CE FEATURE

Auricular Transcutaneous Electrical Neuro-Stimulation, Addiction Education, Behavioral Training, Coaching Support and the Nicotine Addiction Treatment Process

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This qualitative, retrospective instrumental case study explored the effects of auricular transcutaneous electrical neuro-stimulation (ATENS) [auriculotherapy] in combination with addiction education, behavioral training and coaching support to gain greater understanding of this intervention with six motivated smokers in the addiction treatment process. Purposeful sampling was used in case selection. In-depth interviews were conducted to collect the data. Each of the participants had used auriculotherapy to become smoke free and had remained smoke free for at least a year at the time of the interviews. Two theoretical models of addiction are discussed to explain addiction etiology and susceptibility. Although the study was conducted with a small group and the findings are limited to this sample, they are consistent with other studies found in the literature.

The findings suggest that current interventions advocated for nicotine addicted smokers may not be sufficient to support smoker’s long term efforts. Auriculotherapy combined with addiction education, behavioral training and coaching support was viewed by the participants as a viable option to assist them in becoming smoke free as evidenced by their pursuit of this treatment. Addiction is a highly variable and complex disorder. The findings indicate that auriculotherapy applied during the detoxification stage of treatment relieved withdrawal symptoms and reduced anxiety and stress levels during all stages of the treatment process. Auriculotherapy promoted a physical and emotional stabilizing effect in all stages of the addiction treatment process. This study reinforces the need for multidimensional treatment approaches that not only address the acute detoxification stage of treatment but also recovery and relapse prevention. Smokers appreciated the individualized approach. Their ability to resist the urge to smoke was reinforced with the use of auriculotherapy.

Longitudinal follow up studies that include biochemical validation using a larger sample are warranted to compare the effects of high and low intensity auriculotherapy treatment to assess the therapeutic benefits combined with addiction education, behavioral training and coaching support to become and remain smoke free. Knowledge about auriculotherapy as a treatment intervention during all stages of the addiction treatment process is needed to assist health care providers to incorporate this modality into their practices.

Keywords Nicotine Addiction, Smoking Cessation, Auriculotherapy, Auricular Transcutaneous Electrical Neuro-stimulation, Electrical Stimulation, Case Study

INTRODUCTION

Dr. Gro Harlem Brundtland, Director-General Emeritus, World Health Organization [WHO] (2004, p. 1) has stated “It is rare—if not impossible—to find examples in history that match tobacco’s programmed trail of death and destruction . . . A cigarette is the only consumer product which when used as directed kills its consumer.” Since the first Surgeon General’s Report on Smoking and Health was published in 1964 targeting tobacco use as the national leading cause of death, 27 additional reports have concluded that tobacco use is the single most avoidable cause of disease, disability, and death in the United States. Despite implementation of tobacco control strategies through national government initiatives such as Healthy People 2010, and efforts made through healthcare professionals, smoking globally remains epidemic and this major individual and public health problem continues to flourish.

In the past, treatment for smokers was framed in the simple medical model of acute illnesses requiring single level, linear approaches designed to alleviate acute withdrawal symptoms. The underlying regulating mechanisms of addiction and drive to use are now known to be highly complex involving many circuits and systems in the brain (Volkow, Fowler, & Wang, 2003). A better understanding calls for more effective, appropriate and preventive interventions. Auricular transcutaneous electrical neuro-stimulation (ATENS), micro electrical stimulation to ear points, or auriculotherapy, as a healthcare modality has been used as a safe and effective intervention in physical medicine and physical therapy in the management of pain and addiction for the past 50 years (Kahn, 2000). A lack of scientific studies and therefore a lack of understanding of this therapeutic application have impeded its use.

Although auriculotherapy was first described in France over 50 years ago, it is generally considered by the American medical
community to be a member of a family of techniques falling under the umbrella term, acupuncture, a procedure traditionally associated with the use of needles. Acupuncture is recognized and accepted as an effective intervention for substance dependence (NIH, 1997). As an intervention for smokers, auriculotherapy is functional, efficient, low cost and environmentally friendly. In this study, auriculotherapy may be described as a healthcare modality involving electrical stimulation of ear points for the purpose of alleviating pathological, systemic conditions or blockages (Oleson, 2003). Blockage is defined by Beate Strittmatter, M.D., author of Identifying and Treating Blockages to Healing (2004) as “a harmful influence which interferes with the body’s system of self-regulation, especially with the control of stimuli that disturb the body’s order. A focus or blockage becomes an obstacle to healing” (Internet communication, Strittmatter, 2007). This study was designed to investigate smokers’ experience and treatment processes that involve the use of auriculotherapy applied through the use of electrical stimulation in all stages of the addiction treatment process: detoxification, rehabilitation (recovery) and relapse prevention combined with addiction education, behavioral training and coaching support.

**BACKGROUND**

Until recently, little was known about the etiology of addiction and therefore no clear view of addiction and treatment existed. Addiction, as a phenomenon, is highly complex and individual response to nicotine is variable among the population. Scientific studies funded through the National Institutes of Drug Abuse support genetic predisposition to addiction, brain reward cascade deficiencies in the prefrontal and limbic systems with regulatory abnormalities in decision making, inhibitory control, reward, motivation, basic drives, learning, and memory (Volkow, Fowler & Wang, 2003; Volkow, Fowler & Wang, 2003).

Beliefs about addiction rather than scientific theory have influenced both the development and interpretation of addiction treatment. Although scientific, neuro-imaging (fMRI) studies have dramatically altered our understanding of the neurophysiology and etiology of addiction (Volkow, Fowler & Wang, 2003), the implications of that science are yet to be reflected in the current addiction biomedical treatment framework of addictions, the Highjacked Brain Hypothesis (HBH). A core assumption of the HBH is that the drug is the cause of the addiction. This model is inconsistent with human experiences, occurrences and animal studies that show certain inbred strains of mice and rats become addicted when exposed to mood-altering drugs and other strains do not become addicted when exposed to the same drugs. The focus of the disease, biomedical model is an after the fact approach, an approach that has been criticized based on the argument that the nature of the physiology of the brain in some people, prior to the experience of the drug is critical to understanding addiction treatment and prevention. Recent important reports support genetic susceptibility to substance dependence and pre-existing genetic basis for the susceptibility to dependence and comorbid

**Biogenetic Theories of Addiction & Causation**

Blum (1991) was first to write about the reward cascade model and its application to multiple addictive, impulsive and compulsive behaviors. His work was expanded in 2000 with the publication of Reward Deficiency Syndrome: A Biogenetic Model for the Diagnosis and Treatment of Impulsive, Addictive, and Compulsive Behaviors. In this model, the same genetic conditions associated with nicotine, alcohol and other drug addictions are found in behavioral addictive disorders such as gambling. Addictive disorders are linked to a “hard-wired” system in the brain’s cells and signaling molecules. An inborn genetically related disruption (alleles) in the intercellular signaling supplants an individual’s feeling of well being (feeling OK) with anxiety, anger, or drive to relieve negative emotions. Addiction occurs when there is a dysfunction in the reward system regulating mechanisms located in the limbic brain, specifically the dopaminergic system D2 receptor. The neurotransmitter interaction in the meso-limbic brain is responsible for inducing reward when the pleasure molecule, dopamine (the molecule responsible for maintaining a sense of well-being and maintaining stress levels) is released from the neuron in the nucleus accumbens. The dopamine (DA) molecule binds with the dopamine receptor (D2). A reward cascade or domino effect follows involving the release of serotonin and endorphins (enkephalins) at the hypothalamus. The release of GABA fine tunes the amount of DA released at the nucleus accumbens or reward site. Under normal conditions, this cascade works to maintain endogenously, our normal instinctive, or unconscious drives. A dysfunction (or blockages as discussed above) in the brain reward cascade, could be the result of multiple genetic variants (polygenic) causing a
hypodopaminergic trait(s). This creates a vulnerability to (an) exogenous stimulant(s) DA fix to feel good or okay. This trait(s) leads to multiple attempts to feel good or okay through certain exogenous addictor drugs (drugs that mimic endogenous molecules) or behaviors that have the ability to stimulate DA release which then binds with endogenous DA receptors in the brain. Exogenous drugs in the environment such as nicotine, alcohol, cocaine, heroin, marijuana and glucose, all have the properties to mimic endogenous (feel okay) molecules through activation of the pleasure centers and neuronal release of DA at the cellular level in those individuals who are carriers of the DAD2 receptor A1 allele. According to Blum and his colleagues (2000), this lack of D2 receptor activity causes individuals to have a high risk (variable among individuals) for multiple addictive, impulsive, and compulsive behavioral propensities such as for nicotine, alcohol, cocaine, heroin, marijuana, glucose binging, pathological gambling, and others. Although scientists have known for years that genetics (or epigenetics as discussed above) play an important role in an individual’s response to drugs, of particular interest are genes (alleles) that control the brain molecule dopamine and the dopamine circuit which is associated with movement and pleasure, including pleasure from drugs. In this model, any breakdown in the reward cascade will lead to abnormalities in brain function. This leads to expressed changes in the electrical activity of the brain and these changes are the basis for a number of abnormal behaviors such as addiction to nicotine. The core phenotype arising from this breakdown represents Reward Deficiency Syndrome (RDS) behaviors. Other, more extensive models of addiction have been developed beyond Blum’s Reward Deficiency Syndrome. Umanoff’s paradigm for addiction and diversity in human nature will be discussed next.

Umanoff’s complete and comprehensive paradigm for addiction etiology, Hypoism, was proposed in 1996. Although Umanoff’s model has yet to be reviewed or debated extensively by the scientific community, key neuroscientists in the field of addiction acknowledge the merit of this theory. The mounting evidence supporting this theory warranted its inclusion as a supportive framework for this current research.

Umanoff’s (1996) model provides an explanation for decision making difficulties experienced by some individuals even before the primary addiction occurs. The premises are supported by animal addiction studies documented in the literature (Gardner, 1997) that relate addictions to genetic alleles present in the limbic system. In Umanoff’s model, specific addictions are not inherited, only the capability of being addicted. Umanoff’s concept supports the idea that different addictions may be represented in one family and confounds the statistics of the studies examining the inheritance of specific addictions. In Umanoff’s model, alleles that lower activity anywhere within the regulating systems of the brain are capable of producing a hypo functioning. This global concept is about human instincts (as they affect decision making), their origins and regulation. The premise is that all instincts are genetically determined, regulated and coordinated by multiple regulating mechanisms in an unconscious part of the brain located in the limbic system. Functional MRI studies confirm this (Volkow, Fowler & Wang, 2003).

Other important reports support genetic susceptibility to substance dependence and pre-existing genetic basis for the susceptibility to dependence and co morbid traits (Gelernter et al. 2006; Hiroi & Agatsuma, 2005). Hiroi and Agatsuma (2005) argued that despite what is often believed, the majority of individuals who experiment with substances with dependence potential do not develop dependence.

**Perspectives in Electrical Auriculotherapy**

Auricular stimulation has its roots in European and Western medicine. The application of stimulation of the auricle has been a treatment approach for pain management and addiction in the United States since the early 1970s and has been used in physiological and physical therapy (Kahn, 2000) in the US and Europe for the past three decades. The use of the ear for diagnosis and treatment was first described by Nogier (1998) a neurologist and teacher in a medical school in Lyon, France in the early 1950s based on information handed down from Egypt, the Orient, and Hippocrates. Nogier (1998) published his comprehensive system of diagnosis and treatment in 1957 after years of careful observation relating ear points of reduced electrical resistance or conversely high electrical conductivity. Diagnosis and treatment through ear point stimulation subsequently became widespread among acupuncturists. Alimi, Geissmann, & Gardeur (2000) provided evidence for the interconnectedness of ear points with body organs through the central nervous system.

Since 1982, WHO sponsored working groups met to establish international consensus in terminology used for auricular points (Oleson, 2003). There are two main schools of auricular points, one is occidental (European), and the other, Oriental (Nogier, 2003). Although there is no complete agreement on auricular points among the two schools, in 1987, 43 points were adopted (Oleson, 2003). Efforts on consensus in theory and practice continue through international conferences in the United States and Europe such as the International Consensus Conference on Auriculotherapy, Acupuncture and Auricular Medicine (ICCAAM’99) sponsored by the Auriculotherapy Certification Institute (ACI) in the United States in 1999.

In the past, medical science attempted to isolate phenomenon, reduce it to its most basic unit and independently investigate it as if each unit or system of the body functioned independently and apart from the whole system. Groundbreaking research conducted by neuroscientist Candace Pert during the 1970s led to the discovery of the opiate receptor and a body-wide communication system linking the body and mind as one. This revolutionary research established the bio-molecular basis for our emotions and demonstrated the organism’s ability to share information across cellular barriers. A key characteristic of Pert’s research had to do with the natural flow of information. Pert (1997) showed that triangular link—the link between three systems that use
peptides to communicate with one another. Problems or disturbances can impact the whole system as the body continuously strives for functional balance, equilibrium or homeostasis in any part of the system. Her research demonstrated that, regardless of the point of origin, information spreads up and down the system with a domino effect on the entire system. The brain, the endocrine system, and the immune system make up the triangular network. The brain, or neuro component, although the most complicated and sophisticated component of the network is part of a nonhierarchical system to gather, process, and share information.

The work of Pert and others is believed to form the basis for understanding the facilitative mechanisms of auriculotherapy in withdrawal from addictive substances. Auricular acupuncture has been found to raise blood serum and cerebrospinal fluid levels of endogenous neurotransmitters, endorphins and enkephalins found at the same sites in the brain where opiate receptors have been found (Wen & Cheung, 1973).

In 1954, James Olds, an American psychologist (Gardner, 2005) found that laboratory animals voluntarily and avidly self-administered electrical stimulation when delivered through electrodes to the limbic reward centers of the brain. Animals in these experiments self-stimulated to the exclusion of food and water and endured tremendous pain and hardship for an opportunity to press the lever emitting electrical stimulation. The stimulation was a powerful reinforcer of behavior. This supported the idea of specific brain circuits dedicated to the neural mediation of reward and pleasure. In humans, stimulation of certain areas of the brain results in a type of light-headedness that banished negative thoughts (Gardner, 2005).

Gardner (2005) discusses the important work conducted by Lepore and Frankling in 1992. In this work, self-administered electrical brain reward stimulation extinction is shown to be identical to extinction of drug reinforcement behavior including initial frustration exhibited by non reward increases in response followed by slow decrease and ultimate cessation. In this model, electrical brain reward stimulation can be made to emulate drug reward stimulation. This work is important because from an understanding of the underlying neurobiology of drug reward and electrical stimulation of brain-reward circuits, appropriate hypothesis-driven treatment modalities can be derived.

Auricular Therapeutic Intervention with Nicotine Addiction, Smoking Cessation

Although no studies were found using auriculotherapy (without needles) combined with other interventions for smoking cessation, studies using a related technique known to provide similar effects, auricular acupuncture (using needles) in combination with other interventions were found. Studies by Wen and Cheung (1973) were first to show that auricular acupuncture physiologically alleviated the severity of opiate withdrawal symptoms. In a randomly controlled trial conducted by physical therapists on experimental pain threshold, Lein, Clelland, Knowles and Jackson (1989) found that low frequency; high intensity TENS applied to auricular points resulted in statistically significant increases in experimental pain threshold, whereas there were no significant changes in the control group. Bier, Wilson, Studt, and Shakelton (2002) in a prospective randomized, sham-controlled trial made an important contribution to the field showing auricular acupuncture combined with education significantly reduced smoking among smokers with a greater pack year history and at the greatest risk of developing smoking-related diseases. A 40% abstinence rate was reported through an 18 month follow up. However, because of the drop out rate, statistical significance was not reached. Even with a high drop out rate, the combination of auricular acupuncture and education (40%) demonstrated almost twice the cessation rate of education and sham acupuncture (22%). A 40% cessation rate through 18 month follow up is significant given that subjects were recruited through radio and local print media with presumably no attention given to assessment for actual motivation and readiness for change.

Auricular acupuncture using needles, (with or without added electrical stimulation) is generally viewed in the United States as a complementary or alternate approach to treatment and is often associated with an Eastern perspective of healthcare. The framework for this current study is based on Western/European principles of anatomy and physiology and fundamentals of auriculotherapy developed by Paul Nogier in France during the 1950s. The use of ear acupuncture (auriculotherapy) is widely used by physicians in Europe. It is being taught in medical schools and researched at universities. Over 20,000 physicians in Germany, Austria, and Switzerland alone, apply auriculotherapy in practice (Strittmatter, 2004).

The 1997 National Institutes of Health (NIH) Consensus Statement on Acupuncture states that acupuncture is a therapeutic modality now widely used in the United States. NIH has funded a variety of research projects on acupuncture. A report of this conference (NIH, 1997) states that acupuncture is being widely practiced by thousands of physicians, dentists, acupuncturists, and other practitioners for the relief or prevention of pain and for a variety of other health conditions to include addiction (NIH, 1997).

Acupuncture for the treatment of withdrawal and detoxification has been studied in animals and humans. Wen, Ho, Ling, Ma, and Choa (1979) studied the effects of electro-acupuncture in the treatment of morphine withdrawal in mice. These investigators found significant increases in brain beta-endorphine withdrawal in mice. This finding led to the theory that increases in neurotransmitters, endorphins at opiate receptor sites in the central nervous system (CNS), may be responsible for the therapeutic and analgesic effects of auricular electro-acupuncture. Evidence to support this theory was found when Pert, Dionne and Ng (1981) showed that electrical stimulation through needles inserted into the concha of the ear of rats produced an analgesic effect that was reversed by naloxone, a narcotic antagonist used as an antidote in narcotic overdose.
Dale (1993) suggests a common energy disturbance based on the observation that the same acupoints are found to be successful in treating addictions to different substances. This hypothesis is consistent with evaluative studies completed by Bierut and his colleagues (1998) on familial transmission of alcohol, marijuana, cocaine, and nicotine completed as part of the Collaborative Study on the Genetics of Alcoholism (COGA). In this study, evidence of both common and specific addictive factors transmitted in families was found. The diagnosis of substance dependence was the strongest correlate for the development of other substance dependence. All drugs of addiction are known to share common pathways in the brain (Gardner, 1997, 2005). Dale (1993) proposed that auricular acupuncture contributes to addiction treatment by releasing the craving for addictive substances, facilitating detoxification, relieving anxiety and tension, releasing blockages, supporting the immune system, and improving concentrations. In Dale’s view, combining auriculotherapy with synergistic modalities to include breathing therapy, nutritional and nutritional supplemental therapy, exercise and relaxation or meditation therapy can bring the best results.

Kroening and Oleson (1985, p. 1357) studied the narcotic detoxification effects of auricular electrical stimulation. Twelve of the subjects, 85.7%, were completely withdrawn from narcotic medications within 2–7 days, with no to minimal side effects. The results were explained by the relationship of electrical stimulation of ear points and the release of endorphins. The study report included this description of the neurochemical theory of acupuncture detoxification:

In drug addiction, exogenous opiates bond with receptor sites normally occupied by endogenous endorphins. The occupation of these opiate receptor sites by narcotic drugs leads to the inhibition of natural endorphins, while the body’s own internal mechanisms oppose the external drug therapy, resulting in tolerance and addiction. Abrupt withdrawal from the exogenous drug leaves the body’s defense mechanism still geared to offset the narcotic action. Acupuncture may facilitate withdrawal by activating the release of previously suppressed natural endorphins, which can then occupy the opiate receptor sites formerly dominated by the narcotic drug.

Neurohumoral research has been instrumental in establishing the scientific validity of auriculotherapy (Oleson, 2003). Discovered in the 1970s, endorphins are the body’s endogenous morphine neurotransmitters, natural pain relieving molecules known to play a key role in analgesia. Endorphins have been naturally found in the brain and parts of the central nervous system. Behavioral analgesia produced by auricular acupuncture can be blocked by the opiate antagonist naloxone, thereby substantiating the role of the endophenetic systems in understanding the underlying mechanisms of auriculotherapy (Oleson, 2002). Simmons and Oleson (1993) investigated changes in dental pain threshold after auricular electrical stimulation. Stimulation was randomly applied to 40 subjects. In this double blind study subjects were to be treated at either auricular points specific for dental pain or placebo points irrelevant to dental conditions. True auricular stimulation produced a significant elevation of dental pain threshold, whereas the placebo stimulation did not.

Rehabilitation Recovery Process Model for Nicotine Addiction Treatment

Moner (1996) reviewed clinical trials using acupuncture in treatment of opiate, alcohol, cocaine, and nicotine dependence and found the basic ear point protocols to be most effective in treating withdrawal symptoms. In this model, drug treatment is divided into three stages: detoxification, rehabilitation, and relapse prevention. Auricular acupuncture can be used in all stages. The goal of detoxification is to counter the effects of drug withdrawal and return the individual to a neutral physiological and emotional state. In this model, detoxification generally takes 3–7 days. Rehabilitation begins after detoxification and last from 15–90 days or more. Auricular acupuncture is combined with educating the patient about the drug through counseling, and developing effective strategies for sustained change. Relapse prevention begins near the end of rehabilitation. In Moner’s (1996) view, a rehabilitation model is useful because it points to the chronic nature of the disorder of addiction and need to address different stages of the treatment process. Moner highlights the lack of clarity in acupuncture studies as to what aspect of drug treatment the researcher wishes to study. Outcome studies check urine for drug use, yet few studies measure symptoms attributable to withdrawal, relaxation, or dysphoria. Moner (1996) emphasizes the usefulness of comparing auricular acupuncture treatment to conventional treatment. In this current investigation, subjects favorably compared individualized auriculotherapy interventions with other more commonly advocated treatment approaches. During the detoxification stage of treatment, auriculotherapy countered negative physiological emotional states. Stress and tension that often precede a return to smoking was relieved during relapse prevention stage. Auriculotherapy appears to activate suppressed reward pathways and it may also have long-term modulating effects in the spinal and limbic system pathways (Newland, 2004).

METHODS

Design

A qualitative retrospective instrumental case study research method was used to focus on six cases as bounded systems (Creswell, 1998) or integrated systems (Stake, 1995). The focus of the study was an exploration of the treatment process experienced by individuals who have successfully used auriculotherapy as a primary intervention for detoxification, rehabilitation, and relapse prevention. Because an instrumental case study design focuses on teasing out the pervasive problems associated with recovery through descriptions retrospectively from the participant, it was selected as a suitable method for this investigation.
Setting

The study was conducted in a hospital-affiliated private outpatient clinic for smoking cessation. Multiple interventions are used with smokers based on the premise that addiction is a complex and multidimensional chronic disorder requiring a variety of approaches. Auriculotherapy is used as a core modality available to patients during all stages of the addiction treatment process. The initial session is approximately 60–90 minutes in length and includes four components: 1) completion of a health/smoking history questionnaire, 2) personal interview for clarifications and therapeutic planning to address physiological and conditioned responses associated with smoking, 3) educational segment on current understanding of addiction etiology and genetic susceptibility, 4) explanation of the interplay of auriculotherapy and addiction, 5) therapeutic intervention, auriculotherapy, including pre-post assessment of physiological and psychological/emotional symptoms associated with nicotine drug withdrawal. Although interventions and placement of the stimulation on the ear points are individualized and based on assessment by the auriculotherapist in conjunction with expressed subjective needs of the patient, ear protocol during the initial session generally includes point “0,” Shen Men, lung points 1 & 2, oscillation, endocrine and thalamus. Since the effects of therapy are immediate, smokers are expected to be mentally prepared for the initial visit to be their quit day with follow up within 24–36 hours as needed for support. Coaching includes deep breathing exercises, confidence building, what to eat to aid detoxification, encouragement to develop an exercise regimen, relaxation techniques, and strategies to enhance communication with family, social and work situations.

Sample Selection

Participants in this study included subjects who had voluntarily enrolled in an outpatient hospital-affiliated smoking cessation clinic where auriculotherapy is routinely provided as a core modality for nicotine addiction. Participants for the study were selected from the group of patients who were referred for smoking cessation through a variety of sources to include physicians, agencies, self-referred or referred by family, friends or co-workers. The primary criteria for inclusion in the study was that each participant had, a) been unable to stop smoking with other methods or were unwilling or unable to tolerate chemical approaches in treatment and b) had become smoke free with the use of auriculotherapy for a sustained period of at least one year or more. The sample selection was done in the smoking cessation facility in consultation with a volunteer co-investigator, a nurse with a doctorate degree and strong research and interviewing skills. Names of 6 participants who met the criteria for inclusion in the study were simply pulled by the co-investigator. Each member of the population had an equal chance of being selected. The co-investigator interviewed 6 subjects for the study. A simple random sampling was chosen because a precise population was preferred. Members of the population (N) were numbered and the number (n) of them were selected using random numbers without replacing them (Bowling, 1998).

Data Collection

The co-investigator conducted the interview, lasting 60 to 90 minutes with each participant. The participants were contacted by telephone to determine their interest in participating in the study. The study was described, including an overview of the topic, the purpose of the study, their role as co-research, and how the findings from the interview process would be used. Six participants, all long-term smokers who had voluntarily used auriculotherapy as an intervention to assist them in their smoking cessation efforts, were invited to participate in the study by phone in the spring of 2005. A follow-up letter providing further information about the study was sent to those recruited. The interviews were audiotaped. Participants were provided with a copy of the interview questions by mail one week prior to the interview and encouraged to reflect on their experience with auriculotherapy. The use of semi-structured interview questions ensured consistency in the data collection process and guided the interview. The intent of each of the questions was to initiate responses from the participants that elicited specific details about the treatment process. The interview questions were non-directive, open ended and paraphrased. The questions served as a prompt to assure coverage of certain topics. Exploratory questions included questions about the experience of nicotine addiction with treatments other than auriculotherapy, and biological family history of addictions. I wanted to know how the experience of auriculotherapy differed from other cessation approaches, if they were beneficial and if so, how? Were the interventions more beneficial at some times and less beneficial at other times? Did they find the initial orientation/educational segment helpful? Was this knowledge useful in developing a better understanding of addiction? What was different for them before and after interventions? Was the therapist helpful and if so, how?

Data Analysis

The audiotaped interviews were transcribed by a professional transcriptionist as soon as possible following each interview. A holistic analysis was conducted to ascertain an overall sense of the data (Creswell, 1998). This was followed by a within-case analysis of the narrative for each participant to elicit a detailed description of the topics and themes associated with the addiction intervention process. Coding was based on a process recommended by Creswell (1994). First, the answers to questions 1, 2, and 3 were scanned briefly to get a sense of the whole of what the participants had to say about auriculotherapy and the addiction treatment process. Next, the answers to these three questions were read again slowly, paying attention to the topics introduced by the participants. A list of topics was constructed. Pattern matching was applied and categorized (deleted category saturation). This process continued with the remaining questions...
to explore participants’ knowledge and beliefs about addiction and the interplay of auriculotherapy with the addiction treatment process. The final product was then communicated to the co-investigator for discussion and critique; and these insights were integrated into the final analysis.

Quality Criteria

Core philosophical assertions of qualitative research emphasize that the meaning of socially constructed reality can only be understood within the context of the relationship with the wider social system. The individualized reality is constructed through the perception and assigned meaning of the experience of that individual as a response to interaction with others. The research data of this study is filtered through several layers. One potential layer of bias is the recalled experience of the study participants. Another layer of bias is the filter of the co-researcher who gathered the data through the interview process with the participants. Yet another layer of bias is represented through the primary researcher’s perspective. These layers could influence the trustworthiness and value of the study. Efforts were extended to address potential biases of the research design and establish the trustworthiness of the qualitative data.

This research adopted the criteria outlined by Lincoln and Guba in 1985 (Polit & Hungler, 1999) for assessing quality in qualitative research. The criteria for establishing the trustworthiness of qualitative data includes credibility, dependability, confirmability, and transferability. Research gains credibility through a variety of methods. Credibility involves prolonged engagement and sufficient exposure to the phenomenon under study in order to have an in-depth understanding of the group under study. This author’s long-term involvement in helping smokers become smoke free using auriculotherapy for cessation reduced distortions of the phenomenon during analysis. To gain credibility and trustworthiness for the research study, the research design incorporated data collection through interviews conducted by a nurse researcher experienced in interviewing and with no relationship to the treatment process or the research subjects. Credibility was supported through the use of interview transcripts, participant assessment documents and progress notes associated with the therapeutic process, and personal notes of the researcher.

Dependability determines stability with the data. This research hoped to add dependability by scrutinizing the data with relevant supporting documents from the subject’s treatment records. Dependability was further ensured through the use of a volunteer co-investigator to collect the data. Confirmability refers to the objectivity or neutrality of the data to establish agreement between two or more independent people. An external content reviewer reviewed the material and provided agreement about the data’s relevance or meaning. A thick description of the data supported confirmability of the data. To increase credibility, member checking was accomplished by providing the participants with the opportunity to provide feedback on the original transcript interview narrative.

Transferability refers to the degree that the research findings can be generalized from the sample population to the entire population. The transferability of findings was supported through the use of narratives provided in the thick description. A thorough description of the participant’s voice and context of the experience reveals a full experience as a process for the reader, through the writer’s observation of those who have been studied (Denzin & Lincoln, 1998). Qualitative case study research in this study was an exploration into a particular phenomenon rather than focusing on the number of the phenomenon. The sample size of six provided ample variability for comparing and contrasting.

To enhance the trustworthiness of the research data, the participants were asked to provide feedback regarding the data in the form of member checks. This was carried out informally in an ongoing way, by the co-investigator as data was being collected, and informally by the primary researcher through opportunities for feedback that have occurred through therapeutic interaction. Each of the participants was sent a copy of the transcript by the primary researcher and asked to comment on its accuracy. They were asked to return the transcript with any comments to the researcher in a postage paid envelope within an allotted time period. One of the participants provided clarifying comments, and the feedback was positive.

FINDINGS

The study included six Caucasian participants, three women and three men, whose ages ranged from 35 to 68 years. All of the participants were considered motivated because they each made the initial contact for treatment and self identified themselves as being in the action stage of readiness for change based on the Transtheoretical Model for stages of change developed by DiClementi and Prochaska (1998). Each participant reported themselves to be smoke free at least one year or more since treatment. Consistent with family, twin and adoption studies and theoretical tenets of the study, each participant reported a biological family history of addiction behavior.

The within-case analysis for each of the six participants analyzed for themes and patterns of the cases in various stages of the treatment process using a process model advocated by Moner (1996). The goal of the within-case description and analysis was to identify the underlying themes and patterns associated with each stage of the treatment process: detoxification, rehabilitation, and relapse prevention. A schematic matrix was used to organize the themes or sub-variables associated with the stages in treatment. Themes overlapped among all stages of the process. The schematic matrix is included below.

The abrupt cessation of the use of a psychoactive mood altering drug such as nicotine is known to cause psychological and physical withdrawal syndrome in some individuals who are addicted. Symptoms vary with individuals and may include unrelenting desire for nicotine, anxiety, stress, depression, headaches, chest tightness, anger, hunger and irritability to name a few. This distress can become pathological and interfere with
Detoxification 3-7 days | Rehabilitation 8-90 days | Relapse Prevention 90 days forward
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Auriculotherapy Experience | Addiction Education | Support Systems Professional Coaching
Physical/Emotional | Conditioned Usage | Family/ Significant other
Intervention | | Social

Case 1
Case 2
Case 3
Case 4
Case 5
Case 6


FIG. 1. Stages of (Nicotine) Treatment

the individual’s perception of reality and the ability to function in society. The initial goal of auriculotherapy intervention during the detoxification stage of the recovery process is relief or elimination of withdrawal symptoms to create stabilization or physiologic, metabolic and emotional balance, equilibrium or homeostasis. The average number of auriculotherapy interventions ranged from 1–3 during the first 48 hours. Three of the 6 participants, 2 male and 1 female, received auriculotherapy interventions during the detoxification stage only for physical and emotional stabilization of withdrawal symptoms. Each said they no longer had a desire to smoke and thus felt no need to return for treatment.

**Detoxification**

Two themes identified in the detoxification stage of treatment included recognizing the difference between the physical need to smoke compared to the want to smoke and intensity, or number of treatments required. Auriculotherapy seemed to immediately eliminate or greatly reduce the sensation of physical need to smoke. Although the physical anxiety, sensation of needing to smoke had been extinguished, the want to smoke associated with a conditioned response to smoke was not immediately extinguished. For most participants, the thought to smoke, previously associated with smoke routines faded away soon after the thought occurred, particularly when they kept busy. Three of the participants, 2 males and 1 female, became stabilized physically and emotionally almost immediately after the first intervention and participated in the detoxification stage of treatment only. One of the males, a retired truck driver was stabilized with only one intervention. The second male was stabilized with 2 interventions. He did receive a third intervention within the first week although he stated that it really was not needed. Both men experienced major health problems within weeks prior to entering treatment and had strong support from their spouses to maintain a smoke free status. Both of the wives attended the treatment sessions with the participants. The remaining female who participated in the detoxification stage of treatment only received two interventions within a week. Although little support came from her spouse, himself a smoker, the social support she needed was primarily provided by her best friend who had used auriculotherapy successfully to become smoke free. Immediately upon becoming smoke free, she and her best friend became training partners for a half marathon. Anticipatory anxiety to manage the first social situation without a cigarette was alleviated through the development of a plan with her smoking cessation auriculotherapist coach that included auriculotherapy to boost confidence just prior to the anticipated situation.

The remaining 3 participants, 1 male and 2 females required varying degrees of intensity of interventions during the detoxification stage of treatment and returned for supportive therapy intermittently during the detoxification and relapse prevention stages over a period of 3 to 4 years following initiation of treatment. One participant described the experience of auriculotherapy to be similar to the initial first drags from a cigarette although the experience felt more natural than a nicotine-induced experience. Some participants, but not all, described feeling tired and sleepy during and after auriculotherapy. Others described the sensation of being able to see clearer while others expressed difficulty concentrating during the first few days of detoxification. Quality of sleep improved for most. Although the primary focus during the detoxification stage of treatment emphasized withdrawal symptom relief and purging nicotine from the system, themes more associated with the rehabilitation recovery stage emerged as well.
Rehabilitation (Recovery)

Two major reasons for the reactivation of smoking during the rehabilitation stage for 3 of the participants were identified: 1) physical exposure to cigarette smoke or other priming drugs and 2) responses to stressful situations. Major themes associated with the use of auriculotherapy in the rehabilitation recovery stage involved knowledge about addiction gained through the educational component of the program and conditioned usage. One participant, a male, expressed appreciation about learning more about how the brain works with addiction. Both of the female participants seemed to gain strength from the individualized coaching and creating individualized plans to better manage conditioned cues to smoke. The sensation of relaxation and learning how to breathe better was a strong theme throughout all stages of the treatment process. Some participants expressed surprise at perceived reduction of stress and anxiety during treatment since they were not aware of heightened stress levels prior to treatment.

Relapse Prevention

A consideration was whether auriculotherapy was useful in all stages of the treatment process. Participants returned, on occasion, for preventive maintenance when a stressful event or situation such as surgery was anticipated. There was an ongoing need to encourage the engagement of stress reduction activities such as exercise and deep breathing. One of the 2 female participants who required intervention during the relapse prevention stage of treatment engaged in exercise intermittently for weight management. The other female struggled with weight issues and did not engage in physical exercise due to a cardiac related condition. The analysis revealed that all of the participants found auriculotherapy intervention useful regardless of the stage of treatment. Specific behavioral changes as reported by the participants indicated the need for countering the physiological effects of nicotine withdrawal to return the individual to a relatively neutral and balanced physiological and emotional state for those individuals who slipped.

Three of the 6 participants used auriculotherapy during the detoxification stage only, and were smoke free at the time of the study interviews. One of these participants, age 67, who had been smoke free for 9 years prior to the study, had strong spousal support. He did not engage in exercise and did not gain weight. Two other participants used auriculotherapy for detoxification stage only, one female, age 32, began training for a half marathon with a friend who had also used auriculotherapy to stop smoking. The friend provided a strong support system even though the spouse did not. The third male, age 54, who used auriculotherapy in the detoxification stage only, had strong support from the spouse. He experienced a 20 pound weight gain during the year since cessation. He did not participate in formal exercise although he did play golf.

One male participant related the high pressures of a sales position as not conducive to a healthy lifestyle. Although most participants reported changes in lifestyle to support a smoke free life one male participant reported no changes in lifestyle related to caffeine, alcohol and food intake except to report that “food tastes better.” Four of the participants did not gain weight and two of the participants reported weight gain. One participant gained 20 pounds and another participant gained 10 pounds.

Underlying Assumptions

The underlying assumptions of the analysis were as follows: 1) Individuals function as a bodywide system (Pert, 1997). 2) There is a bidirectional nature of the relationship between the nervous, immune and endocrine systems. This is of critical importance in the development and perpetuation of various conditions (Pert, 1997). 3) Disorders, diseases, or illnesses are considered imbalances in the natural flow of information carried by neuropeptides and their receptors (Pert, 1997). 4) In health, the body is in a natural balanced and functioning homeostatic state. In illness, the imbalances are identified by the presenting patterns of symptoms and signs of the disorders, diseases or illnesses (Pert, 1997). 5) Electrical stimulation of various ear points is known to influence the body’s production of opiate peptides in drug addiction (Wen, Ho, Ling, Ma, & Choa, 1979). Electrical stimulation can heighten a sense of well being, promote relaxation, reduce anxiety, perception of stress, and improve sleep (Oleson, 2003). 6) Ear points have been shown through fMRI studies to have a direct correlation with anatomical structures known to Western science (Alimi, Geissmann & Gardeur, 2000). 7) Points of low electrical impedance on the skin can be located with a sensitive ohmmeter (Moner, 1996; Oleson, 2003). 8) Becoming and remaining smoke free is a process (Moner, 1996). 9) There are different stages in the recovery process (Moner, 1996). 10) Applying interventions using a structured rehabilitative approach can potentially improve the ability of smokers to remain smoke free. 11) An individualized approach of guided and progressive interventions including auriculotherapy combined with addiction education, behavior training and coaching support can increase the smoker’s ability to become and remain smoke free (Bonnette, 2005). 12) The combined efforts of the smoker, support from family, friends, physicians, and coaching from the auriculonursing nicotine addiction therapist specializing in smoking cessation can be essential to the rehabilitation recovery process (Bonnette, 2005).

DISCUSSION

The results of this study increase understanding of smoker’s experiences using auriculotherapy in all stages of the addiction treatment process. Findings indicate that auriculotherapy can be an effective tool in all stages of the recovery process: detoxification, rehabilitation recovery and relapse prevention. Participant’s experiences illustrate the need for an individualized and multidimensional approach for some with an option for more intensity if needed.

Each of the participants initiated treatment to address quality of life issues; health, family, social, financial, and emotional.
AURICULOTHERAPY AS NICOTINE ADDICTION TREATMENT 139

Each brought with them an awareness of the negative effects of smoking on themselves and their families. The physiological and emotional balancing and stabilizing effects of auriculotherapy, beginning with the initial therapy seemed to have a cumulative beneficial effect.

Six smokers, all of whom had been smoke free for at least a year after using auriculotherapy, were interviewed to explore the addiction treatment processes each underwent as they became and remained smoke free. Relying on recall of the participants may be considered a weakness of the study; however looking back on one’s addiction process may enable the individual and others to better understand the process of nicotine addiction from a broader perspective. Umanoff (1996) describes the addiction process as “an active process of taking steps on a continuing basis in one’s life, not just not doing your addiction. Recovery is from the underlying disorder, not from the manifested behavior” (Umanoff, p. 996). The underlying disorder involves an entire self-concept and lifestyle based on a “hypo” functioning of low activity of multiple neurotransmitters effecting thinking, feeling, and acting. If the underlying problem of nicotine addiction began with genetic alterations (mutations) leading to deficient or low activity in the critically important internal feedback signaling mechanism of the limbic system to the cerebral cortex (DMA), and this deficiency leads to perceptual difficulties and disrupts the ability to assess whether or not thinking is healthy or not, then a therapeutic modality that can help increase activity in these signaling effects in the limbic system pathways (Newland, 2004) could place those individuals at an advantageous position of positive influence. The use of auriculotherapy on a wider scale among advanced practice nurses, integrated with selected supportive approaches such as behavioral conditioning and coaching, could reduce the burden that cigarette smoking/nicotine addiction places on both individuals and society.

The underlying theme of the study was to understand the role of auriculotherapy in the treatment process for smokers. The research explored effects of auriculotherapy for smokers engaged in the process of becoming and remaining smoke free. Due to the paucity of studies involving auriculotherapy and nicotine addiction in the literature, the literature of a more researched therapeutic modality with similar effects, auricular acupuncture was reviewed.

CONCLUSIONS

This study was limited to auriculotherapy, addiction education, behavior training, conditioning and coaching support for nicotine addicted smokers in the context of a rehabilitation recovery addiction treatment process model based on three stages: detoxification, rehabilitation (recovery) and relapse prevention. The study sample of six was small and limited to one interview after subjects were smoke free for at least 1 year following auriculotherapy intervention for smoking cessation for each of the participants. Participants were all Caucasian. Although the study was conducted with a small group and the findings are limited to this sample, they are consistent with other studies found in the literature including auricular acupuncture for smoking cessation. This study could be replicated using a larger sample; or longitudinal follow up studies that include biochemical validation to compare the effects of high and low intensity auriculotherapy combined in a multidimensional approach could provide additional findings and more comprehensive information related to themes associated with stages in the treatment process.

This study shows that even though participants anticipated the withdrawal process to be extremely challenging; quitting was easier when auriculotherapy was used. Most studies attempt to minimize therapist bias (Bier et al., 2002; Gilbey & Neumann, 1977; He, Berg, & Hostmark, 1997). However, for this study, the will to resist smoking seemed stronger when it was applied within the context of a multi-component treatment approach with practitioner support. In addition to demonstrating the beneficial effects of auriculotherapy; the present study demonstrated the added benefits of current knowledge in neuropsychology, and coaching support to guide the smoker through stages of the process.

This current study builds on previous work by exploring nicotine dependency treatment in the context of a chronic rehabilitation recovery treatment process model and by adding a clear theoretical framework of addiction causation, patho-physiology explanation, and coaching for motivated smokers. The results of this research reinforce beliefs that nicotine addiction and treatment is complex and multidimensional. Auriculotherapy as a therapeutic modality was viewed by participants’ as an intervention to not only assist in detoxification but also to use preventively. Knowledge about auriculotherapy as an intervention to assist smokers in the recovery process can assist health care providers and advanced practice nurses to incorporate this modality into their practices.

Implications for Practice

A study exploring the treatment effectiveness from a multidimensional perspective is important because of the limited amount of outcome assessment research in which multiple dimensions are addressed in a rehabilitative recovery-oriented smoking cessation outpatient healthcare setting. The increasing recognition of limitations of an acute care model and benefits of a chronic care rehabilitative, recovery model in treatment for smokers either unwilling or unable to tolerate chemicals in treatment invites a stronger and more widespread presence of advanced practice nurse smoking cessation specialist. The treatment model described in this current study provides a highly individualized model of care well adapted to the philosophical underpinnings of professional nursing practice. A treatment model as described in this study provides a viable option to the modest effects of currently advocated approaches to nicotine addiction and smoking cessation.

Nicotine addiction, cigarette smoking has been largely ignored in academic nursing and academic medical and practice settings although it is recognized widely as a major, if not the major, ongoing global epidemic of the century. The importance of
this research is that it brings heightened awareness and attention to the importance of developing knowledge and interventions for the nascent area of auriculotherapeutics in nicotine addiction treatment and application to the academic and advanced practice nurse practice settings. The goal is to develop nursing process tools for an assessment based on a system of preventive health that takes into account the whole individual as a functioning system, nursing diagnosis based on scientific knowledge rather than beliefs, planning, implementation of appropriate, innovative interventions and evaluation.

REFERENCES


Auriculotherapy Certification Institute. (August 12, 1999). International Conference on Acupuncture, Auriculotherapy, and Auricular Medicine, Las Vegas, Nevada.


Article 1: Auricular Transcutaneous Electrical Neuro-Stimulation, Addiction Education, Behavioral Training, Coaching Support and the Nicotine Addictions Treatment Process

Continuing Education Credit: 2.0 contact hours

CE Instructions:

1. Read the article.
2. Locate the answer sheet and posttest questions following the article.
3. Complete the posttest questions and program evaluation by circling the selected responses on the answer sheet.
4. Fill out the registration form.
5. Send registration form, answer sheet, and a check for $20.00 to:
   Continuing Nursing Education
   The University of Texas at Arlington
   Box 19407
   Arlington, TX 76019-0407
6. Send before September 30, 2009

Within three weeks after receipt of your posttest and registration, you will be notified of your results. A passing score is 70%. If you pass, your CE certificate will be forwarded to you. If you do not pass, you will be notified and may repeat the test once at no cost.

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Registration Information:

Name: __________________________________________
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City/State/ZIP: _________________________________
Social Security Number: __________________________
State(s) of Licensure: _____________________________
Telephone Number: _____________________________
Posttest for Continuing Education Credit

Article 1: Auricular Transcutaneous Electrical Neuro-Stimulation, Addiction Education, Behavioral Training, Coaching Support and the Nicotine Addiction Treatment Process

Journal of Addictions Nursing (19:3)
Continuing Education Credit: 2.0 contact hour

CE Questions: Please circle your response on the answer sheet.

Posttest Questions for Continuing Education Credit

1. Because the author chose to focus on the collection of information as it is expressed by people within the normal context of their lives, the research method utilized is:
   a. Prospective
   b. Quantitative
   c. Qualitative
   d. Experimental

2. Which of the following statements is TRUE?
   a. The underlying regulating mechanism of addiction is now known to involve a single circuit and system in the brain.
   b. Micro-electrical stimulation to ear points is a novel, experimental modality which has only very recently been used in the treatment of addiction.
   c. Auriculotherapy as a therapeutic application has been impeded because of a lack of scientific studies and therefore a lack of understanding of it.
   d. All of the above

3. Auriculotherapy is generally considered by the American medical community to be a member of a family of techniques falling under the umbrella term of:
   a. Electroconvulsive therapy (ECT)
   b. Acupuncture
   c. Hypnosis
   d. Nerve-blocking

4. Auriculotherapy may be described as a healthcare modality involving electrical stimulation of ear points for the purpose of alleviating pathological, systemic conditions or blockages.
   a. True
   b. False

5. Auriculotherapy is used in all stages of the addiction treatment process EXCEPT:
   a. Predetoxification
   b. Detoxification
   c. Rehabilitation
   d. Relapse Prevention

6. Our understanding of the neurophysiology and etiology of addiction has been dramatically altered by:
   a. The *Highjacked Brain Hypothesis*
   b. Functional neuro-imaging
   c. The 12-Step Facilitation Process
   d. Contingency Management tenets

7. The fact that genetically identical twins can be very different is a tenet of:
   a. The Biogenic Theory of Addiction
   b. The Allele Disparity Model
   c. The Human Epigenome Project
   d. The Epigenetic Model

8. Addiction occurs when there is a dysfunction in the reward-regulating mechanisms of the brain, specifically the:
   a. Dopamine receptors
   b. Serotonin receptors
   c. Norepinephrine receptors
   d. Acetylcholine receptors
9. The Umanoff model of addiction supports the idea that:
   a. Addiction is the result of a weak will.
   b. Specific addictions are not inherited; only the vulnerability to addiction is inherited.
   c. The drug is the cause of the addiction.
   d. The majority of those who experiment with addictive substances will surely develop dependence.

10. Auricular stimulation has its roots in:
    a. Eastern medicine
    b. Western medicine
    c. Ayurvedic medicine
    d. American Indian medicine

11. Auricular acupuncture has been found to raise cerebrospinal fluid levels of all of the following EXCEPT:
    a. Substance P
    b. Endorphins
    c. Enkepalins
    d. All of the above
    e. None of the above

12. Auricular acupuncture contributes to addiction treatment by:
    a. Releasing the craving for addictive substances
    b. Relieving anxiety and tension
    c. Improving concentration
    d. All of the above

13. Behavioral analgesia produced by auricular acupuncture can be blocked by the administration of:
    a. Acamprosate
    b. Disulfiram
    c. Naloxone
    d. Methadone
Article 1: Auricular Transcutaneous Electrical Neuro-Stimulation, Addiction Education, Behavioral Training, Coaching Support and the Nicotine Addiction Treatment Process

Journal of Addictions Nursing (19:3)
Continuing Education Credit: 2.0 contact hour

Purpose: To explore the effects of auricular transcutaneous electrical neuro-stimulation in combination with addiction education, behavioral training and coaching support.

At the completion of the article and the posttest, the reader should be able to:

1. Define auriculotherapy and name three stages of addiction where this modality can be utilized.
2. Compare and contrast the Highjacked Brain Hypothesis with Umanoff’s model of addiction.
3. Identify the putative mechanism of action of auriculotherapy.
4. List and define three criteria for establishing the trustworthiness of qualitative data.

Posttest Answer Sheet: (Please circle selected response.)

Select a for true and b for false in true-false questions.

01. a b c d e
02. a b c d e
03. a b c d e
04. a b c d e
05. a b c d e
06. a b c d e
07. a b c d e
08. a b c d e
09. a b c d e
10. a b c d e
11. a b c d e
12. a b c d e
13. a b c d e

Program Evaluation

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<th>Strongly Disagree</th>
<th>Strongly Agree</th>
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<td>1 2 3 4 5</td>
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<td>Objective 2 was met.</td>
<td>1 2 3 4 5</td>
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<td>Objective 3 was met.</td>
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<td>Objective 4 was met.</td>
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<td>Rate the effectiveness of the teaching/learning resources</td>
<td>1 2 3 4 5</td>
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<td>Were the objectives relevant to the overall purpose/goal(s)</td>
<td>1 2 3 4 5</td>
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<td>Rate the difficulty of this test: 1 = easy and 5 = hard.</td>
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How long did this program and posttest take to complete? ____ hours.