

Caries Process, Prevention, and Management: Prevention



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Intended Audience: Dentists, Dental Hygienists, Dental Assistants, Dental Students, Dental Hygiene Students, Dental Assisting Students, Office Managers, Dental Educators, Dental Therapists

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Conflict of Interest Disclosure Statement

- Dr. Apoena Aguiar Ribeiro reports no conflicts of interest associated with this course. She has no relevant financial relationships to disclose.

Short Description – Forensic Dentistry

This is part 8 of a 10-part series entitled Caries Process, Prevention and Management. This course introduces the dental professional to the concept of oral health promotion and education as a means of preventing caries. The topics discussed include understanding patient behavior, the barriers to change a patient may experience, why it is important for a dental professional to provide continuous support even when a patient is slow to change and helping a patient to set goals that promote caries-reducing habits.

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Overview

This is part 8 of a 10-part series entitled Caries Process, Prevention and Management. This course introduces the dental professional to the concept of oral health promotion and education as a means of preventing caries. The topics discussed include understanding patient behavior, the barriers to change a patient may experience, why it is important for a dental professional to provide continuous support even when a patient is slow to change and helping a patient to set goals that promote caries-reducing habits.

Learning Objectives

Upon the completion of this course, the dental professional should be able to:

- Explain the three levels of prevention: primary, secondary, and tertiary.
- Discuss why changing behavior can be difficult.
- Identify the multiple and complex barriers to change.
- Be familiar with the five stages of change.
- Apply skills that enhance dentist-patient communication.
- Understand the importance of setting specific goals with the patient to effectively promote caries-reducing behavior.

Glossary

cognitive dissonance – Knowing one thing and doing another or living in hope that the one thing does not apply to you. Most smokers are true examples of cognitive dissonance.

contemplation – Acceptance that a problem

exists and that commitment to a change in behavior may help reduce or remove the problem. To reach commitment to act may take months or even years.

oral health education – The science and art of educating individuals or groups of people to learn to act and behave in a manner conducive to good oral health. Oral health education is largely based on improving knowledge so that life skills can develop which are conducive to good oral health. Examples would be educating individuals that tobacco use causes periodontal diseases and oral cancer, that sugar use causes caries, and that lack of oral hygiene leads to gum disease. Life skills that can be taught may include how to avoid tobacco use, how to identify sugar-free foods and beverages, and how to practice the correct methods for plaque removal in daily oral hygiene. Oral health education has typically been more limited to the increase in knowledge rather than behavior change itself. Cognitive dissonance tells us that many people do things they already know they should not. Nearly every smoker knows that tobacco use leads to heart disease and lung cancer, but smokers still choose to smoke despite having this knowledge.

oral health promotion – The science and art of helping people change their lifestyles to move toward a state of optimal oral health. This is a very broad and encompassing definition and reaches far beyond the bounds of the dental office. Health promotion is typically targeted at communities or groups at risk for a disease or condition and seeks a small degree of action by many people, irrespective of their own risk of disease. Oral health promotion should be linked closely to general health promotion, and is delivered to schools, workplaces, community centers, etc.

oral hygiene instruction – Instruction in the correct methods to remove plaque. Often unsuccessful, as the instruction overlooks the need and motivational elements of behavior change.

precontemplation – Not yet knowing that there is a problem or possibly knowing there is a problem but denying it.

Introduction

Dental caries, commonly known as tooth decay, is an oral disease in which the acid generated after sugar metabolism by specific species of bacteria cause damage to hard tooth structure. It is the most common chronic diseases among American children and adults. Caries prevention attempts to reduce the odds of developing this disease. The dental health professional plays a crucial role in preventing caries by educating the patient about the causes of caries, and by offering information that promotes caries-reducing habits and, hopefully, puts an end to unhealthy habits. However, affecting behavior change in a patient is a complex process that requires continuous support. Understanding the many psychological, social, cultural, and economic barriers to change, how to communicate effectively, and how to help a patient set health-promoting goals are discussed as a means to effecting change that can lead to caries prevention.

Clinical Significance Snapshot

My patients seldom follow the advice and instructions I provide. Why not?

Habits that determine health outcomes are formed at an early age and are not easy to change. Habits in the formative stage are shaped by many factors – ignorance (knowledge), family members (primary socialization), authority figures such as teachers, and peers and friends (secondary socialization). Merely passing on more information in the hope of overcoming ignorance does not work. For example, nearly every smoker knows the deathly consequences of their habit. So, they already have the information but choose to continue smoking for many reasons. Again, this is a prime example of cognitive dissonance. Mere ‘show and tell,’ as in oral hygiene instruction, will fail unless the patient accepts there is a problem that needs to be fixed (acceptance), is ready and willing to fix it, believes and trusts that what you are advising will fix the problem, and understands that any sacrifices made will be worth the benefit (contemplation). Telling a patient he or she has a dirty mouth that they are not cleaning correctly will not by itself interest the patient

in the ‘show and tell,’ as they do not yet have the motivation and belief that the sacrifice is worth the benefit (no acceptance). In oral hygiene instruction, the dental professional is attempting to change a habit and ritual developed over many years, so it will not change in days or weeks. Think about how you would try to have someone change his or her handwriting style! It has become a habit, and it will not change merely by showing nicer calligraphy. Don’t worry, many healthcare providers do not enjoy great success in changing the behaviors of their patients – largely because they fail to recognize all the steps involved in this supportive, not prescriptive, process.

How can I further encourage my patients to follow the advice I give them?

Giving advice to patients in relationship to dental caries most often involves changes in the selection and consumption of foods and beverages, and the home use of fluoride agents. Patients need motivation to follow your advice, and therefore must understand the benefits of their actions. Patients need to feel empowered by the knowledge that they can make a difference through their actions.

There are five stages that must be recognized in following the change process of Prochaska and Di Clemente:

- **Stage 1 – Precontemplation.** In this stage, the patient does not necessarily realize that a problem exists. Or if they do, they do not understand it is within their power to make the needed changes. Patients commonly believe their oral health status is due to ‘how the cards were dealt.’ ‘I have weak teeth,’ a patient may say, and therefore feel there’s no reason to contemplate taking any action to change things. In this phase it is important to help the patient accept that healthy teeth are possible, and that repeated fillings are not necessary. Patients need to accept that they have a role to play in their health outcomes.
- **Stage 2 – Contemplation.** The patient now accepts they have a role to play in their own oral health, and that actions and sacrifices are necessary in order to enjoy this benefit (fewer

or no more cavities). They have to contemplate for themselves (not be ordered or instructed) that reducing consumption of sugary foods is worth doing, and may not be too difficult. They have to agree to a plan with clear objectives that they can change to 'diet' sodas, sugar-free gum, and not add sugar to foods at the table (or to use a sugar substitute). Upon acceptance of this contemplated action, they can then move to implement the plan of action.

- **Stage 3 – Preparation.** Involves testing the waters to become familiar with all that is to be done to bring about change. A date must be set for the action phase and this needs to be chosen carefully to ensure the fewest obstacles to change still exist in the environment. The patient will need to change their environment and these changes should be thoroughly planned. For example: empty the fridge of sugared sodas and replace with diet sodas, empty the sugar bowl and throw away the pack of table sugar, and throw away the sugared gum. The patient will need a lot of support – from family and friends, as well as their dental professional – during the first few days of the action phase. Thorough preparation is vital for a successful start for the action phase.
- **Stage 4– Action.** Action is about executing all that has been prepared. This phase may take several months and minor relapses will occur. Support must be provided to get over these relapses and help the patient avoid the feeling of helplessness and failure.
- **Stage 5 – Maintenance.** This is the greatest challenge, and most likely leads to relapse. During the maintenance stage, it is important that the benefit of the change can be realized, and that help, and support are still provided until new habits are well-formed. Relapse should not be admonished, but congratulatory support should be given for the period of success. The cycle can then repeat itself through pre-contemplation. For smokers attempting to quit, it has been shown that it takes between 7 and 12 cycles before lasting success (i.e. tobacco freedom) can be achieved. Setbacks are to be expected.

Prevention Strategy: Types of Prevention

Prevention Strategy: Types of Prevention

In general, preventive care refers to measures taken to prevent diseases instead of curing or treating the symptoms. The three levels of preventive care - primary, secondary, and tertiary care (Figure 1) - are detailed below:

Primary Prevention

Primary prevention aims to avoid the development of a disease or disability in healthy individuals and remove risk factors.² Most population-based health promotion activities, such as encouraging less consumption of sugars to reduce caries risk, are primary preventive measures. Other examples of primary prevention in medicine and dentistry include the use of fluoridated toothpaste, improvement of plaque removal by toothbrushing, dietary counseling, and vaccinations for infectious diseases like measles, mumps, rubella, and polio.

Secondary Prevention

The focus of secondary prevention is early disease detection, making it possible to prevent the worsening of the disease and the emergence of symptoms, or to minimize complications and limit disabilities before the disease becomes severe.² Secondary prevention also includes the detection of disease in asymptomatic patients with screening or diagnostic testing and preventing the spread of communicable diseases. Examples in dentistry and medicine include screening for caries, including diagnosing non-cavitated lesions (white spot lesions), periodontal screening and recording for periodontal disease, and screening for breast and cervical cancer.

Tertiary Prevention

The goal of tertiary prevention is to reduce the negative impact of an already-established disease by restoring function and reducing disease-related complications.² Tertiary prevention also aims to improve the quality of life for people with disease. In medicine and dentistry, tertiary prevention measures include the placement of temporary fillings during the control phase of the treatment plan, use of

amalgam and composite fillings for dental caries, replacement of missing teeth with bridges, implants, or dentures, or insulin therapy for Type II diabetes.

This chapter will focus on the primary prevention strategies. Secondary prevention will be addressed in [CE715 Caries Process, Prevention and Management: Diagnosis](#) and tertiary prevention strategies will be addressed in the [CE718 Caries Process and Prevention Strategies: Intervention](#).

Prevention Strategy: Effecting Behavior Change

Behavior change in an individual can reduce a person's risk of disease, yet changing behavior in patients has proven to be difficult.³ Educating a patient is valuable and offers information and skills that enhance an individual's ability to make healthy choices, yet there is no guarantee that the patient will always make the best choices. For example, while the important advice to reduce the amount and frequency of sugar consumption (and when possible, limit it to mealtimes) seems clear-cut and easy to follow, sugar consumption continues to increase, particularly in the US (Figure 2).

There are multiple theoretical models that demonstrate why changing a behavior, particularly a socially and culturally important one such as a feeding behavior, is difficult. However, outlined here is the most useful information compiled from these various theories, and the most practical tips that dental professionals can put to use in their practice to promote oral health.

Patients do not always act rationally: It is important that dental professionals do not assume that just by providing information their patients will behave in a rational way and immediately take action that follows that advice.³ Not only do patients not always act rationally, multiple studies have found that information from health professionals, increased awareness, and possessing more knowledge about the cause of disease are not strong enough motivators to change a habitual behavior.^{3,5,6} Dental professionals must, therefore, learn to think of behavior change as a process and support the change, rather than thinking that behavior change is instantaneous and simply based on information.³

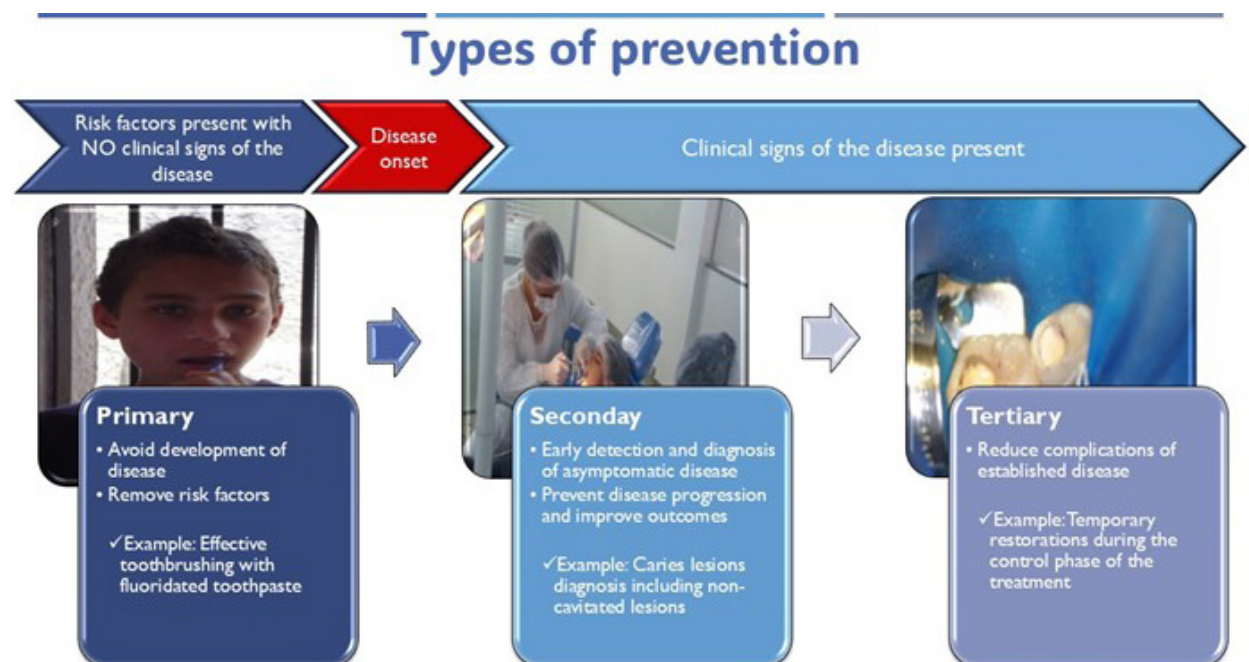


Figure 1. The three levels of preventive care - primary, secondary, and tertiary care.

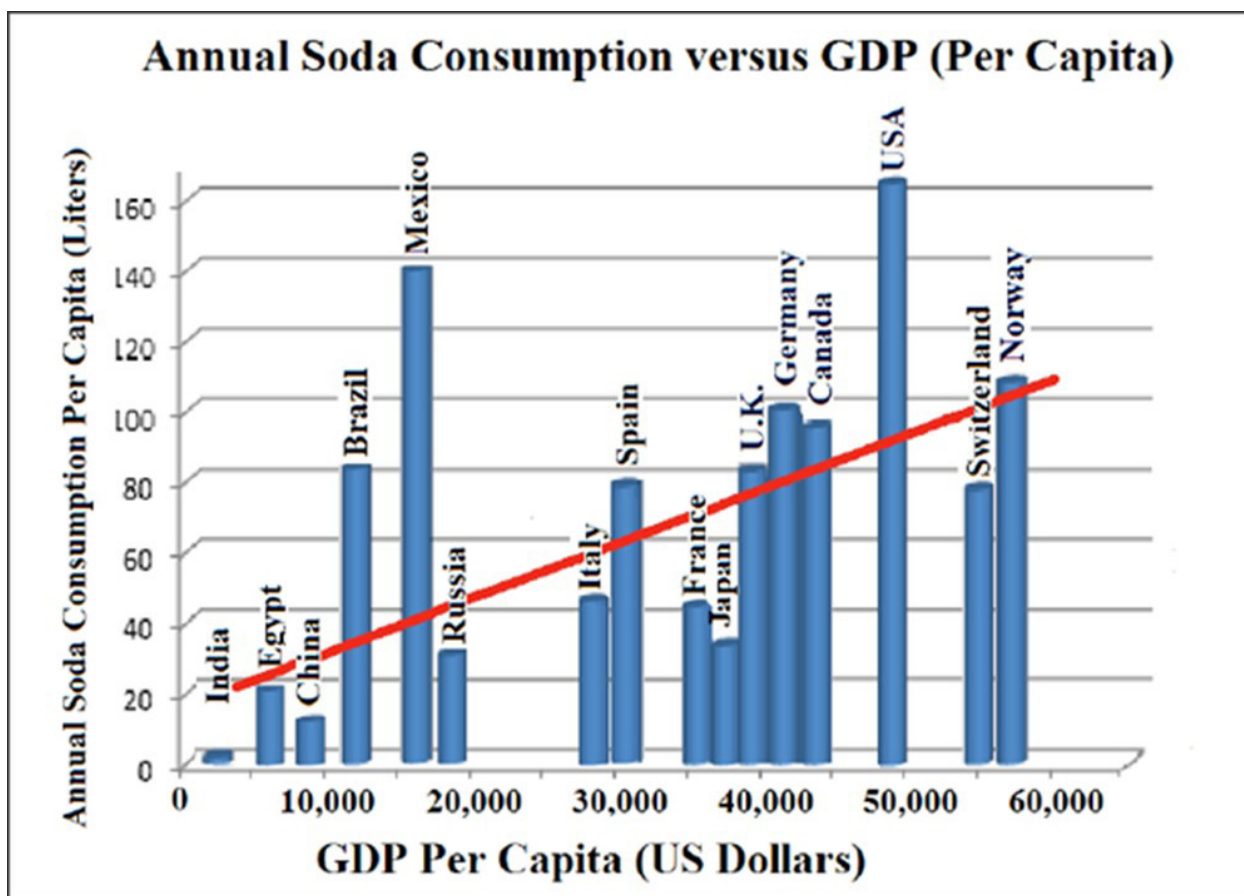


Figure 2. Annual global consumption of sodas vs. Gross domestic product (GDP) per capita clearly demonstrate a much higher level of sugar consumption (sodas) in the US compared to other nations.

Adapted from Sugar, Consumption at a Crossroads. Credit Suisse⁴

There are multiple and complex barriers to change: One of the main barriers experienced by people who are considering change is the attitudes of those around them, which are typically influenced by ethnicity and culture. The beliefs and expectations of an individual's family members and peers have a very strong effect on a person's ability to change. Thus, it may be important to recruit family members or friends who support a behavior change to express frequently to the patient that the recommended change is a good thing. Other social or psychological barriers may include factors such as distrust of medical healthcare providers, fear of medical settings, and anxiety or fear which breeds denial that there is a problem. Behavior change can also be hindered by financial or socioeconomic circumstances

such as lack of health services where the patient lives, insufficient money to pay for dental visits and services, and transportation difficulties.³

Another set of barriers are related to communication, such as not being fluent in the language the dentist speaks, illiteracy, limited understanding of scientific or technical terms due to poor education, learning disabilities that hinder the understanding of instructions or advice, or unclear communication from the dentist.³ Other patients learn better by visual communication. Demonstrations of relevant concepts are helpful, such as Tell-Show-Do technique to improve toothbrushing, or photos demonstrating the amount of sugar in different beverages (Figures 3 and 4).



Figure 3. Dentist showing effective toothbrush technique.

Change Occurs in Stages

The Stages of Change Model devised by Prochaska and Di Clemente suggests that there are five stages of behavior change (Figure 5).¹ These stages are:

1. **Precontemplation** - not thinking about changing.
2. **Contemplation** - beginning to think change may be a good thing.
3. **Preparation** - making small changes.
4. **Action** - undertaking the new behavior.
5. **Maintenance** - the new behavior becomes habitual.¹

Taking an example from dentistry, a patient who has never considered their soda-drinking habit to be relevant to the number of fillings they have (precontemplation) may be advised by their dentist to reduce sugary soda intake



Figure 4. Added sugars are hidden in more foods and drinks than you might expect!

Image Source: www.diabetes.bm

(contemplation). The patient might then start to make small changes at first by reducing the number of sodas they get at the vending machine at the office (preparation) and after another prompt from the dental professional, might cut out sodas altogether, as well as avoid the candies and chocolate they snack on throughout the day (action). Over time, the caries-preventing low-sugar diet becomes the norm (maintenance).

To help the student understand how stages of change can be applied to everyday statements, here are a few examples:

- "Interproximal cleaning? I have never heard of that!" – example of precontemplation.
- "Could you tell me more about x-rays? What are the pros and cons?" – example of contemplation.
- "The first step I'm taking is that I'm stopping going to the office candy jar." – example of preparation.
- "I made an appointment to have my teeth cleaned." – example of action.
- "It's been almost 6 months now that I've stopped drinking sodas and snacking on candy throughout the day." – example of maintenance.

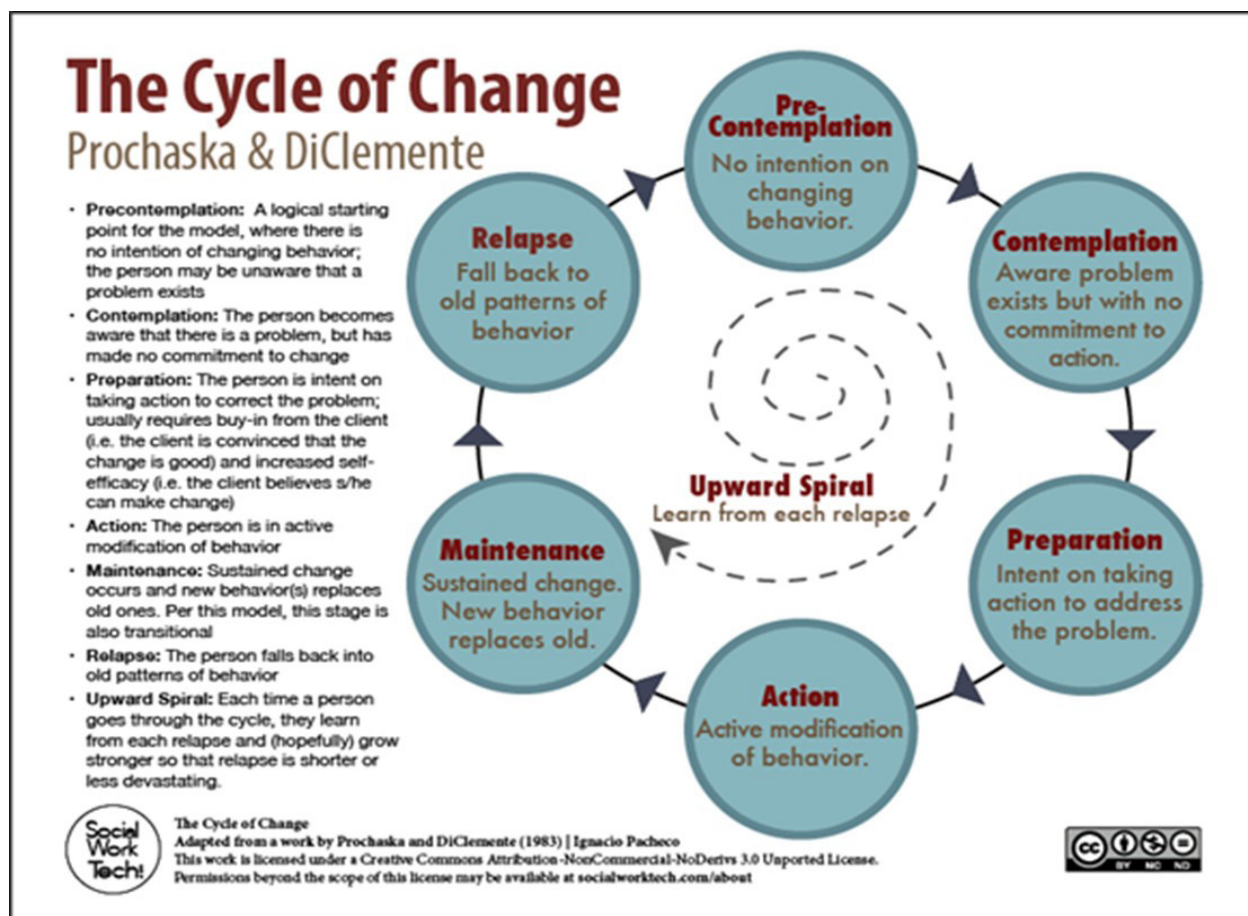


Figure 5. The Stages of Change Model.

Adapted from: SocialWorkTech.com

The dental professional should be aware that an individual may move back and forth between the stages, occasionally falling back to previous ones (relapsing). It is important to continue to encourage and advise a patient even when they relapse to previous unhealthy habits. Encouragement is a positive act, which can help the patient re-establish a healthy habit. On the other hand, reprimanding a patient when they relapse (such as if they go back to sipping sodas throughout the day) could lead to a sense of failure in the patient that does not encourage the re-establishment of a healthy behavior.^{3,7-9}

The health professional should also be aware that the first two stages of change - precontemplation and contemplation—can be very lengthy, and a host of factors, such as the barriers to change mentioned before, can influence whether or not a patient takes the recommended action. Also, even though no change has yet been observed, it is very possible

that a patient is moving toward change; they may simply be lingering in the contemplation stage and continuing to gather information or seek advice or support that will bring on the change.³

Studies show that it is important to set clear goals with a patient to help behavior change occur.^{2,6,7} Statements like, “*You need to brush better*” could be unclear because the patient is left not knowing exactly what this means and why they need to do it. Instead, it is advised that a dental professional follow these three goal-setting guidelines:

- **Give the patient a personally relevant reason for taking the health-promoting action** - such as, “*I can tell you how to stop this white-spot lesion from becoming a hole and causing the need for a new filling.*”
- **Make it clear what is to be achieved** - such as, “*Try to stop drinking sodas and snacking on candies throughout the day.*”

- **Suggest a tip that helps the goal to be achieved** - *such as, "Why not have your sweets only at mealtimes?"*^{6,7}

Other Behavioral Modification Techniques: Motivational Interviewing

Motivational Interviewing (MI) is a client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence. MI is a method that has been subjected to clinical trials for a wide range of behavior-change problems. MI works by activating the patient's own motivation for change and adherence to treatment. The starting point for MI is that motivation for change is actually quite malleable and is particularly formed in the context of relationships. The way in which patients are approached can substantially influence their motivation for personal behavior change.

The Spirit of MI

The "spirit" of MI has been described as collaborative, evocative, and honoring of patient autonomy.

- **Collaborative:** In place of the uneven power relationship in which the expert clinician directs the passive patient in what to do, there is an active collaborative conversation and joint decision-making process. This is regarded as particularly important. Ultimately, it is only the patient who can actually make the change.
- **Evocative:** Often healthcare seems to involve giving patients what they lack, be it medication, skills, or insight. MI seeks to evoke from patients that which they already have, to activate their motivation and resources for change. It respects that each patient has personal goals, values, aspirations, and dreams. Part of the art of

MI is connecting health behavior change with what patients care about: their own values and concerns.

- **Honoring patient autonomy:** MI also requires a certain degree of detachment from outcomes - not an absence of caring, but more of an acceptance that people can and do make choices. Healthcare professionals can inform, advise, and even warn, but in the end it is the patient who decides to take action or not. Recognizing and honoring that autonomy is a key element in effecting behavior change. Human nature frequently resists being coerced and instructed on what to do.⁹

Further information on Motivational Interviewing can be found at www.motivationalinterviewing.org and in the book especially written for the dental practice: Health behavior change in the dental practice.⁹ The evidence base for successful behavior change is continually expanding, and adopting current science will tip the balance in favor of success, bringing greater satisfaction to both the healthcare professional and the patient.

Conclusion

This section has outlined concepts related to oral health promotion and education as part of primary prevention for dental caries. To be successful at promoting healthful caries-reducing changes in patients, dental professionals should recognize the multiple and complex factors and barriers that influence behavior and the ability and willingness to change unhealthy habits. It has also been established that using clear, effective communication and setting specific goals with patients can go a long way in helping a patient to benefit from a dental professional's knowledge about the causes of caries and caries prevention.

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: www.dentalcare.com/en-us/ce-courses/ce717/start-test

1. Which of the following is an example of primary prevention?

- A. Use of fluoridated toothpaste.
- B. Insulin therapy for Type II diabetes.
- C. Screening for caries.
- D. Screening for periodontal disease.

2. Which of the following is an example of secondary prevention?

- A. Vaccinations for measles, mumps and rubella.
- B. Using amalgam fillings for caries.
- C. Screening for caries.
- D. Bleaching teeth.

3. What is the goal of tertiary prevention?

- A. Avoid the development of a disease or disability in healthy individuals.
- B. Reduce the negative impact of an already-established disease by restoring function and reducing disease-related complications.
- C. Focus on early disease detection, making it possible to prevent the worsening of the disease and the emergence of symptoms.
- D. None of the above.

4. Which of the following is true about patient behavior?

- A. Changing behavior can be difficult.
- B. Patients will always make the best choices.
- C. Education is guaranteed to help an individual make good choices.
- D. All of the above.

5. Which of the following is not a motivating force when it comes to effecting change?

- A. Having information from health professionals.
- B. Increased awareness.
- C. Possessing more knowledge about the cause of disease.
- D. All of the above.

6. Which of the following factors could act as a barrier to change?

- A. Attitudes influenced by ethnicity and culture.
- B. Fear of medical settings.
- C. Having insufficient money to pay for dental visits.
- D. All of the above.

7. What types of communication problems might present a barrier to change?

- A. Unclear communication from the dentist or hygienist.
- B. Learning disabilities that hinder the understanding of instructions or advice.
- C. Not being fluent in the language the dentist or hygienist speaks.
- D. All of the above.

8. What are the Stages of Change according to Prochaska and Di Clemente?

- A. Contemplation, preparation, decision-making, action, implementation.
- B. Precontemplation, contemplation, preparation, action, maintenance.
- C. Research, preparation, action, implementation, maintenance.
- D. Resignation, contemplation, preparation, decision-making, implementation.

- 9. According to the stages of change modeled by Prochaska and Di Clemente, at what stage of change is a patient when they are unaware that their soda habit could be linked to caries?**
- A. Contemplation
 - B. Maintenance
 - C. Precontemplation
 - D. Action
- 10. According to the stages of change modeled by Prochaska and Di Clemente, at what stage of change is a patient when they first start to make small changes, such as get less soda from the office vending machine?**
- A. Action
 - B. Preparation
 - C. Precontemplation
 - D. Maintenance
- 11. At what state of change is the patient when he or she makes a statement like: "Could you tell me more about x-rays? What are the pros and cons?"**
- A. Contemplation
 - B. Preparation
 - C. Action
 - D. Precontemplation
- 12. At what stage of change is the patient when they make a statement like: "It's been almost 6 months now that I've stopped drinking sodas and snacking on candy throughout the day."?**
- A. Preparation
 - B. Action
 - C. Precontemplation
 - D. Maintenance
- 13. If a patient relapses (goes back to an unhealthy habit), which of the following is not an effective way to help them re-establish a healthy habit?**
- A. Continuing to offer information.
 - B. Reprimanding the patient.
 - C. Encouraging the patient to re-establish the healthy habit.
 - D. None of the above.
- 14. Which of the following is an example of a statement that is not effective at helping a patient set a health-promoting goal?**
- A. "Why not have your sweets only at mealtimes?"
 - B. "Try to stop snacking on candies throughout the day."
 - C. "You usually drink about 6 sodas a day, and it's caused you to get cavities that needed fillings. Why don't you start by trying to bring this number down to two sodas a day?"
 - D. "You need to brush better."
- 15. Why is a statement like "I can tell you how to stop this white-spot lesion from becoming a hole and causing the need for a new filling" effective at helping a patient set a health-promoting goal?**
- A. The possibility of a new filling scares the patient.
 - B. The patient will think a hole in the tooth is esthetically unpleasing.
 - C. It gives the patient a personally relevant reason for taking the health-promoting action.
 - D. None of the above.

References / Additional Resources

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Additional Resources

- No Additional Resources Available

About the Author

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Apoena De Aguiar Ribeiro is a Pediatric Dentist and Microbiologist. She was born in Rio de Janeiro, Brazil. Among her 25 years of teaching, Ribeiro most recently served as a tenured associate professor in the Fluminense Federal University, Department of Pediatric Dentistry and Cariology for 12 years, with a joint appointment at the Department of Microbiology for 5 years, in Rio de Janeiro State, Brazil. Prior to that role, she was an associate professor in the Grande Rio University Department of Pediatric Dentistry and Cariology for 8 years. During this time, she has also maintained a part-time role in a solo dental practice for 22 years, devoted to provide oral health to infants, children, adolescents and children with special needs. She is the author of a full book of Pediatric Dentistry (Pediatric Dentistry - A contemporary approach, GEN Editor, Brazil) and has published more than 50 papers in peer-reviewed journals. Dr. Ribeiro had successfully obtained 5 grants as a Principal Investigator in Brazil.

In August 2018, Dr. Ribeiro began her appointment as an associate professor in the Department of Diagnostic Sciences at the UNC Adams School of Dentistry, and in 2024 she was promoted to Tenured Professor. In her role at the UNC Adams School of Dentistry, she provides didactic teaching to pre-doctoral students and graduate students, committee service and research, including mentoring students in research projects. Her research interests include translational science, with focus on the oral microbiome communities and their metabolic profiles as determinants in oral and systemic health, mainly on dental caries in children and adolescents.

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