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Health Behavior Models and Oral Health: A Review

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Dental hygienists help their clients develop health promoting behaviors, by providing essential information about general health, and oral health in particular. Individual health practices such as oral self-care are based on personal choices. The guiding principles found in health behavior models provide useful methods to the oral health care providers in promoting effective individual client behaviors.

Theories provide explanations about observable facts in a systematic manner. Research regarding health behavior has explored the effectiveness and applicability of various health models in oral health behavior modification. The Health Belief Model, Transtheoretical Model and Stages of Change, Theory of Reasoned Action, Self-Efficacy, Locus of Control, and Sense of Coherence are examples of models that focus on individuals assuming responsibility for their own health. Understanding the strengths of each and their applicability to health behaviors is critical for oral health care providers who work with patients to adopt methods and modify behaviors that contribute to good oral health.

This paper describes health behavior models that have been applied to oral health education, presents a critical analysis of the effectiveness of each model in oral health education, and provides examples of application to oral health education.

Keywords: theories, models, Health Belief Model, Transtheoretical Model, Stages of Change, Theory of Reasoned Action, self-efficacy, Locus of Control, Sense of Coherence

Introduction

Patient education is considered a hallmark of the dental hygiene profession. According to the American Dental Hygienists' Association (ADHA) Code of Ethics, dental hygienists have "a primary role in promoting the well being of individuals and the public by engaging in health promotion/disease prevention activities".¹ The American Dental Education Association (ADEA) lists identification of individual and population risk factors and development of strategies that promote health-related quality of life as one of the core competencies for entry into the dental hygiene profession.² Patient education is an integral part of dental hygiene education. In a recent survey of dental hygiene education programs, all respondents indicated that their programs included teaching patient education in the curriculum.³

To fulfill the profession's code of ethics, dental hygienists must have a thorough knowledge of health models and health behavior theories that affect oral health behaviors. Many such theories are now available and have been applied to oral health, and others are sure to be introduced and tested in the future. The purpose of this review is to outline the basic

principles of several major health theories that have been applied to oral health and to examine the strengths and limitations of each.

Health Theories

The overall goal of patient education is to provide patients the information they need to make informed life style choices and options for professional services. Early approaches to patient education tended to focus on health care provider to patient communication. During that time, the main message from health care providers to patients was to comply with a prescribed self-care regime. The medical community paid less attention to an individual's perception of health and disease only a few decades ago.^{4,5} Public health workers in the 1950's began to discuss the importance of individuals taking part in their own health. An early breakthrough in health education came in the 1950's with the introduction of the Health Belief Model. Other theories have since followed and applied to both acute and chronic health conditions. Theories most often associated with oral health are the Health Belief Model, Locus of Control, Self-Efficacy, Stages of Change, and Theory of Reasoned Action. Sense of Coherence, a theory introduced in the 1970's, has recently been applied to oral health. Other health theories have proven useful with health conditions such as patient self-management for HIV infection,⁶ emotional well-being for obesity,⁷ and Family Coherence and Conflict Resolution for diabetes management.⁸ This review will include only the models reported in the literature associated with oral health.

Health Belief Model

First proposed in the 1950's by Hockbaum, and adopted in the 1970's by the United States Public Health Service, the Health Belief Model (HBM) was one of the first attempts to view health within a social context.⁹ The underlying principle of the HBM is that individuals with better information make better health decisions. According to Hockbaum, people will find it worthwhile when making health related decisions to keep an open mind. A person who is prepared to accept new concepts, will have a better understanding of self. With a better understanding of how and why they make choices, individuals will be much better able to make them intelligently, independently, and maturely.⁹

The HBM is a staged theory, with each step in the decision making process dependent on the previous decision or belief. According to this theory, an individual must believe that s/he is susceptible to a condition; the condition is serious; there is a successful intervention for the condition; and can overcome all barriers to using the intervention. Each step is dependent on the previous belief.

Applying this theory to an oral health condition such as early childhood caries, the primary caregiver must believe that the child is susceptible to dental caries; that primary teeth are important and dental caries is a serious threat to them; that dental caries can be prevented; and must be willing to limit the child's exposure to fermentable carbohydrates, and must assist the child in practicing good oral hygiene.

A limitation of the HBM is that supplying information alone is usually not enough to change health behaviors. Behavior changes rarely follow a logical, stepwise progression.¹⁰ Cross sectional studies have found strong associations between good oral health and HBM stages.^{11,12} However, longitudinal studies have not shown good predictive value in following HBM principles.^{13,14,15} It is possible that measuring health beliefs cross sectionally reveals that, after a behavior is adopted, the individual believes the condition is serious and that interventions have value. However, measuring those beliefs before behavior changes take place has questionable value.

Transtheoretical Model and Stages of Change

The Transtheoretical Model and Stages of Change developed by Prochaska, Norcross, and DiClemente is another staged theory that measures an individual's readiness to adopt a new health behavior.⁵ Like HBM, Stages of Change is a staged model with each step contingent on the previous step. This theory states that individuals move along a predictable continuum of change; and that each step has distinct characteristics. Accurately assessing where an individual is along this continuum

allows health care workers and educators to tailor interventions appropriate to the person's stage of readiness. The six stages of change are: precontemplation, contemplation, preparation, action, maintenance, and termination.¹⁶

In the precontemplation stage, an individual has no intention of changing a behavior. At this stage, providing information regarding risks may be appropriate to initiate a person's thought for change. In the contemplation stage, the individual is considering making a change within the next six months. The individual will examine the pros and cons of making a change, carefully weighing the benefits of changing versus the costs of changing. To help evaluate the pros and cons of changing, the individual may explore options such as community support programs like smoking cessation programs that assist behavior changes. If the available options seem appropriate and beneficial, the individual may advance to the next stage of preparation. In the preparation stage, the individual is ready to make the change and actively makes plans to enact the change, for example enrolling in a tobacco cessation class. In the action stage, the change has been adopted, and in the maintenance stage, the change has been continuous for at least six months. The termination stage, often not attained, represents a state in which the individual feels as if the prior behavior never existed and is, therefore, highly unlikely to return to the previous behavior.¹⁷

Individuals move through the stages as they weigh the benefits and costs, or pros and cons, of the change. As the scale tips more toward the pro end of change, the individual may move to the next step. Self-efficacy develops as the individual believes a change in behavior is likely to result in a positive outcome. As an individual believes a change is possible and believes in his/her ability to enact the change, a move to a more advanced stage is likely.¹⁷

The strength of the theory is that it allows the client education program to provide the precise intervention for which the participant is ready. Applying the theory to smoking cessation, pre-contemplators may be given some educational material to consider. Computer based feedback for health care providers may help contemplators assess pros and cons of the behavior change. Those in the preparation stage may have set a quit date for smoking. Health care providers or health clinics can provide support using multiple methods. Consciousness raising, self-evaluation, and environmental evaluation are useful in the pre-contemplation and contemplation stages. Consciousness raising can alert an individual to a severe health problem and possible outcomes if left untreated. Self-evaluation and environmental evaluation assess personal habits and social environments that might affect a personal habit.

Counter-conditioning and contingency management may be most useful in the action and maintenance stages. Counter-conditioning allows the individual to substitute one behavior for another, encouraging a healthy alternative for an unhealthy habit. Contingency management relies on rewards to encourage positive changes and may be most useful for helping individuals who have reached the maintenance stage. Those in the termination stage may provide assistance or counseling to those trying to change the behavior.¹⁷

Regarding oral health behaviors, Stage of Change theory is most often used with tobacco cessation programs. Prochaska, Redding, and Evers tested a staged intervention against a standard self-help cessation program, following participants for 18 months. Results were similar at 12 months but at 18 months the staged group moved ahead.¹⁷ Behaviors and attitudes about smoking and cessation readiness often match the appropriate stage in cross sectional studies. A program evaluation at a clinic for the medically underserved questioned smokers to assess their stage of change. Smokers who planned to quit within six months scored higher on statements consistent with quitting than did smokers who were not planning to quit. Furthermore decisional balance scores of those planning to quit indicated more concerns over negative consequences of smoking.¹⁸

Evaluation of the effectiveness of smoking cessation programs based on stages of change theory have been less definitive than reported by the theory's proponents. Longitudinal analysis of smoking cessation programs based on stages of change theory found that using interventions based on the theory added little or borderline improvements over other cessation strategies.^{19,20} A systematic review of clinical trials based on Stages of Change interventions found the approach ineffective in school aged children.²¹ Cross sectional and prospective analysis of a workplace smoking cessation program mirrored results of previous research. Behaviors and attitudes significantly correlated with appropriate stage of change. However, the theory failed to predict progression through the stages at the one and two-year follow up.²²

Theory of Reasoned Action

Theory of Reasoned Action stresses the importance of attitudes and intentions in changing a behavior. According to this theory, the most important determinant of behavior is intention.²³ Very few actions that produce a healthy outcome happen without ample knowledge and full intention to practice the healthy behavior. Two cognitive processes are at work to develop healthy behaviors: 1) belief about what significant others think, and 2) personal motivation to comply with those significant people. Other external variables that will influence attitudes and thus behaviors are internally processed within the context of significance.

According to the Theory of Reasoned Action, people make rational decisions based on their knowledge, personal values and attitudes. Therefore, a person's intent to perform a certain action is the most immediate and relevant predictor of carrying out that action. Behavioral beliefs and normative beliefs are two kinds of beliefs that shape intentions.²³

Behavioral beliefs are the attitudes held by the individual alone. A person forms attitudes based on relative risks, benefits, and possible outcomes. Therefore, personal knowledge and perception of personal health importance influence behavioral beliefs. Normative beliefs are those held by other people who influence the individual. If a certain behavior is expected or is the social norm, or is expected by someone of importance to the individual, those expectations will have a bearing on an individual's intentions and, therefore, affect his or her behavior.²³

Intentions will only predict behavior if they are stable and consistent.²³ When faced with an unexpected obstacle, an individual might change his or her intentions and neglect to carry out the originally intended behavior. Another limitation of this theory is that intentions must be matched very closely to the behavior to have predictive power.

Social norms and community expectations are powerful predictors of individual behavior, according to the Theory of Reasoned Action. When using this theory in a community intervention, the behavior of the collective community may be more easily predicted than that of the individual. Social norms do not change as readily as individual choices; therefore, social norms are more stable and provide strong normative beliefs to those in a close community.²³

The Theory of Reasoned Action helps explain an individual's perceptions of normal and expected behavior. The theory seems to be most successful in predicting behaviors that are completely within the individual's control and in which intentions remain stable, such as daily oral hygiene practices. Extraneous factors outside of the individual's control, such as fatigue or change of environment, may quickly change intentions and therefore change behavior and outcome. This theory has proven to be effective in influencing oral hygiene in young adults. The social expectations of the group had a strong influence on their oral hygiene behavior.^{10,23} Applying this concept to patient education, a teenager may consistently practice oral hygiene at home, but a change in environment, such as moving to student housing at college, may change intentions and behavior. Fatigue associated with student life also might affect nightly oral health practices.

Self-Efficacy

Self-efficacy is a construct of the Social Cognitive Theory proposed by Bandura.²⁵ Social Cognitive Theory, a revision of Social Learning Theory, states that individuals do not learn or change behavior in a linear fashion. Rather, changes take place bidirectionally; environment, information, and behavior all affect one another. As an individual learns more, behaviors and environment may change, causing more knowledge to be gained, which, in turn, reinforces behavior and healthy environments. Lapses are a part of the learning process as the individual employs personal choices to develop behaviors consistent with individual choice and lifestyle.^{24,25}

Individuals with high self-efficacy believe their actions will affect outcome. As a healthy behavior produces results, success reinforces success. Individuals may have no intention of changing a behavior but after experiencing a success, behaviors, knowledge and environments change.²⁵

Self-efficacy is gained by several means. Enactive attainment, or experiencing success, is the most powerful method. Vicarious learning is another method. Individuals do not have to experience the affects of poor health choices if they can

learn from others' experiences. The third method of gaining self-efficacy is through verbal persuasion. Affective states such as pain or fatigue will deter self-efficacy.²⁵

Self-efficacy has been an accurate predictor of oral health in both cross sectional and longitudinal studies.^{27,28,29} Qualitative analysis of dental attitudes indicated that cognitive experiences, supportive and emotional dimensions, and childhood experiences influence dental attitudes and behaviors.²⁶ Dental self-efficacy was found to be a determinant in oral health and oral hygiene among diabetes patients and for general oral health in elderly patients.^{27,28} Self-efficacy has shown to be consistent with improvements in oral hygiene over time, but the benefit may be short term only. Periodontal patients showed improvements in oral hygiene and dental self-efficacy six months after the initial intervention but differences were lost over time.¹¹ Self-efficacy was found to be protective against early childhood caries (ECC). Researchers have proposed that self-efficacy may be a useful part of a multidimensional model to predict ECC.²⁹

Self-efficacy is perceiving control over actions that will have an affect on outcome. The theory differs from other theories addressing personal agency or control, in that self-efficacy is domain specific. That is, an individual can have high expectations that oral health is attainable through personal oral hygiene and professional care. The same individual may have low self efficacy in other areas of health.

Locus of Control

This theory, developed by Wallston, Wallston, & Kaplan in the mid 1970's, deals with perception of personal control over health issues. Internal locus of control (LOC) occurs when individuals think their personal actions determine their health status. Those with external locus of control means individuals perceive others in control of health decisions and health status. External sources may be fate, chance, luck, God, or powerful others.³⁰

The theory has been refined since its introduction. As originally presented and in much subsequent research, LOC has been considered a global orientation to health behavior. The scales were designed to be mid-level in specificity so they could be used to predict behaviors or outcomes for any condition. Validation of the theory, however, has found this to be a problematic approach because healthy people respond differently to the questions on the scales than do chronically ill individuals.³¹ Several researchers have used the basic scales but found the scales needed to be modified to measure specific diseases or conditions such as diabetes, headaches, and adolescent depression.³²⁻³⁴ This was successful within the context used in individual studies. However, because each study adapted the scales differently, little comparison between studies is possible. Development of the Multidimensional Locus of Control scale helped address this issue and make the scale appropriate for specific conditions.³¹

LOC has been found to be predictive for children's dental health. Researchers found children whose mothers had more external LOC were at higher risk for developing dental caries.³¹ In contrast, other research has found little association between mothers LOC, children's health status, and use of preventive health services.³² This theory continues to be refined for use in various populations and conditions.

Sense of Coherence

Antonovsky took a very different tact in health promotion and disease prevention. Antonovsky's central premise is that it is more useful to study health than to study disease. He referred to this method of study as salutogenesis, the beginnings of health. Salutogenesis defines health in terms of a continuum of ease to dis-ease and with the conditions surrounding the individual providing coping resources. Antonovsky's objection to the study of pathogenesis is that it tends to dichotomize people into either a "healthy" or "ill" state. He contends there is a continuum of "ease to dis-ease" state for most people.³³

The salutogenesis model closely examines the role of stressors and tension as contributing factors for health and dis-ease. A stressor is defined as a source of disturbance that upsets a sense of equilibrium. This may come from external or internal sources such as illness, heredity, job stress, or lack of personal control. Many sources of stimuli are handled routinely as

individual and are not stressors. Stressors produce tension and it is the perception of stress and the tension response that has an affect on the individual.³³

To cope with, and possibly to use, stressors to enhance life experience, people build a network of generalized resistance resources (GRRs). A GRR is more than a specific coping skill for a particular event. GRRs include all available resources at an individual level, a community and a cosmic level that enable people to manage daily crises and cataclysmic events. A network of GRRs may contain a person's heredity, education, finances, physical resources, values, attitudes, or faith.

GRRs can help an individual avoid stressors as in prevention, practicing good health habits, or avoiding dangerous situations. They may also enable a person to effectively manage a stressor and avoid psychological, emotional, or physical impairment. An examination of the list of GRRs shows that they encompass a broad range of elements. Included are biological elements such as the immune system, cognitive elements such as knowledge, material resources such as personal income or medical insurance, social factors such as support and social norms, and macrosocial support such as a belief in divine purpose.³³

A GRR has an element of farsightedness. This quality allows an individual to envision coping strategies and anticipate the response of the environment. The coping strategy is not the actual behavior but the planned behavior. This may give an individual a measure of personal control, but the actual response or behavior may be limited by circumstances such as physical ability or material resources.³³

Sense of coherence (SOC) is the main construct of salutogenesis. SOC is a method of seeing the world and one's place in it. It is cognitive, perceptual, and social. SOC is central to a salutogenic orientation to health and disease. From a pathogenic perspective, a clinician will diagnose a condition and work to cure it. From a salutogenic perspective, a clinician can work with a patient on goal-oriented behavior that will strengthen the sense of coherence and thereby move the patient toward the "ease" end of the ease to dis-ease continuum. SOC will move a person toward consistency and stability.³³

Researchers have found that mothers' SOC is significantly associated with several oral health indicators in adolescents.³⁴ Strong maternal SOC was associated with gingival health, overall caries rate, anterior caries, and professional dental visits.

No longitudinal studies have been conducted to measure the long term impact of SOC on oral health.³⁴ Summary Health behavior theories may be applied for both individual patient instruction or in developing community-based programs. For example, in providing oral hygiene instructions for diabetes patients, the dental hygienist may help develop self-efficacy in a patient using enactive attainment by pointing out how the patient's efforts have improved gingival health. Encouraging a patient to self-assess the gingival condition over time may allow the patient to observe the benefits of daily plaque removal as tissues bleed less and become firmer. Asking the patient if he/she has noticed anyone with loose teeth may cause vicarious learning. Many patients have observed loose teeth and tooth loss in family members. Explaining this tooth loss may have been caused by advanced periodontal disease allows the patient to learn vicariously through another person's experience without personally experiencing the adverse event. Dental hygienists may also help develop patients' sense of coherence by networking with medical providers, community support groups, and family members.

Many preschools, elementary schools, and day care centers have toothbrushing programs and/or teach dental health to students and parents. Dental hygienists involved in these community programs may use Theory of Reasoned Action to encourage daily brushing and thereby create a behavioral norm for the parent and child. Social norms of good nutrition, appropriate weaning schedules, and healthy smiles established in these early childhood programs might have an impact long after the program has ended.

Conclusion

Principles of evidence-based medicine and professional ethics require health providers to keep their knowledge current and employ tested techniques.¹ Longitudinal research evaluates outcomes for programs based on various theories. Examination of outcomes allows dental hygienists to employ the most appropriate theoretical base for patient education. Assisting patients in partaking in their oral health maintenance remains a constant challenge for oral health professionals at the community and individual level. A brief review of theories commonly used in relation to oral health shows that each

theory has proven successful in certain situations; each has limitations. Many of the available studies are cross sectional and cannot be used to determine cause effect relationships. It is possible that some theories are more applicable on a community level, and others more useful for individual counseling. Longitudinal studies are needed to test the predictive value of theories or the relative impact on various conditions. The Surgeon General's national call to action recommends research designed to determine the complex interactions of biological, social, and environmental influences on oral health.

"Such research must be complemented by prevention and behavioral science research (including community-based approaches and ways to change risk behaviors), health services research to explore how the structure and function of health care services affect health outcomes, and by population health and epidemiology research to understand potential associations among diseases and possible risk factors."³⁵

Following this recommendation, and in light of the current state of knowledge of the success and limitations of health behavior modification theories, research is needed to determine the long term outcomes of programs based on various theoretical constructs. Research is also needed to examine possible interactions between health theories, possible multidimensional models, or appropriateness of certain models for certain conditions.

Dental hygienists routinely provide patients information on a variety of oral health related issues. The benefit of time spent on in doing this may depend on the effectiveness of the intervention for a particular patient, particular condition, and in a particular setting. With a working knowledge of current health modification theories, oral health professionals are better equipped to provide educational services for patients and communities.

Notes

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