REVIEW

Behavioral Intervention for Cancer Treatment Side Effects

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The use of increasingly aggressive methods of cancer treatment during the last 20 years has brought clinical attention to the need for more effective management of pain, nausea, and other aversive side effects of state-of-the-art cancer therapy. One of the most promising approaches to effective management is nonpharmacologic intervention based on behavioral research and theory. The purpose of this review is to examine the effectiveness of behavioral intervention methods in the control of aversive side effects of cancer treatments. Fifty-four published studies using a variety of research designs were identified for review. Results indicated the following: 1) Behavioral intervention can effectively control anticipatory nausea and vomiting in adult and pediatric cancer patients undergoing chemotherapy; however, the evidence for the efficacy of behavioral intervention to control post-chemotherapy nausea and vomiting is less clear. 2) Behavioral intervention integrating several behavioral methods can ameliorate anxiety and distress associated with invasive medical treatments. 3) Although a variety of behavioral methods have been shown to reduce acute treatment-related pain, there is increasing evidence that these methods are not equally effective. Hypnotic-like methods, involving relaxation, suggestion, and distracting imagery, hold the greatest promise for pain management. Unfortunately, research is scant on the use of behavioral intervention to control prolonged pain associated with invasive medical procedures. It is clear that the application of behavioral theory and methods has an important place in the care of patients undergoing invasive cancer treatments. [J Natl Cancer Inst 2001;93: 810–23]

Because cancer treatments have become more aggressive during the last 20 years, the need for new techniques to manage pain, nausea, and other aversive side effects of such therapy has become apparent. Behavioral research and theory offer the possibility of nonpharmacologic intervention methods. Part of a larger movement called behavioral medicine, behavioral intervention with patients undergoing cancer treatment has received wide acceptance from both front-line medical staff and patients. Behavioral intervention procedures are now among the most widely offered psychosocial services at comprehensive cancer centers *(1).* At the World Health Consensus Conference on pediatric cancer pain management, behavioral methods were identified as a primary treatment for side effects with children undergoing repeated diagnostic and treatment procedures *(2).* Similar recommendations have been made by the Agency for Health Care Policy and Research *(3).* Reasons for the broad acceptance of behavioral methods include the following: the immediacy of their positive impact on patient distress and suffering *(4),* the relative ease of their application, and the sense of control their use provides patients at a time when they feel most vulnerable *(5).*

The purpose of this review is to discuss the use of behavioral intervention methods with adults and children undergoing cancer treatment. Our discussion begins with a brief introduction to behavioral principles/methods and the broad field of behavioral medicine. The goal of the first section is to provide an understanding of what constitutes behavioral intervention and to present the theoretical and clinical foundations of such intervention methods. The core of the discussion is a critical review of published reports on behavioral methods used to reduce aversive side effects of cancer treatment. That discussion begins with an overview of specific methods and ends with a tabular summary of the published literature. The contribution of this work to the understanding of basic biobehavioral processes is discussed briefly, followed by a consideration of future areas of investigation. The literature on symptom control is then placed within the context of behavioral research and the broad field of cancer prevention and control. The discussion ends with conclusions drawn from this review.

Behavioral Medicine

One of the most important contributions of the behavioral sciences during the last 40 years has been the development of effective intervention methods to facilitate positive psychosocial adjustment in adults and children. Most of the advances in behavioral theory and research have come from the disciplines of psychology and education. The focus of the work has been broad, from remedial education/training of the mentally retarded and rehabilitation of institutionalized psychiatric patients to behavioral coping strategies to control nausea in cancer chemotherapy patients and biofeedback training for stroke victims. The theoretical foundation for the work is found in the behavioral conditioning studies of Pavlov *(6),* Skinner *(7,8),* and Thorndike *(9)* as well as in the child development research of Bijou and Baer *(10–12).* The early behaviorists did not propose elaborate models that specified particular psychologic needs; rather, they stressed the role of immediate environmental factors on behavior. In contrast to Sigmund Freud, Carl Jung, and other intrapsychic theorists who sought to determine the long-term effects of unresolved childhood issues and used lengthy psychoanalytic exploration, the early behaviorists focused on the here and now. Their behavioral interventions could best be described as prac-

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See "Note" following "References."

tical, seeking to modify those conditions (environmental and social) and coping skill deficits that adversely affect daily functioning.

With greater acceptance of behavioral intervention strategies within the medical health and education communities, this approach has been adopted in the treatment of increasingly complex issues. There is almost no aspect of our lives that has not been the focus of behavioral intervention. An important result of the broad application of the approach is an increased appreciation for the role of cognitive factors in behavior. Now, in addition to changing the patient's environment and coping skills, many clinicians focus on how to change beliefs, feelings, and attitudes that a substantial proportion of the behavioral camp believes affect people's behavior. The widening conceptual base of behavioral intervention is reflected in the terms frequently used to describe the approach; these terms include "cognitive-behavior therapy," "cognitive-behavioral approach," and "behavioral medicine intervention." For the purpose of this review, we will use the term "behavioral intervention."

The application of the behavioral approach to the treatment and prevention of disease began in the early 1970s. The impetus was research on biofeedback in the treatment of headache, asthma, and epilepsy. Biofeedback provides the individual with a moment-to-moment feedback regarding normally nonvolitional functions, such as heart rate, body temperature, and electromyographic feedback. Biofeedback is typically provided as the individual sits quietly and attempts to control those vital functions. The dramatic success of such training for patients with asthma, epilepsy, and migraine headache drew considerable attention among both academic and lay groups *(13).* Those studying biofeedback immediately saw its potential importance in the treatment of a variety of medical disorders; in 1977, they held the Yale Conference on Behavioral Medicine *(14).* At that meeting, the following two issues were addressed: 1) the potential scope of the field (from prevention to rehabilitation) and 2) its break from psychosomatic medicine. Psychosomatic medicine evolved from the biomedical sciences with a focus on disease etiology and pathogenesis, whereas behavioral medicine evolved from the behavioral sciences with a focus on prevention and treatment of physical disease. In the early 1980s, investigators began to explore the application of behavioral medicine to cancer and its treatment. That early work *(15–17)* focused on the control of aversive side effects of cancer chemotherapy through the use of relaxation, hypnosis, and distraction.

Behavioral medicine is now a major area of scientific research, with its own professional society, at least five professional journals, and two National Institutes of Health study sections for peer review of investigator-initiated research proposals. Behavioral medicine has also achieved considerable prominence among cancer-focused professional groups and funding agencies. The American Cancer Society supports both intramural and extramural behavioral research, and one of the major thrusts of the National Cancer Institute's effort in prevention and control is behavioral. Moreover, a number of federal and private agencies support graduate and postgraduate training programs for those interested in the psychologic and sociologic factors in cancer. There clearly appears to be broad professional recognition of behavioral factors as they contribute to cancer treatment.

As discussed above, behavioral interventions are concrete in their focus and application. The clinician is interested in what can be done to alter those coping skills and environmental, physical, social, and cognitive factors that affect the person's behavior in specific situations. However, in the case of cancer, the physical factors that affect behavior are often difficult to change. For example, although specific factors that contribute to the occurrence of treatment side effects (e.g., the emetic potential of chemotherapeutic agents) have been identified, it would be medically ill advised to change them (e.g., reduce the intensity of treatment) as a way to reduce aversive side effects. For this reason, clinicians have focused on teaching patients behavioral coping skills. Training is directed toward teaching specific behaviors that reduce anxiety, nausea, pain, and related distress. The clinician and the patient usually work as a team, and much of the intervention is carried out by the patient. For example, the patient who becomes highly anxious during venipuncture might be taught paced breathing and self-hypnosis and then instructed how to use the newly found skills during aversive medical procedures.

Specific Behavioral Treatment Methods

Before the specific methods used to reduce aversive side effects of cancer treatment are outlined, it is important to point out the critical role of assessment in behavioral intervention. The emphasis on ongoing assessment is an important factor that distinguishes behavioral intervention from more traditional psychodynamic approaches. Such assessment is critical at every point in the course of the intervention: 1) before the actual intervention is initiated to determine what environmental factors should be targeted for change and what resources the patient has to facilitate the intervention, 2) during the period when the intervention is being implemented to provide feedback so that the methods can be refined to meet the patient's particular needs, and 3) after the intervention is completed to guide follow-up care. In each instance, assessment involves monitoring the patient's behavior in terms of its frequency, intensity, and the circumstances under which it occurs.

The following eight specific methods have been used in behavioral intervention to reduce aversive side effects of cancer treatment: 1) contingency management, 2) cognitive/attentional distraction, 3) hypnosis/distracting imagery, 4) systematic desensitization, 5) emotive imagery, 6) relaxation training, 7) cognitive restructuring, and 8) modeling. Each method is briefly reviewed below. The application of these behavioral methods to specific problems associated with the treatment of cancer has been guided by practical concerns and by clinical judgment as well as by behavioral research in education and psychology. References for each procedure are provided so that the reader can obtain fuller descriptions of methods and their clinical application.

1) **Contingency management.** Based on Thorndike's Law of Effect *(9),* contingency management involves the use of rewards (prizes, treats, and/or special events) to increase the patient's adherence to the treatment regimen. It has been used most frequently on pediatric cancer patients to encourage their cooperation. For example, parents might implement a program in which their child receives stars toward the acquisition of a special toy or treat contingent on his/her lying still during painful diagnostic and treatment procedures *(18,19).* Contingency management is typically used in the context of a larger intervention program incorporating a number of behavioral methods.

2) **Cognitive/attentional distraction.** This distraction method is used to control nausea and acute pain/distress. It in-

volves engaging the patient in highly interesting (i.e., absorbing) activities during invasive procedures. Although the mechanism underlying the role of attentional distraction in symptom control has not been identified formally, it is presumed that the patient's attention to (i.e., awareness of) aversive stimuli is blocked by his/her involvement in the task. Activities used to effectively block the occurrence of aversive side effects through distraction include the following: guided imagery *(20),* storytelling *(21),* video game playing *(22),* and playing with a party blower (a simple paper noise maker) *(20,21).* Guided imagery training (primarily used with adults) and storytelling (used with children) are quite similar and involve the clinician's presenting imagery suggestions like those used in hypnosis (e.g., floating on a raft on a quiet lake and sitting by the ocean as the waves ebb and flow). The positive effects of distraction usually last only as long as the patient is actively engaged in the distraction task. That is, symptoms are controlled while the patient's attention is focused on the distraction task, but they return immediately if the patient's focus is lost. This limitation does not usually present a clinical problem because many aversive treatment procedures, like venipuncture, can be completed relatively quickly. For procedures that are prolonged, patients can be taught to maintain focused attention for extended periods of time. If symptoms break through, the patient can return to the distraction task and regain symptom control.

3) **Hypnosis/distracting imagery.** There are theoretical controversies regarding what constitutes hypnosis, and interventions employing hypnosis vary in the treatment strategies used *(23–26).* Although hypnosis has historically been considered at times to be a psychoanalytic approach in psychotherapy [e.g., *see (27)*], more recent conceptualizations of hypnosis have clearly placed it within the behavioral realm [*see* Kirsch *(28)*]. Such conceptualizations argue that hypnosis employs what are now considered to be classic behavioral intervention approaches (e.g., distraction and relaxation). Although the use of hypnosis predates behavioral medicine, contemporary hypnosis researchers recognize that hypnosis is not a therapeutic treatment modality *per se,* but rather it is one technique under the behavioral umbrella [*see (29)*]. Classifying hypnosis as a behavioral technique emphasizes its operational components and avoids perpetuation of the myth that hypnosis is a magical experience *(17,30).* In this review, hypnosis is defined as a relatively simple process in which the patient learns to focus attention on thoughts or images unrelated to the source of distress. While the patient is relaxed through meditation-like excursions to pleasant locations/activities, the clinician introduces suggestions of calm and well-being. With children, such imaginative involvement is often gained through storytelling. Hypnosis and attentional/cognitive distraction appear to rely on similar skills. Nevertheless, a meta-analysis *(29)* has revealed that using the term "hypnosis" can increase the beneficial impact of the behavioral intervention in a variety of circumstances. Although some patients may not be comfortable with hypnosis *(31),* for those who are, hypnosis may enhance clinical outcomes (e.g., improved pain control) *(32).* With cancer patients, hypnosis is used most frequently to control nausea, pain, and anxiety.

4) **Systematic desensitization.** This method is used to alter patients' aversive reactions to stimuli associated with treatment (e.g., anxiety and nausea upon seeing a chemotherapy nurse). It involves gradually introducing feared stimuli/events in a hierarchical manner, beginning with the least feared stimuli and progressing to the most feared. This exposure is carried out across individual sessions with the patient calm and relaxed. Exposure to feared stimuli/events can be *in vivo* (actual re-exposure to the feared stimuli while the patient is in a state of relaxation) or imaginal (exposure to verbal descriptions of the feared stimuli or situations). Fears gradually diminish with repeated exposure in this carefully programmed manner. A particularly dramatic example of *in vivo* systematic desensitization in the context of cancer treatment is its application to control a life-threatening eating disorder following successful gastrointestinal surgery in a female patient *(33).* Despite reassurances from her doctors that surgery had removed all of the cancer, the patient insisted that "it was coming back." This belief was related to the fact that after surgery she would vomit and become upset whenever she tried to eat solid foods (as she did when her disease was first discovered). At the time that the psychiatric consultation was called, the only medical option was a feeding tube. Systematic desensitization involved a careful assessment of medical and psychosocial factors and then the gradual introduction of solid foods while the patient was relaxed. During twice-daily sessions, the patient was first relaxed and then gradually given solid foods. After 14 such desensitization sessions, the patient was then able to retain solid foods and go home. A 9-month follow-up evaluation revealed that the patient had returned to her normal weight and displayed no behavioral symptoms. In addition to presenting the application of systematic desensitization, this case demonstrates the critical role that behavioral factors can have in recovery after cancer surgery.

5) **Emotive imagery.** This method is similar to desensitization, distraction, and hypnosis and is used most frequently with children. It differs from those procedures because it incorporates personalized storytelling and takes advantage of the child's openness to fantasy. After establishing rapport with the child, the clinician determines the child's favorite storybook hero and then tells the child a series of stories involving the child and his/her hero. The child is encouraged to become engaged in imagining himself/herself being helped by the hero. Each subsequent story brings the child closer to the feared setting/procedure, while the hero and the child master the situation. The rationale is that the elicitation of strong anxiety-inhibiting emotive images in the context of the feared stimuli/procedures will reduce anxiety reactions *(19–21).* Parents are frequently involved in the intervention and retell the stories during invasive diagnostic and treatment procedures.

6) **Relaxation training.** The goal of relaxation training is to teach the patient how to establish a state of deep relaxation, which has been shown to reduce pain *(34)* and anxiety *(35)* and to facilitate distraction *(36–38).* During training with a clinician or via an audio-tape recording, the patient learns to focus on soothing images, to tense and release muscles, and/or to breath deeply. With practice, the patient is able to control his/her level of relaxation and to go quickly into a state of deep relaxation. The patient then uses this skill during aversive procedures and when he/she feels tense and anxious. A variety of related techniques have been developed to increase relaxation and to reduce anxiety and distress. They differ primarily in terms of the techniques used to induce relaxation. Patients are instructed either to focus on tranquil imagery (focused imagery), to tense and release muscle groups, or to deepen and slow the pace of breathing. Hypnosis has also been used as a method for relaxation training *(17),* since deep breathing and focused imagery are

common components of hypnotic inductions *(39).* For this reason, in clinical practice, it is often difficult to distinguish between relaxation and hypnosis.

7) **Cognitive restructuring.** Cognitive restructuring interventions are used to alter beliefs and attitudes that may contribute to the patient's distress. This technique is similar to that used by many modern psychotherapists who often encourage the patient to reframe stressful life events as less threatening and under his/her control. In this way, the patient is encouraged to "restructure" his/her thoughts and beliefs. This method involves the patient and clinician reviewing thoughts, feelings, and beliefs about medical treatment/procedures in order to identify those that elicit fear and distress. The patient is then encouraged to consider other ways of viewing the fearful event(s) that might help reduce feelings of distress and anxiety. An interesting example of the use of cognitive restructuring is reported by Chen et al. *(40),* who studied children undergoing lumbar puncture in the treatment of leukemia. To reduce the children's distress, Chen et al. had them recall and then more realistically appraise their responses to their most recent lumbar puncture. The aim was to enhance the children's confidence and beliefs regarding their ability to cope effectively with the pain and distress of lumbar punctures. The intervention was successful, resulting in reductions in both pain and distress.

8) **Modeling.** This method involves the use of *in vivo* or videotape demonstrations of successful coping during invasive diagnostic/treatment procedures to teach behavioral coping skills. It is most commonly used with children. One example of this method is the use of a film in which a child scheduled for repeated bone marrow aspirations describes thoughts and feelings that he/she often experiences and then demonstrates behavioral coping skills to manage his/her fear and distress *(19).*

Review of Published Reports

The goals of this review are to evaluate the clinical impact of behavioral intervention with patients undergoing cancer treatment and to describe these results in a meaningful way to health professionals on the front lines of cancer treatment. Because much of the foundation of this field of research is based on dramatic effects within studies designed with a small number of participants, we have chosen to take a narrative approach in evaluating the research literature. An alternative would have been to use meta-analysis. However, that approach ignores studies incorporating individual analysis designs. Those studies are important because they focus on clinically significant changes only.

Published reports of research on behavioral intervention to reduce aversive side effects of cancer treatment have focused most frequently on the following three symptom clusters: 1) nausea and vomiting, 2) anxiety and distress, and 3) pain. Three other side effects (neuropsychologic impairment, incontinence, and sexual dysfunction) have also been the subject of study. Unfortunately, that research is less well developed. To ensure that our review is comprehensive, we included randomized controlled studies, within-subject studies, and case reports.

Studies were identified from a computer search of the National Library of Medicine PubMed database, which includes MEDLINE®, PreMEDLINE, and other related databases. The search examined publications from 1979 to January 2000 in English, entering the search terms "cancer and: behavior, intervention, pain, nausea, vomit, distress, depression, anxiety, fatigue, neuro, cognitive, menopause, sex, and post-traumatic stress disorder." To ensure that we did not miss an emerging area of behavioral work on sexual dysfunction with cancer patients, we also included the search terms "prostate," "vaginal," and "impotence" individually. The computer search algorithm was also set to accept plurals (e.g., "anxieties" and "pains") and word variants (e.g., "neurological," "sexual," and "distressing"). Initial inclusion criteria were as follows: 1) a cancer patient population undergoing or having undergone traditional cancer treatment (e.g., chemotherapy, surgery, and radiation therapy), 2) the inclusion of a behavioral intervention, and 3) outcome data on the effects of the behavioral intervention on treatment-related side effects. The search was then replicated in the PsychLIT database in order to address the possibility that appropriate studies may have been published in the psychology literature not covered by PubMed. This list was checked against reference lists of previous reviews of this literature *(2,4,5,41,42)* to ensure thoroughness.

One hundred seventy-seven studies were initially identified. These studies were screened independently by each of the three authors to ensure that they met inclusion criteria. Studies were excluded for the following reasons: 1) 42 were review articles, 2) 46 described cancer treatment-related side effects but did not include a behavioral intervention, 3) 14 did not report any data on intervention effects, 4) eight studied subjects who were not cancer patients (e.g., behavioral interventions for parents of children undergoing cancer treatment), and 5) 13 did not address cancer treatment-related side effects (e.g., some addressed mortality). Fifty-four studies meeting the above criteria were included in the present review and are described in Tables 1–3.

Nausea and Vomiting

Despite improvements in the efficacy of antiemetics, nausea and vomiting associated with chemotherapy continue to be common problems for many cancer patients *(43,44).* Reports *(43,44)* suggest that well over half of all chemotherapy patients experience nausea and vomiting as a direct consequence of their treatment. Not only do these side effects have a substantial impact on quality of life, but also they can affect treatment adherence *(45,46).* In addition to post-chemotherapy nausea and vomiting, a substantial number of patients experience these aversive side effects in anticipation of chemotherapy infusions. That is, they become nauseated and sometimes even vomit before the drugs are actually administered. Behavioral researchers have focused primarily on the control of anticipatory side effects.

Perhaps one of the clearest examples of the effectiveness of behavioral intervention for the control of anticipatory side effects is presented in a series of individual analyses of relaxation and hypnosis to control persistent anticipatory vomiting in chemotherapy patients *(16–19).* In that series, the clinician first trained patients to go into a state of deep relaxation and then guided them through relaxation exercises immediately before and during chemotherapy infusions. For the evaluation of the effectiveness of the program, the intervention methods were used and withheld during alternative infusions; i.e., a reversal individual analysis design was used. Results were quite remarkable: During those chemotherapy treatments when the behavioral methods were implemented, no anticipatory vomiting occurred; however, during those chemotherapy treatments when the behavioral methods were not implemented, anticipatory vomiting occurred *(17,22).* Similarly dramatic results have been

obtained with children using distraction through video game playing *(22).* A review of the studies summarized in Table 1 supports the effectiveness of behavioral intervention to control anticipatory nausea and vomiting. Results from the individual analyses reviewed above were confirmed in 12 of 13 randomized clinical trials that compared behavioral interventions with no treatment/attention control conditions.

Unfortunately, the impact of behavioral intervention on post-chemotherapy infusion side effects is less well established. In the four studies *(47–50)* that reported on post-chemotherapy side effects, the results were modest. In those studies, behavioral intervention reduced the intensity of post-chemotherapy side effects, but it did not block their occurrence.

Anxiety and Distress

Since research examining the impact of behavioral intervention has investigated both anxiety and distress as outcomes within the same study, they are grouped together in Table 2. Research with children has focused on reducing the aversive side effects of bone marrow aspiration, lumbar puncture, and venipuncture. Most of those studies have incorporated multiple behavioral methods (e.g., distraction, modeling, relaxation, contingency management, and cognitive restructuring) within a behavioral intervention package. Results support the efficacy of such multimodal packages to control anxiety and distress associated with invasive medical procedures. Although most studies of such intervention packages have not attempted to determine moderators of behavioral intervention effects, one study *(51)* found that the children's age predicted which specific behavioral method was most helpful. For younger children, imaginal involvement through hypnotic procedures appeared to be the critical component of the intervention. A side benefit of these methods is that they help reduce the necessity of using pharmacologic agents that can have their own side effects. It is important to note that the effects of behavioral intervention can be equal to or greater than those achieved through pharmacologic intervention *(19,20).*

Similarly positive results have been obtained with adult cancer patients. For example, research with patients receiving radiation therapy *(52)* showed that behavioral intervention was effective in reducing anxiety, distress, and somatic preoccupations. As with children, these methods can be as effective as pharmacologic interventions in reducing anxiety and depression *(53).*

A total of 19 published studies have investigated the efficacy of behavioral intervention to reduce acute anxiety and distress associated with diagnostic and treatment procedures. Four of five studies using randomized designs in which the behavioral intervention was compared with a no treatment/attention control condition demonstrated a clear beneficial effect. The remaining 14 used a variety of study designs, including within-subject approaches and case reports. Thirteen of the 14 confirmed the beneficial impact of behavioral intervention.

Pain

Behavioral interventions have been developed to control acute pain associated with diagnostic and treatment procedures in children and adults (*see* Table 3). This work has focused on specific behavioral methods used alone or in combination with others (i.e., behavioral intervention packages). The most commonly used methods are hypnosis, relaxation, and distraction via guided imagery. Although interventions to control pain in children are similar to those used to reduce anxiety and distress (*see* Tables 2 and 3), there is increased study of the relative effectiveness of behavioral methods on different side effects of treatment. An example of this research is a recently completed randomized clinical trial *(54)* that compared behavioral training (i.e., cognitive restructuring and relaxation training) with hypnosis to ameliorate pain and anxiety in pediatric patients undergoing bone marrow transplantation. Results from that trial indicated that, although behavioral training and hypnosis had equally beneficial effects on pain, hypnosis had a greater impact on treatment-related anxiety.

As with research on behavioral method in children, investigators have sought to determine the relative effectiveness of different methods. For example, in one such study of pain control with bone marrow transplantation patients *(55),* hypnosis and behavioral coping skills (i.e., relaxation and cognitive restructuring) were compared against both standard treatment and attention control conditions. The results of that study indicated that hypnosis was superior to other methods.

Of the 12 studies investigating the impact of behavioral intervention on cancer treatment-related pain, five were randomized clinical trials with either no treatment or attention control conditions (*see* Table 3). Four of these five supported the efficacy of behavioral intervention. All seven of the remaining seven studies, incorporating a variety of designs, found a reduction in pain following behavioral intervention.

It is important to point out that behavioral research on cancer pain has been limited to investigations of the control of acute pain. No systematic research has addressed the possible application of behavioral intervention to treat prolonged pain. This narrow focus is especially troublesome, since it is difficult to generalize from research on acute pain to behavioral control of prolonged pain.

Implications for Understanding Biobehavioral Processes

In understanding the role of behavioral medicine in cancer, it is also important to understand the contribution of work in this area to the broad field of behavioral science. The study of behavioral factors in cancer prevention and control provides an unparalleled opportunity to further the study of behavioral psychology. An otherwise healthy individual is abruptly faced with a life-threatening illness and is exposed to a series of highly stressful events. Moreover, those events occur in an environment that is highly controlled and where careful observation and detailed monitoring are possible. In essence, the treatment of cancer provides a context for the rigorous study of human behavior. A number of interesting examples of such double-edged research efforts exist.

The first example is a clinical study that contributed to understanding of the role of conditioned learning in the regulation of immune function in humans *(56).* Following research on the control of anticipatory nausea and vomiting, Bovbjerg and Redd *(56)* sought to determine if patients also developed anticipatory immune suppression, a side effect of chemotherapy. To investigate this possibility, they expanded their assessment of patients' reactions to chemotherapy to include the measurement of immune function (from blood samples drawn before and after chemotherapy). Their predictions were confirmed: During the course of repeated chemotherapy infusions, patients developed anticipatory immune suppression as well as anticipatory nausea/

Table 1. Summary of behavioral interventions to relieve nausea and vomiting*

	Participants		Intervention					Outcomes‡		
Authors (reference No.)	Diagnosis	Total No. (No. of females/males)	Control groups (total No.)	Experimental groups (total No.)/ study design	Format	No. and length of sessions	Behavioral components†	Anxiety and distress	Nausea–vomiting	Physio arousal
Burish and Lyles *(74)*	Thymic lymphoma	1 (1 F)		Case report	Indiv		Relaxation		++	++
Burish and Lyles *(47)*	Mixed cancer	16 (14 F/2 M)	No tx (8)	#1 (8)/RCT	Indiv	5 sessions	Cognitive/attentional distraction, hypnosis, relaxation	+	+	0
Lyles et al. *(15)*	Mixed cancer	50 (31 F/19 M)	No tx (18); Attn (14)	#1 (18)/RCT	Indiv	5 sessions	Cognitive/attentional distraction, hypnosis, relaxation	+	+	0
Morrow and Morrell *(16)*	Mixed cancer	60 (42 F/18 M)	No tx (20); Attn (20)	#1 (20)/RCT	Indiv	2 sessions, 1 h	Cognitive/attentional distraction, hypnosis, desensitization, relaxation		+	
Redd et al. *(17)*	Mixed cancer	6 (6 F)	Multiple	Indiv analysis	Indiv—ABA design	2 sessions before next scheduled chemotherapy infusion, then at each following infusion except on reversal (no tx) infusions for 3 patients	Cognitive/attentional distraction, hypnosis, relaxation		++	
Zeltzer et al. *(75)*	Mixed cancer	8 (3 F/5 M), children		#1 (8)/Pre-post			Hypnosis	++	++	
Morrow *(76)*	Mixed cancer	10		#1 (5) audio tape #2 (5) "live"/RCT	Indiv	Provided tape 1 session plus tape	Relaxation Relaxation		00 ++	
LeBaron and Zeltzer *(77)*	Mixed cancer	8, children		#1 (8)/Pre-post	Indiv	2–3 sessions	Cognitive/attentional distraction	++	++	
Zeltzer et al. *(78)*	Mixed cancer	51 (? F/? M), children		#1 (9) #2 (10)/RCT	Indiv Indiv	1 session, 30 min 1 session, 30 min	Hypnosis Cognitive/attentional distraction	0, ++ ++	0, ++ ++	
Cotanch et al. *(79)*	ALL	12 (4 F/8 M)	No tx (6)	#1 (6)/RCT			Hypnosis	+	+	
Kolko et al. *(80)*	ALL	3 (0 F/3 M), children		#1 (3)/ABAB	Indiv	6 sessions	Cognitive/attentional distraction	++	++	
Morrow *(81)*	Mixed cancer	92 (61 F/31 M)	No tx (20) Attn (20)	#1 (26) #2 (26)/NRT			Desensitization, relaxation Relaxation		+ +	
Burish et al. *(49)*	Mixed cancer	24 (? F/? M)	No tx (12)	#1 (12)/RCT	Indiv	6–8 sessions	Hypnosis, relaxation	+	+	+
Redd et al. *(22)*	Mixed cancer	26 (7 F/19 M), children	Study 1, no tx (13)	#1 (13)/ABAB	Study 2, Indiv ABAB design		Cognitive/attentional distraction Cognitive/attentional distraction	 00	+ ++	
Feldman and Salzberg *(82)*	Mixed cancer	60 (? F/? M)	No tx (15)	#1 (15) #2 (15) #3 (15)/RCT	Indiv	1 session 1 session 1 session	Hypnosis Hypnosis Hypnosis	+ + +	0 0 0	
Lerman et al. *(48)*	Mixed cancer	48 (32 F/16 M)	No tx (23)	#1 (25)/RCT	Indiv	1 session, 30 min	Relaxation	0	+	
Burish and Jenkins *(85)*	Mixed cancer	60 (29 F/31 M)	Attn (15)	#1 (15) #2 (15) #3 (15)/RCT	Indiv Indiv Indiv	1 session 4 sessions 5 sessions	Rehearsal modeling Hypnosis, relaxation Hypnosis, relaxation, rehearsal modeling	+ + +	+ 0 +	0 0 0
Greene et al. *(84)*	Stomach cancer	1 (0 F/1 M)		#1/case report	Indiv	6 sessions	Cognitive/attentional distraction, hypnosis		++	

(Table continues)

Table 1 (continued). Summary of behavioral interventions to relieve nausea and vomiting*

Authors (reference No.)	Participants: Diagnosis	Participants: Total No. (No. of females/males)	Intervention: Control groups (total No.)	Intervention: Experimental groups (total No.)/ study design	Intervention: Format	Intervention: No. and length of sessions	Intervention: Behavioral components†	Outcomes‡: Anxiety and distress	Outcomes‡: Nausea–vomiting	Outcomes‡: Physio arousal
Zeltzer et al. *(37)*	Mixed cancer	54 (28 F/26 M)	Attn (17)			All groups: 2 sessions				
				#1 (21)		Session 1: 15–30 min	Cognitive/attentional distraction, hypnosis, relaxation	+	+	
				#2 (16)/RCT		Session 2: 5–15 min	Cognitive/attentional distraction, relaxation	+	+	
Burish and Jenkins *(85)*	Mixed cancer	81 (54 F/27 M)	No tx (15)	#1 (17) emg	Indiv	5 session				+
				#2 (12) st						+
				#3 (13) rt			Hypnosis, relaxation	+	+	+
				#4 (12) emg + rt			Hypnosis, relaxation	+	+	
				#5 (12) st + rt/RCT			Hypnosis, relaxation	+	+	
Morrow et al. *(50)*	Mixed cancer		No tx (14)	#1 (29)	Indiv	2 sessions, 1 h (administered by oncology staff)	Desensitization, relaxation		+	
				#2 (29)/RCT	Indiv	2 sessions, 1 h (administered by psychologist)	Desensitization, relaxation		+	
Vasterling et al. *(86)*	Mixed cancer	60 (39 F/21 M)	No tx (20)	#1 (20)	Indiv	5 sessions	Cognitive/attentional distraction, relaxation	+	+	0
				#2 (2)/RCT	Indiv	5 sessions	Cognitive/attentional distraction	+	+	0
Jacknow et al. *(87)*	Mixed cancer	20 (10 F/10 M), children	Attn (10)	#1 (10)/RCT	Indiv	2–3 sessions	Hypnosis, relaxation		+	

*Abbreviations used: ABAB and ABA = study designs in which the treatment is presented and withdrawn in series, a reversal design; ALL = acute lymphocytic leukemia; Attn = attention; emg = electromyographic feedback; F = female; Indiv = individual; M = male; NRT = nonrandomized trial; Physio = physiologic; RCT = randomized clinical trial; rt = relaxation training; st = skin temperature feedback; tx = treatment.

†Behavioral components: contingency management, cognitive/attentional distraction, hypnosis/distracting imagery, systematic desensitization, emotive imagery, relaxation training, cognitive restructuring, and modeling.

‡ + = statistically significant improvement relative to controls; 0 = statistically nonsignificant improvement relative to controls; ++ = statistically significant improvement pre–post; 00 = statistically nonsignificant improvement pre–post.

vomiting. There was a substantial suppression in immune function when patients approached scheduled chemotherapy.

Another example of the contribution of behavioral medicine research to the understanding of basic mechanisms of behavior change is research by Montgomery and colleagues on the role of cognitive variables in patients' symptom experiences. Specifically, these researchers focused on the effect of patients' expectations on the development of chemotherapy side effects *(57–60)*. On the basis of the response expectancy theory *(28)*, Montgomery and Bovbjerg *(60)* predicted that patients' expectations of their reaction to treatment would be causally related to subsequent development of chemotherapy side effects. In a series of prospective longitudinal studies, the predictions of Montgomery and colleagues were confirmed. Patients' expectations made a strong and reliable contribution to the occurrence of anticipatory and post-treatment nausea as well as chemotherapy-related fatigue *(58–60)*. Their expectations also played a role in the actual severity of the side effects. These results have broad implications for the understanding of basic biobehavioral processes, most notably: 1) the relative contributions of patients' expectations and conditional learning trials to the production of putative conditional responses, 2) opportunities and foci for clinical intervention, and 3) the mechanisms responsible for mind–body effects.

A third example is research by Manne, DuHamel, and colleagues *(61–63)* on the role of social support in mothers' successful coping with their children's bone marrow transplantation in the treatment of leukemia. In this work, the nature of the social support affected subsequent post-traumatic stress disorder. Mothers who had a social support system that provided them the opportunity to express their cancer-related thoughts and feelings (such as making sense out of their child's catastrophic illness) had far fewer symptoms of post-traumatic stress disorder.

These examples, taken from three independent lines of research, demonstrate the importance of behavioral medicine research with cancer patients in broadening our understanding of psychologic factors and health. In a very real sense, cancer research can serve as a model for understanding psychobehavioral processes and mechanisms of behavior change.

Critical Areas for Future Investigation

As with most areas of clinical research, a number of issues demand further investigation. These issues relate to understand

Table 2. Summary of behavioral interventions to relieve anxiety and distress*

	Participants		Intervention					Outcomes‡		
Authors (reference No.)	Diagnosis	Total No. (No. of females/males)	Control groups (total No.)	Experimental groups (total No.)/ study design	Format	No. and length of sessions	Behavioral components†	Anxiety and distress	Pain	Physio arousal
Kellerman *(88)*	Leukemia	1 F, child		#1 (1)/case report	Family		Contingency management, hyposis, relaxation training	+++		
Kellerman et al. *(89)*	Mixed cancer	18 (10 F/8 M), children		#1 (18)/repeated measures	Indiv	2 sessions, ? min, and during procedure itself	Hypnosis, relaxation training	++	++	
Dahlquist et al. *(90)*	Mixed cancer	3 (1 F/2 M), children		Case report	Indiv	4 sessions	Contingency management, hypnosis, relaxation training	+++		
Domar et al. *(91)*	Skin cancer	42 (? F/? M)	Attn (21)	#1 (21)/RCT	Indiv	Varied mean = 24 days (administered by audio tape and written instruction)	Relaxation training	0 on standard, + subjective rating	0	+ (respiration rate)
Jay et al. *(19)*	Leukemia	56 (20 F/36 M), children		Repeated measures, counterbalance order of intervention	Indiv	1 session				
				#1 Attn control #2 CBT #3 valium			Contingency management, cognitive/attentional distraction, emotive imagery, relaxation training, rehearsal modeling	++	++	++ lower pulse rate; ++ lower blood pressure
Kuttner et al. *(51)*	Leukemia	48 (18 F/30 M)	No tx (?)	#1 (?)		1 session, 5- to 20-min preparation and then tx	Cognitive/attentional distraction	+ more effective for older children	+ for older children	
				#2 (?)/RCT		1 session, 5- to 20-min preparation and then tx 30 of ? had a second session	Hypnosis	+ more effective for younger children	+ for older children	
Smith et al. *(92)*	Mixed cancer	38 (12 F/16 M), children		#1 verbal distraction (13)	Group	1 session	Cognitive/attentional distraction			+ lower heart rate
				#2 sensory information (15)/RCT	Group	1 session				
Manne et al. *(69)*	Mixed cancer	23 (12 F/11 M), children	Attn (10)	#1 (13)/NRT	Family		Contingency management, cognitive/attentional distraction, relaxation training	+ children, + parent, 0 nurse	+ children—decreased pain and decreased restraint	
Holland et al. *(53)*	Mixed cancer	147 (95 F/52 M)		#1 (77)	Indiv	1 session plus audio tape	Relaxtion training	++		
				#2 (70)/RCT		0.5 mg of alprazolam 3 times per day		++, +		
Jay et al. *(20)*	Mixed cancer	83 (38 F/45 M), children		#1 (45)	Indiv	1 session	Contingency management, cognitive/attentional distraction, emotive imagery, relaxation training, rehearsal modeling	++	++	++

(Table continues)

Table 2 (continued). Summary of behavioral interventions to relieve anxiety and distress*

Authors (reference No.)	Participants: Diagnosis	Participants: Total No. (No. of females/males)	Intervention: Control groups (total No.)	Intervention: Experimental groups (total No.)/ study design	Intervention: Format	Intervention: No. and length of sessions	Intervention: Behavioral components†	Outcomes‡: Anxiety and distress	Outcomes‡: Pain	Outcomes‡: Physio arousal
Jay et al. *(20)*	Mixed cancer	83 (38 F/ 45 M), children		#2 (38) plus valium/RCT	Indiv	1 session	Contingency management, cognitive/attentional distraction, emotive imagery, relaxation training, rehearsal modeling	++	++	++
Decker et al. *(93)*	Mixed cancer	82 (52 F/30 M)	Attn (29)	#1 (34)/RCT	Indiv	6 sessions, 1 h	Relaxation training	+		
Powers et al. *(94)*	Leukemia	4 (4 F/0 M), children		#1 (4)/Indiv analysis	Family	2–4 intensive training sessions, 45 min; 2–4 maintenance promotion sessions, 15 min	Cognitive/attentional distraction, relaxation training	++ children	++ children	
Manne et al *(95)*	Mixed cancer	35 (16 F/19 M), children		#1 nurse encouragement (17)	Family	1 session, 10 min	Contingency management cognitive/attentional distraction, relaxation training	++		
				#2 No nurse encouragement (18)/RCT	Family	1 session, 10 min	Contingency management, cognitive/attentional distraction, relaxation training	++		
Slifer et al. *(96)*	Mixed cancer	10 (? F/? M), children		Case report	Indiv	1–3 sessions	Contingency management, hyponosis, desensitization, relaxation training			++ most radiation tx without sedation
Evans and Connis *(52)*	Mixed cancer	72 (25 F/47 M)	No tx (26)	#1 (29)	Group	8 sessions, 60 min	Relaxation training, cognitive restructuring	+		
				#2 (23)/RCT				+		
Baider et al. *(97)*	Mixed cancer, not metastatic	45 (? F/? M)	tx refusers: no tx (24)	#1 (21)/NRT	Indiv	6 sessions, 60 min	Hypnosis, relaxation training, cognitive restructuring	++ end of tx, but not at 3-mo follow-up		
Broome et al. *(98)*	Mixed cancer	28 (11 F/17 M), children		#1 (28)/Pre-post	Indiv	1 session	Cognitive/attentional distraction, relaxation training, rehearsal modeling	00	++	
Chen et al. *(40)*	Leukemia	50 (12 F/38 M), children	Attn (25)	#1 (25)/RCT	Indiv	2 sessions	Cognitive restructuring	+	+	+, 0
Steggles *(99)*	Breast cancer	2 F		Case report	Indiv	Patient 1: 6 sessions	Hypnosis, desensitization, cognitive restructuring	++		
						Patient 2: 10 sessions	Hypnosis, desensitization, cognitive restructuring	++		

*Abbreviations used: Attn = attention; CBT = cognitive behavioral therapy; F = female; Indiv = individual; M = male; NRT = nonrandomized trial; Physio = physiologic; RCT = randomized clinical trial; tx = treatment.

†Behavioral components: contingency management, cognitive/attentional distraction, hypnosis/distracting imagery, systematic desensitization, emotive imagery, relaxation training, cognitive restructuring, and modeling.

‡+ = statistically significant improvement relative to controls; 0 = statistically nonsignificant improvement relative to controls; ++ = statistically significant improvement pre–post; 00 = statistically nonsignificant improvement pre–post.

Table 3. Summary of studies of behavioral interventions to relieve cancer treatment-related pain*

	Participants		Intervention					Outcomes‡		
Authors (reference No.)	Diagnosis	Total No. (No. of females/males)	Control groups (total No.)	Experimental groups (total No.)/ study design	Format	No. and length of sessions	Behavioral components†	Anxiety and distress	Pain	Physio arousal
Hilgard and LeBaron *(38)*	Leukemia	24 (? F/? M)		#1 (24)/Pre–post	Indiv	1 session, baseline, tx 1, tx 2	Hypnosis, rehearsal modeling		++	
Zeltzer and LeBaron *(36)*	Leukemia, non-Hodgkin's lymphoma, and neural tumors	33 (16 F/17 M), 6–17 y old		#1 (16) #2(17)/RCT	Indiv Indiv	11+ 11+	Hypnosis Cognitive/attentional distraction, hypnosis, relaxation training	+, ++	+, ++ ++	
Reeves et al. *(100)*	Mixed cancer	28 (12 F/16 M)	No tx (14)	#1 (14)/RCT	Indiv	2 sessions, 45 min	Hypnosis, relaxation training		+	
Katz et al. *(101)*	Leukemia	36 (12 F/24 M)	Attn/play (19)	#1 (17)/RCT	Indiv	2 sessions, 30 min	Cognitive/attentional distraction, hypnosis, relaxation training	0, ++ ++	0, ++ ++	
McGrath and de Veber *(35)*	Leukemia	14 (5 F/9 M), 3–14 y old		#1 (14)/repeated measures			Cognitive/attentional distraction, hypnosis, relaxation training	++	++	
Wall and Womack *(102)*	No information on cancer diagnosis	20 (? F/? M), children		#1 (9) #2(11)/RCT	Group	2 sessions	Cognitive/attentional distraction, hypnosis, relaxation training	00, ++ obs 0, 00, ++ obs	++	
Broome et al. *(103)*	Leukemia	14 (3 F/11 M), 3–15 y old and 13 parents		#1(14)/repeated measures	Family	3 sessions	Cognitive/attentional distraction, hypnosis, relaxation training	00 children, 00 parent	++ children	
Syrjala et al. *(55)*	Hematologic malignancy or lymphoma	45 (19 F/26 M)	No tx (10); Attn (12)	#1 (11)	Indiv	2 sessions, 90 min	Cognitive/attentional distraction, relaxation training, cognitive restructuring		0	
				#2 (12)/RCT	Indiv	2 sessions, 90 min	Hypnosis, relaxation training		+	
Arathuzik *(104)*	Metastatic breast cancer	24 F	No tx (8)	#1 (8)	Indiv	1 session, 75 min	Hypnosis, relaxation training	0	0	
				#2 (8)/RCT	Indiv	1 session, 120 min	Cognitive/attentional distraction, hypnosis, relaxation training	0	0	
Dalton and Lambe *(105)*	Mixed cancer	2 (1 F/1 M)		#1 (2)/case report	Indiv	5 tx sessions and 2 follow-up visits, 45–60 min	Cognitive/attentional distraction, cognitive restructuring	++	++	
Syrjala et al. *(106)*	Leukemia or lymphoma	94 (41 F/53 M)	No tx (?), Attn (?)	#1 (?)	Indiv	12 sessions	Hypnosis, relaxation training		0	
				#2(?)/RCT	Indiv	12 sessions	Cognitive/attentional distraction, hypnosis, relaxation training			
Liossi and Hatira *(54)*	Leukemia	30 (13 F/17 M), 5–15 y old	No tx (10)	#1 (10)	Indiv	2 sessions, 30 min	Hypnosis, relaxation training		+	
				#2 (10)/RCT	Indiv	2 sessions, 30 min	Relaxation training, cognitive restructuring		+	

*Abbreviations used: Attn = attention; F = female; Indiv = individual; M = male; NRT = nonrandomized trial; obs = observed; Physio = physiologic; RCT = randomized clinical trial; tx = treatment.

†Behavioral components: contingency management, cognitive/attentional distraction, hypnosis/distracting imagery, systematic desensitization, emotive imagery, relaxation training, cognitive restructuring, and modeling.

‡+ = statistically significant improvement relative to controls; 0 = statistically nonsignificant improvement relative to controls; ++ = statistically significant improvement pre–post; 00 = statistically nonsignificant improvement pre–post.

ing why behavioral methods work and for what new problems they might work as well as overcoming obstacles to making them work. Although most of the research to date has focused on investigating the effectiveness of behavioral intervention, interest in investigating the mechanisms underlying these methods has increased. For example, in the study of the use of hypnosis and related methods [e.g., *(55)*], clinical investigators are trying to determine the active ingredients: Is it relaxation, is it distraction, or is it suggestion? In research on multimodal intervention, investigators are increasingly interested in the possible role of cognitive factors. Identification of the active components of effective behavioral intervention will help determine how to streamline clinical applications and make them more effective.

Behavioral intervention is now being tested in the treatment of neuropsychologic deficits and sexual dysfunction *(64–66).* For example, in a case study of a man 2.5 years after having had a right temporal lobectomy *(64),* a cognitive retraining program (including training in self-monitoring skills) led to improvements in neuropsychologic functioning. Researchers have developed an intervention for women who experience sexual dysfunction after radiation therapy for cervical, endometrial, or ovarian cancer. The intervention included teaching women how to use vaginal dilators and lubricants as well as how to perform Kegel exercises. As compared with a control group, the women who received the intervention had less fear about cancer and sexuality *(67).*

As mentioned earlier in this review, research on behavioral intervention to control prolonged pain associated with cancer treatment is scant, and this issue demands further study. Fortunately, there is reason to be guardedly optimistic regarding behavioral intervention in the treatment of these types of pain. Indeed, there is a growing body of research on the effectiveness of behavioral intervention to control long-term and chronic pain associated with other illnesses, such as arthritis, fibromyalgia, and sickle cell anemia *(68).* That work could be used to inform the design and testing of behavioral interventions for these problems in cancer patients. There are substantial barriers to the wide implementation of behavioral intervention. One of the most important is cost. Although behavioral investigators have recognized this problem, little research has been conducted to explore the cost-effectiveness of these interventions. Nevertheless, steps have been taken to reduce costs of behavioral interventions. One strategy, for example, has been to train parents as coaches to help guide their child in the use of behavioral coping during invasive medical procedures *(69).* Not only has this intervention strategy been effective in controlling the child's aversive side effects, but also parents have benefitted by their involvement. Specifically, parental anxiety and distress were reduced *(20).* Another practical barrier is that behavioral intervention has primarily been the domain of psychologists, who often have to be brought in as specialized consultants. One solution has been to involve oncologists, nurses, and other direct-care medical staff as behavioral interventionists *(50).* In addition to making behavioral services more readily available, this strategy holds the potential for preventing the development of aversive side effects by introducing behavioral methods early in the course of medical treatment.

An important issue is the identification of "less traditional" behavioral methods, such as those generated by patients and individuals from other cultures (e.g., Asian). As with many professional attempts to improve quality of care, patients often know best. Patients may have discovered, on their own, other methods that help. For that reason, researchers must systematically survey patients, survivors, and family to identify new methods to manage aversive side effects. Another source of symptom control might be gained from alternative methods research to control side effects (e.g., meditation).

A topic that has received only modest attention is that of possible side benefits of behavioral intervention for patients. Indeed, patients often report an increase in sense of self-control and mastery through participation in behavioral intervention. For example, in their research with the use of audio-tape relaxation training with chemotherapy patients, Burish and his colleagues *(70,71)* found that patients used the relaxation audio tapes to manage other problems, such as insomnia, generalized anxiety, and headache. Such reports should be documented, and the specific mechanisms need to be identified.

Role of Behavioral Intervention in Cancer Prevention and Control

As was pointed out earlier in this review, behavioral medicine is recognized as key in the overall effort in cancer prevention and control. There is no question that behavioral intervention has made substantial clinical contributions to the reduction of aversive side effects of cancer treatment. It is also important to appreciate the fact that the impact of behavioral medicine in cancer is not limited to behavioral intervention to reduce treatment side effects. Behavior research and theory are being applied in other areas of cancer prevention and control. The most notable applications are efforts to increase participation in cancer screening and early detection, programs to help smokers quit, and behavioral skill training to facilitate the long-term adjustment in cancer survivors. A common feature of all of this work is the tailoring of the intervention/training (whether it be health education, training in specific skills, or rehabilitation) to the individual. Rather than initiating, for example, a broad educational program about the dangers of cigarette smoking, the behavioral approach to smoking cessation counseling involves first determining the individual's interest in quitting and his/her personal barriers to participating in a focused cessation program. With that information, the health educator or interventionist designs a program that is tailored to "where the individual is" in terms of quitting [i.e., the individual's "readiness" to stop smoking *(72)*]. Through ongoing monitoring of the individual's progress in the cessation program, the program is modified to meet the individual's changing needs. This strategy is used in all behavioral education/intervention: The individual's strengths, weaknesses, barriers, and interest are determined, and then a program is implemented that takes into consideration the patient's progress. For cancer survivors, behavioral interventions, such as systematic desensitization and relaxation training, are also being used to reduce symptoms of post-traumatic stress disorder (e.g., avoidance behaviors and flashbacks) that have been shown to occur up to 11 years after bone marrow transplantation *(73).*

Perhaps the strongest evidence of the broad impact of behavioral medicine movement prevention and control is the 1998 reorganization of the Division of Cancer Control and Population Sciences of the National Cancer Institute.

Strong evidence of the broad impact of the behavioral medicine movement on cancer prevention and control is the creation, in 1997, of the Division of Cancer Control and Population

Sciences at the National Cancer Institute. Part of its mission is to support behavioral research through the Behavioral Research Program. With five branches (Basic Biobehavioral Research, Tobacco Control Research, Health Promotion Research, Applied Cancer Screening Research, and Health Communications and Informatics Research), the program seeks to foster the integration of basic behavioral research and public health intervention development.

CONCLUSIONS

Based on this review, the following conclusions are warranted: 1) Behavioral intervention can effectively control anticipatory nausea and vomiting in adult and pediatric cancer patients undergoing chemotherapy; however, the evidence for the efficacy of behavioral intervention to control post-chemotherapy nausea and vomiting is less clear. 2) Multimodal behavioral intervention can ameliorate anxiety and distress associated with invasive medical treatments. 3) Although a variety of behavioral methods have been shown to reduce treatment-related pain, increasing evidence demonstrates that these methods are not equally effective. Hypnotic-like methods, involving relaxation, suggestions for reduced pain, and distracting imagery, hold the greatest promise for benefit to the patient. The results from this review provide strong support for the integration of behavioral intervention into standard care of cancer patients.

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NOTE

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