that what they are experiencing is not abnormal. Continuing to remind patients that the acute phase of the sensitivity only lasts a couple of days and can be controlled is also important.

Taking precautions to reduce sensitivity is very important. There are many options to reduce and, if necessary, treat sensitivity associated with tooth whitening. Having the patient use a desensitizing toothpaste containing potassium nitrate for two weeks prior to the whitening procedure can reduce sensitivity. Other options include using a whitening agent containing potassium nitrate, potassium nitrate alone or with fluoride; using a high-level (5,000 ppm) fluoride dentifrice; and the use of amorphous calcium phosphate (ACP) either in the whitening agent or as a stand-alone treatment gel.15-17 If a patient is whitening using trays, these can be applied with potassium nitrate, ACP gel or prescription-level fluorides to relieve sensitivity. Potassium nitrate desensitizes the nerves, while ACP and fluorides work by plugging the open dentinal tubules. Making patients’ trays prior to an in-office whitening appointment and having them pretreat their teeth for several days prior to the appointment can help reduce sensitivity. This author has also found that painting the backs of the teeth being whitened with ACP before treating them with the whitening agent helps. If using ACP, it can be applied as gel immediately following the whitening procedure, preferably in trays for 30 minutes (but if not then can be applied directly to the teeth), and the patient should not eat or drink for 30 minutes afterward. Regardless of what is used to relieve sensitivity, the office staff must understand what is being used and how it works. For in-office whitening, patients can also be given ibuprofen at the beginning of the appointment (provided there are no contraindications). In rare cases where sensitivity following tooth whitening does not subside sufficiently, prescription pain relievers can be given. If all precautions are taken against sensitivity, this should not occur, but because of the potential extreme severity of post-whitening sensitivity, it is important to always remind patients at the end of their whitening appointment that they should call the office if they are experiencing pain.

Patient instructions during and following whitening treatments
After the potential effectiveness of a tooth whitening treatment has been determined, informed consent has been obtained and sensitivity has been controlled, it is time to proceed with treatment and give the patient his or her instructions. If using a home-use whiter with trays, the custom trays must be fabricated and the fit checked. It is helpful to perform the first session in the office to help educate patients on the correct use of the trays. If, on the other hand, an in-office whiter is being used, it is important to first tell the patient to remain still during the procedure in order to avoid dislodging the barrier (liquid dam) placed in the mouth to protect soft tissue from irritation and the burning effects of the peroxide and the whitening lamp. In conjunction with these instructions, the patient should be provided with a means of alerting your attention (such as a bell), as well as a pad of paper and writing instrument so that he or she can let you know about any problems that might come up during the procedure. If hydrogen peroxide irritations do occur, they will appear as little white patches on the gums and the patient should be informed that they will heal quickly. If the patient is experiencing discomfort as a result of this, a topical medication that contains anesthetic can be applied to promote comfort while the burns are healing. The patient should also be instructed to avoid heavily pigmented foods and beverages for 48 hours. Some studies have found that teeth remain extra susceptible to staining pigments in foodstuffs post-whitening for a period of time.18 Informing the patient that he or she can actually make the teeth darker than they were prior to whitening if they ignore these instructions is also important. The primary offenders for tooth stains are coffee, tea, red wine and tobacco. It is also important to inform patients before starting on any tooth whitening procedure that over time the whiteness of the teeth will fade and some degree of color regression will occur.19 This happens with all tooth whiteners. Letting patients know this and also that this can be managed by periodically “touching up” the tooth whitening avoids patient disappointment.

Practice-building
Tooth whitening provides a desired treatment to patients and is also a practice builder. Word of mouth is still one of the most effective ways to market dental services. One suggestion is to take “before” and “after” photographs of the patient smiling, while ensuring that the skin tone is the same to verify that the exposure was the same in both instances, and then give these photographs to the patient. Patients will share their story with others, which leads to more referrals. We also offer a gift card for new patient referrals that affords a gift credit toward free products or tooth whitening services for both the patient and any friend they refer to us. Whitening treatments can also be used to promote the service to gain more whitening customers or, conversely, whitening services can be used to promote the cosmetic practice. In-office whitening is a great gift to give to local charities for their fund-raising auctions. Finally, in-office “power whitening” is a great special to offer to generate traffic and excitement for cosmetic services at special times (for example, Christmas, Valentine’s day, wedding events, graduations and back-to-school events). One clinical observation made by the author is that in-office tooth whitening with the light holds a special value to certain patients, even though they have been informed that to achieve optimum results they must supplement the in-office whitening...
ing with take home trays or repeated in-office treatments. The motivation may be the desire to have a spa-like experience. It could also be the desire to have a special time scheduled for the whitening because they just are not motivated to do it themselves. Another possible reason is that the quick boost from the in-office whitening is the motivation they need to complete the whitening process. The point is that the consumer has reasons that may be quite different than ours for choosing what method they use to whiten their teeth. Giving away a tooth whitening procedure to patients who are having extensive cosmetic work is a good relationship builder and helps guarantee that the patient will be more compliant with the whitening protocol in combination with the restorative work. Another relationship builder is free whitening for life. A touch-up kit is given away with each recare appointment. It not only attracts new patients, it is also a good program for building patient loyalty.

**Summary**

In summary, before implementing a tooth whitening procedure, one must identify whether the patient is a good candidate for whitening, use good informed consent procedures to manage patient expectations, be prepared to answer fundamental questions about the procedure, take preventative measures against and inform patients about the potential for sensitivity, and provide patients with instructions for during and after tooth whitening, including that they need to avoid heavily pigmented foods and beverages post-whitening. Once these preliminary issues are addressed, the actual implementation of the procedure is straightforward, a good marketing tool and a welcome adjunct to other cosmetic treatments.

**References**


**Webliography**


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Questions

1. Tooth whitening products include _________.
   a. whitening toothpastes
   b. office-dispensed trays
   c. in-office whitening treatments
   d. all of the above

2. Whitening toothpastes are designed to remove _________.
   a. extrinsic stains
   b. intrinsic stains
   c. extrinsic and intrinsic stains
   d. none of the above

3. ________ is a consideration for which type of tooth whitening procedure to select.
   a. Convenience
   b. Cost
   c. The speed of whitening
   d. all of the above

4. In-office products _________.
   a. contain the highest concentration of active ingredients
   b. are more efficient in rapidly altering tooth shades
   c. ultimately result in the same shade changes as home products
   d. all of the above

5. Sodium perborate is used for _________.
   a. the removal of extrinsic stain
   b. the removal of tetracycline stains
   c. a ‘walking bleach’ procedure
   d. all of the above

6. Care must be taken when performing “walking bleach” procedures as these have been associated with _________.
   a. dental caries
   b. periodontal disease
   c. root resorption
   d. all of the above

7. Carbamide peroxide is a combination of urea and _________.
   a. hydrogen peroxide
   b. sodium peroxide
   c. sodium perborate
   d. any of the above

8. Hydrogen peroxide whitens teeth through a combination of the pigment molecules embedded in the teeth.
   a. mechanical transformation
   b. chemical transformation
   c. biological transformation
   d. a and b

9. The addition of urea to hydrogen peroxide acts to _________.
   a. stabilize the hydrogen peroxide
   b. increase it shelf life
   c. seal carious lesions
   d. a and b

10. The primary factor that controls the amount of whitening that can be achieved using tooth whitening products is the _________.
    a. concentration of the peroxide
    b. substantivity of the product
    c. total length of time it remains on the enamel
    d. a and c

11. Carbamide peroxide and hydrogen peroxide tooth whitening treatments remove _________.
    a. extrinsic
    b. intrinsic
    c. sub intrinsic
    d. a and b

12. ________ may not whiten as effectively as other types of intrinsic stains.
    a. Tetracycline stains
    b. Fluorotic stains
    c. Developmental defect stains
    d. all of the above

13. ________ in particular take much longer to whiten than other types of intrinsic stains.
    a. Tetracycline stains
    b. Developmental defect stains
    c. Fluorotic stains
    d. all of the above

14. A patient with resistant stains can choose to _________.
    a. whiten for longer
    b. elect to have cosmetic restorations
    c. use a different substance
    d. a and b

15. Darker ________ shades respond very well to tooth whitening.
    a. grey
    b. yellow
    c. green
    d. all of the above

16. Patients should be informed that _________.
    a. the effectiveness of tooth whitening varies from person to person
    b. specific outcomes are hard to predict
    c. they will see a noticeable and pleasing outcome
    d. all of the above

17. Porcelain and most composite restorations will _________.
    a. whiten a little
    b. not whiten at all
    c. whiten substantially
    d. be irrelevant

18. Visible white specks _________.
    a. may become more pronounced immediately after whitening
    b. can appear where there were none
    c. are the result of different rates of whitening
    d. all of the above

19. Pre-existing white specks _________.
    a. may become less noticeable
    b. will disappear completely
    c. will still be visible
    d. a and c

20. Patients with ________ are poor or complex candidates for tooth whitening.
    a. erosion
    b. yellow stains
    c. multiple anterior restorations
    d. a and c

21. To obtain a good shade match, the patient must whiten for the prescribed period of time and then wait for a minimum of _________. before the restorations are completed.
    a. one week
    b. two weeks
    c. three weeks
    d. none of the above

22. In patients with erosion, _________.
    a. the enamel is thin
    b. the teeth do not whiten well
    c. the large amounts of exposed dentin would become very sensitive with tooth whitening
    d. all of the above

23. Tissue irritation can be caused by _________.
    a. a poorly fitting tray impinging on the gingival margin
    b. contact of high-concentration hydrogen peroxide with the gingiva
    c. the liquid dam
    d. a and b

24. Prior to undertaking any tooth whitening treatment, it is essential to evaluate the patient for _________.
    a. recession
    b. exposed dentin
    c. leaking restorations and cavities
    d. all of the above

25. Sensitivity associated with tooth whitening _________.
    a. can reduce sensitivity
    b. can exacerbate sensitivity
    c. has little effect
    d. none of the above

26. Having the patient use a desensitizing toothpaste containing potassium nitrate for two weeks prior to the whitening procedure _________.
    a. can reduce sensitivity
    b. can exacerbate sensitivity
    c. has little effect
    d. none of the above

27. ________ is an option for the management of sensitivity associated with tooth whitening.
    a. Amorphous calcium phosphate
    b. High fluoride level dentifrice
    c. Potassium nitrate alone or with fluoride
    d. all of the above

28. If hydrogen peroxide irritations occur, _________.
    a. they will appear as little white patches on the gums
    b. the patient should be informed that they will heal quickly
    c. a topical medication that contains anesthetic can be applied to promote comfort
    d. all of the above

29. A touch-up kit given away with each _________.
    a. they will appear as little white patches on the gums
    b. the patient should be informed that they will heal quickly
    c. a topical medication that contains anesthetic can be applied to promote comfort
    d. all of the above

30. With respect to tooth whitening _________.
    a. the actual implementation of the procedure is straightforward
    b. it is a good marketing tool
    c. it is a welcome adjunct to other cosmetic treatments
    d. all of the above
# Course Evaluation

1. Were the individual course objectives met?  
   - Objective #1: Yes No  
   - Objective #2: Yes No  
   - Objective #3: Yes No  
   - Objective #4: Yes No

2. To what extent were the course objectives accomplished overall?  
   - 5 = Excellent  
   - 4 = Good  
   - 3 = Fair  
   - 2 = Poor  
   - 1 = Very Poor  
   - 0 = None

3. Please rate your personal mastery of the course objectives.  
   - 5 = Excellent  
   - 4 = Good  
   - 3 = Fair  
   - 2 = Poor  
   - 1 = Very Poor  
   - 0 = None

4. How would you rate the instructor’s effectiveness?  
   - 5 = Excellent  
   - 4 = Good  
   - 3 = Fair  
   - 2 = Poor  
   - 1 = Very Poor  
   - 0 = None

5. How do you rate the author’s grasp of the topic?  
   - 5 = Excellent  
   - 4 = Good  
   - 3 = Fair  
   - 2 = Poor  
   - 1 = Very Poor  
   - 0 = None

6. How would you rate the objectives and educational methods?  
   - 5 = Excellent  
   - 4 = Good  
   - 3 = Fair  
   - 2 = Poor  
   - 1 = Very Poor  
   - 0 = None

7. Was the overall administration of the course effective?  
   - 5 = Excellent  
   - 4 = Good  
   - 3 = Fair  
   - 2 = Poor  
   - 1 = Very Poor  
   - 0 = None

8. Please rate the usefulness and clinical applicability of this course.  
   - 5 = Excellent  
   - 4 = Good  
   - 3 = Fair  
   - 2 = Poor  
   - 1 = Very Poor  
   - 0 = None

9. Please rate the usefulness of the supplemental webiography.  
   - 5 = Excellent  
   - 4 = Good  
   - 3 = Fair  
   - 2 = Poor  
   - 1 = Very Poor  
   - 0 = None

10. Do you feel that the references were adequate?  
    - Yes  
    - No

11. Would you participate in a similar program on a different topic?  
    - Yes  
    - No

12. If any of the continuing education questions were unclear or ambiguous, please list them.  

13. Was there any subject matter you found confusing? Please describe.  

14. How long did it take you to complete this course?  

15. What additional continuing dental education topics would you like to see?  

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# Educational Objectives

1. Describe the mechanism of action by which whitening agents work.
2. Identify and list the types of patients who may be candidates for tooth whitening procedures and considerations in this determination.
3. Identify and describe potential side effects associated with tooth whitening and their management.
4. List and describe the patient information and instructions that should be discussed with every patient receiving tooth whitening.
5. How do you rate the author’s grasp of the topic?
6. How would you rate the instructor’s effectiveness?
7. Was the overall administration of the course effective?
8. Please rate the usefulness and clinical applicability of this course.
9. Please rate the usefulness of the supplemental webiography.
10. Do you feel that the references were adequate?
11. Would you participate in a similar program on a different topic?
12. If any of the continuing education questions were unclear or ambiguous, please list them.
13. Was there any subject matter you found confusing? Please describe.
14. How long did it take you to complete this course?
15. What additional continuing dental education topics would you like to see?