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## Theoretical models that can be applied to address therapeutic adherence.

### Modelos teóricos que se pueden aplicar en la adherencia terapéutica.

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#### **Abstract:**

Adherence is defined by the World Health Organization (WHO) as “the degree to which patients' behavior, in relation to taking medication, following diet or changing lifestyle, corresponds with the recommendations agreed upon with the healthcare professional.” Good adherence implies control of the disease, greater effectiveness of the treatment and an improvement in the patient's quality of life, while lack of adherence can lead to serious complications of the disease, ineffectiveness of the treatment and an increase in health costs. The WHO reports that the prevalence of non-adherence ranges between 25% and 50%, mainly in patients with chronic diseases. Lack of adherence to pharmacological treatment is a prevalent and relevant problem in clinical practice and it is necessary to address it through interventions that are supported by the use of theoretical models of behavior change that focus on understanding and improving people's ability to follow the instructions. Medical indications. The objective of this review is to mention some theoretical models of behavior change that health professionals can use as scientific support for the design of interventions to address lack of therapeutic adherence considering cognitive, motivational and environmental aspects.

#### **Keywords:**

*Theoretical models, therapeutic adherence, change in behavior*

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#### **Resumen:**

La adherencia es definida por la Organización Mundial de la Salud (OMS) como “el grado en que el comportamiento de los pacientes, en relación con la toma de medicación, seguimiento de la dieta o cambios de estilo de vida, se corresponde con las recomendaciones acordadas con el profesional sanitario”. Una buena adherencia implica el control de la enfermedad, una mayor efectividad del tratamiento y una mejoría en la calidad de vida del paciente, mientras que la falta de adherencia puede llevar a complicaciones graves de la enfermedad, una ineficacia del tratamiento y un aumento en los costos sanitarios. La OMS informa que la prevalencia de la falta de adherencia oscila entre 25% y 50% principalmente en pacientes con enfermedades crónicas. La falta de adherencia al tratamiento farmacológico es un problema prevalente y relevante en la práctica clínica y es necesario abordarla mediante intervenciones que se sustenten mediante el uso de modelos teóricos del cambio de comportamiento que se centran en comprender y mejorar la capacidad de las personas para seguir las indicaciones médicas. El objetivo de esta revisión es mencionar algunos modelos teóricos del cambio de comportamiento que pueden utilizar los profesionales de la salud como sustento científico para el diseño de intervenciones para abordar la falta de adherencia terapéutica considerando aspectos cognitivos, motivacionales y ambientales.

#### **Palabras Clave:**

*Modelos teóricos, Adherencia terapéutica, Intervenciones, cambio de comportamiento*

#### **INTRODUCTION**

Therapeutic Adherence (TA) is an extensive, multiple and multifactorial concept; there is great variability in the terms used to describe patient behavior related to taking medications.<sup>1,2</sup> TA can be described as the patient's behavior related to taking medications.<sup>1,2</sup> The World Health Organization (WHO) defines adherence as “the degree to which patients'

*behavior, in relation to taking medication, following diet or lifestyle changes, corresponds to the recommendations agreed upon with the healthcare professional”, which includes the active role of the patient and collaboration and agreement with the healthcare professional in relation to their medication<sup>1</sup>, that is, adequate doctor-patient communication must be created to facilitate shared decision-making.<sup>3</sup> In 2003, the WHO reported that approximately 25% to 50% of patients are not adherent to*

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their treatments, especially those with chronic diseases.<sup>4</sup> Currently, lack of adherence is a problem in Mexico and in the world for which it is necessary to know its real prevalence for each disease in order to reduce it and improve the patient's level of health.<sup>5</sup> In this sense, behavioral science offers theories, models and strategies<sup>6-13</sup>, but only some are useful in helping patients improve their adherence to treatment and may also be effective in changing the behavior of healthcare providers and of health care systems.<sup>6,7</sup> In this review we will talk about each model that can be applied in TA.

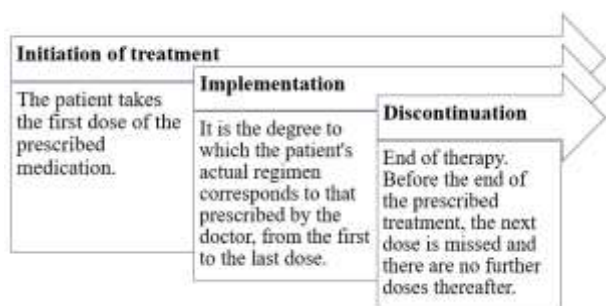
Various models have been described that explain therapeutic adherence<sup>6-13</sup>, among which cognitive behavioral models<sup>14</sup>, can be noted, since they combine learning theory with aspects of information processing and focus on the way in which human behavior is learned or acquired<sup>15</sup>, but currently no studies have been found that use these models for the design of interventions to address lack of therapeutic adherence.

Adherence is considered a behavior, for this reason, it is important to use theoretical models that explain adherence and address the lack of TA to carry out precise interventions in patients with this problem<sup>6-13</sup>, however, in Mexico, no research or studies have been found in which any of these models of behavior change are used in the design of interventions to improve the lack of TA.

In order to address the lack of therapeutic adherence using one of the models that will be described later<sup>6-13</sup>, it is necessary to know its characteristics, such as, for example, the phases of adherence, the nature of the lack of adherence and the barriers that prevent the patient from adhering to their treatment.

### PHASES OF THERAPEUTIC ADHERENCE

Adherence is divided into 3 phases: initiation, implementation and discontinuation as described in Figure 1. Adherence phases are different depending on the conditions<sup>1,15-17</sup>, this is because the general determinants impact each situation in different ways. Furthermore, there is a big difference depending on the severity of the disease. In general, adherence to treatments is lower in chronic processes than in acute ones, which is known as lack of adherence or non-adherence.<sup>18</sup>



**Figure 1. Phases of therapeutic adherence.**<sup>1,15-17</sup>

In this context, a patient is considered non-adherent when he or she takes less than 80% of the doses prescribed by the doctor.<sup>19</sup> It is difficult to achieve TA, since due to lack of knowledge of

the disease and the importance of pharmacological treatment, patients forget or avoid taking their medications, especially if they feel relieved or controlled. Polypharmacy is a factor that affects adherence, because it has been determined that as the number of prescribed drugs increases, adherence to treatment decreases.<sup>20</sup> It is important to mention that the appearance of adverse reactions, the appearance of drug interactions, the probability of forgetting and the complexity of taking medications are the main consequences of polypharmacy that will prevent adequate TA.<sup>21</sup>

### NATURE OF LACK OF ADHERENCE

Non-adherence (NA) can be classified from different points of view and can be classified as intentional NA or unintentional NA, primary and secondary non-adherence<sup>22-24</sup>, whose characteristics are described in Table 1.

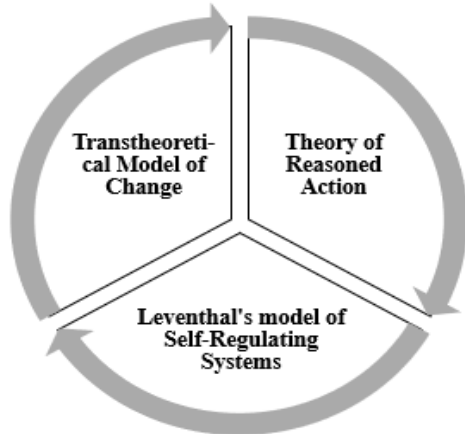
**Table 1. Phases of therapeutic adherence depending on its origin.**<sup>18,22,24</sup>

<b>Intentional non-adherence</b>	It is one in which the patient does not want to take his medication due to barriers in his perception, as a consequence of erroneous beliefs about the health problem, treatment, alterations in his family and social environment, low motivation or a poor relationship between the doctor and the patient.
<b>Unintentional non-adherence</b>	It is one in which the patient cannot take their medication correctly; it is caused by practical barriers derived from lack of skills, complex guidelines, forgetfulness, routines and poor organization.
<b>No Primary adhesion</b>	It refers to when a new treatment is prescribed to a patient and the patient does not arrive to pick up the medication at the pharmacy.
<b>No Secondary adhesion</b>	It is the inappropriate taking of medication once it is picked up at the pharmacy, including taking the wrong dose at the wrong time, forgetting to take one or more doses or increasing or decreasing the frequency of the dose and stopping the treatment too soon, stopping the medication. take it before the date indicated by the doctor.

The previous classification<sup>18,22,24</sup>, is used to identify voluntary and involuntary behavior patterns, highlighting the need to address each one of them through interventions directed to the type of non-adherence detected.<sup>2</sup>

### THEORETICAL MODELS THAT COULD EXPLAIN THERAPEUTIC ADHERENCE

Among the cognitive behavioral models that can be used to explain adherence the literature refers to the Health Belief Model (HBM)<sup>10,27,28</sup>, Theory of Reasoned Action (TRA)<sup>29-31</sup>, and the Leventhal's Self-Regulatory Systems model (LSRSM)<sup>28</sup>, which are shown in Figure 2.



**Figure 2. Example of Cognitive-Behavioral Models that can be applied in Therapeutic Adherence.**<sup>10,27-31</sup>

### Health Belief Model (HBM)

This model explains the modification of the behavior working on the beliefs or perceptions that the subject has and focuses on criteria that provide data on the possibility of the subject following or not the guidelines educational.<sup>10,27,28</sup> This model is criticized because it does not take into account the context and does not consider it appropriate to modify the behavior of healthy people, although it is useful to apply when we want to address compliance with a therapeutic plan.<sup>11</sup>

The HBM was developed and adapted by Becker and Maiman in 1974, Janz and Becker in 1984 and Glanz and Rimer in 1995.<sup>28</sup> This model is based on expected value theories (expectations) whose premise is that behavior depends on two variables, the value that the person gives to a certain objective and the estimate that the person makes about the probability that carrying out a certain action will achieve the desired objective.<sup>32,33</sup>

This model explains that a person's behaviors are determined by the perceived threat to their health. This vulnerability that is experienced is conditioned by the perception about susceptibility to the disease and the perceived severity of the consequences of acquiring them. An increase in the perception of vulnerability to a health threat produces motivation and a strengthening of protective behaviors towards that threat.<sup>34</sup>

The contribution of the model is to consider beliefs as main elements for the interpretation of individuals' behaviors regarding health and illness.<sup>32</sup> Some of its limitations are that it is a rationalist model, since the subject often does not behave in a manner consistent with his or her beliefs; it does not consider the influence of more objective social elements derived from environments in which the subject is immersed; and downplays

the individual and social emotional element produced by a certain illness; it does not include as study variables the various previous forms of coping that individuals carry out when faced with the disease and perceives the subject as a logical-economic processor.<sup>32-34</sup>

### Theory of Reasoned Action (TRA)

This model was developed by Fishbein and Ajzen in 1973-1975, it reiterates the role of cognitive factors and motivation as determinants of health behavior.<sup>29</sup> This theory established a model that had better predictive power for behavior based on the study of attitudes that other expected value models had not been able to establish.<sup>29-31</sup>

The most relevant thing that the authors Fishbein and Ajzen propose is to protect the idea that beliefs determine attitudes and norms, therefore, they will indirectly determine our intentions and behaviors.<sup>31</sup>

When applying the model to the study of behaviors related to health and illness, the authors discuss that people capture from the environment the information that they consider sufficient and important about the health risks, benefits and consequences of carrying out or not certain behaviors.<sup>30,31</sup> An antecedent of behavior is behavioral intention, on which both the execution of the motivated behavior and the intensity with which it is carried out depend. The intention is determined by two variables: a personal one, which is deferred to the personal attitude towards the behavior, that is, a favorable or unfavorable evaluation by the subject of that behavior and a social variable, which refers to the expectations that, regarding this behavior, the subject perceives in his social environment as, for example, the social pressure that incites him to perform or not perform some behavior, called normative social influence or subjective norm.<sup>33</sup>

Subsequently, Ajzen in the years 1985-1991 added a new variable to the model, the degree of perceived control over behavior, with the intention that the model could predict behaviors over which individuals have incomplete volitional control, that is, no it depends solely on the will of the subject to carry them out. Perceived control refers to the perception of two types of obstacles: those that refer to the subject's lack of skills or competencies to carry out the behavior and situational obstacles, such as the opportunities and resources available to execute the behavior. Motivated behavior will be carried out effectively if there is the intention and the possibility of carrying it out.<sup>33</sup>

### Leventhal Self-Regulatory Systems Model (LSRSM)

This model was developed in 1980-1987 by Diefenbach<sup>35</sup>, Leventhal, Meyer and Nerez<sup>36</sup>, to overcome the difficulties revealed in research that had the Health Belief Model as a reference. and the Theory of Reasoned Action.<sup>29-31</sup>

Through the Leventhal model<sup>36</sup>, Meyer and Nerez try to explain how people are immersed in a self-regulatory process that allows them to adapt in the short and long term to disease

situations.<sup>36</sup> Behaviors in the face of illness would be determined by common sense representations or beliefs about the illness: symptoms, cause, consequences, existing body state, absolute body state, emotional experience, and plans for change. and how the patient evaluates all these aspects.<sup>31</sup>

The model proposes two parallel channels in this process. The first results in the development of an objective representation of the health threat, as well as the development of coping responses to control it.<sup>35-37</sup> The second involves the processing of emotional reactions to that threat and the implementation of strategies to control that emotion. Therefore, these are two independent systems that can occasionally interfere with each other.<sup>35-37</sup>

The self-regulatory system of perception of internal and environmental stimuli that initiate self-regulatory progress is described below.<sup>33</sup>

- The cognitive, schematic and representational processing of stimuli through common sense representations of the disease and the dangerousness with which the disease is perceived, its possible consequences of suffering from it and the perceived vulnerability.
- Action plans and the selection of behaviors to face the disease.
- Evaluation of the results of the behaviors carried out, taking into account the progress according to the achievement of the ideal state; that is, if the objectives that triggered this self-regulation process have been achieved.

The three aforementioned levels correspond to the emotional representational processing of the stimuli, where emotions are conceived as subjective feelings that integrate the affective response to the stimuli that serve as guiding elements of behavior. The emotional state may be activated in any of the three stages and interact with the cognitive processing of certain stimuli.<sup>33</sup>

For Leventhal, the two self-regulatory systems are relatively independent<sup>28</sup>, but, at the same time, they are interactive, because both are involved in conscious perception and in the emotions associated with a certain disease, as well as with people and situations. Regarding the disease, harmful stimulation is processed simultaneously in an informational or objective system and in the emotional system (threat, fear). Both systems act similarly based on stimuli, interacting through the various stages of interpretation, coping and evaluation.<sup>36</sup>

The model has contributed new elements to the study of beliefs about health and illness, fundamentally, including emotions as important factors in the health-illness problem. Likewise, some limitations can be pointed out, among them, the importance given to individual logical analysis based on physiological and environmental sensations and the fact that individuals evaluate the disease fundamentally from physiological symptoms.<sup>33,35-37</sup>

#### **Information-Motivation-Behavior Skills Model (IMBSM)**

This model proposed by Fisher et al. in 2002<sup>12,38</sup> points out that information is an important element for any behavioral change;

however, it is insufficient to achieve it, so it will require the intervention of other factors, such as motivation and behavioral skills; the latter would be decisive for the change that is required. Therefore, information and motivation increase the probability of adherence, so it must be ensured that the patient has these behavioral tools.<sup>33</sup> The beliefs that the person has about the ability and self-regulation to implement said behavior will be decisive. In this context, people will be motivated if they perceive that their actions can be effective, if there is the conviction that they have personal capabilities that allow them to regulate their actions.<sup>39-41</sup>

#### **THEORETICAL MODELS OF HEALTH EDUCATION**

The most commonly used models in health education are described:

##### **Model Transtheoretical of the Behavior (MTB)**

Prochaska and DiClemente proposed a seven-stage spiral model of the behavior change process described in 1984 and adapted in 1992.<sup>6-9</sup> This model allows us to understand how people manage to make significant changes in their behaviors, mainly in the context of health. This model is useful in helping practitioners design appropriate interventions for people at different stages of change.<sup>42</sup> The stages of this model are described in Table 2.

*Table 2. Description on the seven stages of the MTB.<sup>6-9</sup>*

<b>Precontemplation</b>	There is no intention of change in the near future, it is not that the solution is not seen, it is that the problem is not seen.
<b>Contemplation</b>	You are aware that there is a problem and you think about overcoming it, but you have not yet decided to take action.
<b>Preparation</b>	Intention and decision-making are combined, small changes begin to be introduced. If it does not change, the person regresses to the contemplation stage.
<b>Action</b>	A change occurs in the problem to be solved.
<b>Maintenance</b>	The results obtained in its action persist and are consolidated. People try hard to prevent relapses.
<b>Relapse</b>	The behavior that had changed or was in the process of changing is repeated.
<b>Termination</b>	The new habit is now solid and difficult to abandon, it is now part of your life, the therapeutic objective is adherence.

The model contributes to the recognition of the nature of behavioral change, it is considered a spiral model, as shown in Figure 3, because the person revolves around the process several times before reaching a stable change.<sup>6,7,43</sup>



Figure 3. Spiral model of the MTB change process.<sup>5,6,7</sup>

#### Model of Development Staff and Skills Social (MDSSS)

The model poses the need of appropriate development staff and of acquire skills social that train to the individual for resist to the pressure social in the development of behaviors no healthy and it which it does competent for take decisions responsible for his welfare.<sup>44</sup> The activities of this model he guide to work for get the following skills<sup>33</sup>:

- Communication effective
- Expression of feelings
- Self-esteem
- Selfconcept
- Assertiveness
- Decision making
- Solution of issues

The Education Sanitary (ES) is the pillar fundamental of health education because it modifies attitudes and produces behavioral changes. All individuals experience different phases in the process of change in health-related behaviors, these changes were defined through theoretical models of behavior change.<sup>45</sup>

#### Model of Perceived Need and Concerns (MPNC)

This model assumes that the beliefs or opinions that people have about prescribed medications. They are based on two aspects: the need they have to take the medication to maintain or improve health and the concern it causes that is related to the adverse effects of the medication.<sup>46</sup>

Beliefs and concerns can affect treatment adherence; therefore, it is important to inquire about the beliefs of the patient and the people around them. It must be taken into account that patients' beliefs do not remain constant over time, therefore, they can

change for various reasons, one of them being that they acquire more information. It is important to maintain good communication with the patient since sometimes they do not know how to express their concerns, expectations, and fears about their illness and treatment verbal and non-verbal communication are key points to be able to intervene in the needs and concerns of patients.<sup>33</sup>

#### Motivational Interviewing (MI)

Motivational Interviewing<sup>11</sup>, is defined as a style of direct patient-centered care, to stimulate intrinsic motivation and provoke changes in behavior by exploring and resolving ambivalence.<sup>47</sup> The patient is encouraged to evaluate his or her behavior and explore this behavior for his or her aspirations, values, and interests.<sup>13</sup> Additionally, you are encouraged to address any discrepancies that may arise. This entire process evokes psychological and behavioral changes in patients.<sup>47</sup>

The model was created specifically to achieve a positive and lasting change in the patient's lifestyle or behavior, informing a frank discussion about the risks in order to increase awareness and replace denial with insight and motivate in a guided exploration of factors that lead to empowerment with the capacity for change. The MI it is a skill used to support the discovery of the personal value of change and to build confidence in the ability to achieve change.<sup>13</sup> Table 3 describes the principles and skills of MI.

Table 3. Basic principles and skills of Motivational Interviewing.<sup>13</sup>

Express empathy:	Using open-ended questions that provide information
Understand the patient's perspective, accept and propose solutions	
Create discrepancy:	Reflective/active listening using verbal and non-verbal communication
Confront current behavior and desired objectives, raise doubts.	
Avoid discussions:	Affirm supporting the patient through positive comments and phrases of understanding
Do not assume a defensive attitude because it provokes resistance. The strategy must be changed.	
Promote self-efficacy:	Summarize by reinforcing and confirming what was said by the pharmacist or the patient
Increase your perception to confront obstacles and achieve success.	

Three steps are used in motivational interviewing<sup>47</sup>

- Assess the stage of readiness for change: this may require a discussion of risk to overcome denial.
- Increase conviction (motivation) to change through reflection to discover the personal benefits of change. As

conviction (motivation) grows, the focus can shift to building trust.

- Foster confidence in the ability to change by exploring individualized solutions to the individual's perceived barriers.

### BARRIERS THAT PREVENT ADHERENCE AND THEIR APPROACH WITH THEORETICAL MODELS

There are two types of barriers that prevent the patient from being adherent, these are related to the type of non-adherence. For intentional NA, practical barriers (resources and skills) correspond, and for unintentional NA, perceptual barriers (beliefs and motivation) correspond.<sup>48-50</sup>

#### Intentional NA: Perceptual barriers

Are related to erroneous beliefs, lack of motivation, excessive worry, social fear in the case of lack of adherence intentional. The patient decides not to follow his treatment correctly, he does not want to do so.<sup>2,22</sup> This type of barrier can be addressed with the Personal Development and Social Skills Model<sup>44,45</sup>, Perceived Need and Concerns<sup>33,46,51-53</sup>, Model of Health Beliefs<sup>54,55</sup>, and Motivational Interviewing.<sup>10,13</sup>

#### Unintentional NA: Barriers practices

Related with lack of skills and resources, forgetfulness, complexity of treatment, low capacity to handle complex treatments, in the case of lack of adherence No intentional. The patient cannot follow his treatment correctly or finds it difficult.<sup>22</sup> In this barrier, the patient's capacity must be increased, using a combination of behavioral strategies such as the Transtheoretical Model of Behavior<sup>6-9,43</sup>, the Information-Motivation-Strategy model<sup>56-58</sup> and Motivational Interviewing.<sup>10,13</sup>

### THEORETICAL MODELS USED TO ADDRESS THERAPEUTIC ADHERENCE

As mentioned above, several models of behavior change can be useful for the design of interventions in non-adherence, however, 5 main ones that health professionals can choose to address are highlighted. Figure 4 summarizes these models.

Each of the models offers a unique perspective on the factors influencing patient behavior and can provide guidance for the development of effective interventions. MS plays a fundamental role, as it can explore and reinforce a person's motivation to make positive changes in their health, for this, the basic principles and skills that underpin this model must be used.<sup>13,47,59-61</sup>

### CONCLUSIONS

In Mexico, there are currently no studies that use any of the theoretical models in the design of strategies and interventions to improve the lack of AT, for this reason, it is important to publicize the approaches of each model, being an area of opportunity to carry out more studies on the effectiveness of their use as scientific support in the design of interventions for

the lack of AT. Understanding the theoretical models of behavior change in the context of TA is essential to design individual or group interventions that are effective in improving the patient's health and quality of life. The wide diversity of approaches of these models provides tools to address the complexities of health behavior modification, on the other hand, the integration of these theories into clinical practice can significantly enhance the efforts of healthcare professionals to improve therapeutic adherence, promoting successful outcomes, in this sense, good adherence to treatment provides significant benefits to patients, such as prevention of complications, improvement in the effectiveness of treatment and an improvement in quality of life.<sup>61,62</sup>

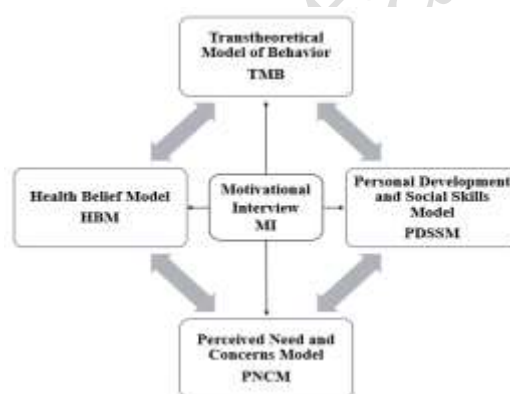


Figure 4. Main models for addressing therapeutic adherence.<sup>12,13,33,44,54</sup>

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