Integrative Care in Pediatric Oncology

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Pediatric integrative oncology is the intentional combining and coordinating of *conventional* and *evidence-based complementary therapies* into the overall treatment plan developed by the pediatric oncology team with the family. In contrast, according to the National Center for Complementary and Alternative Medicine (NCCAM http://nccam.nih.gov), alternative medicine refers to therapies used outside the mainstream biomedical model. Alternative therapies are not covered in this chapter.

The core principles of integrative medicine are as follows: (1) focus on the individual's innate healing response, (2) emphasis on the therapeutic relationship between patient and provider, (3) consideration on the whole person (body, mind, spirit) and all elements of lifestyle, (4) emphasis on health promotion, and (5) the use of all appropriate evidence-based therapies, both conventional and complementary.

As cancer and its treatment take a profound toll on children and caregivers, many families independently turn to complementary therapies to help support their children. Reasons include a desire to improve overall health and to mitigate treatment side effects and related conditions (e.g., fatigue, anxiety, depression, pain, nausea). Other reasons include a desire to explore all possible treatment options, maximize nutrition, reduce stress, and to offer all possible comfort and support throughout treatment including end-of-life. Prevalence reports of pediatric oncology patients using complementary therapies vary from 17 to 84 % primarily because of lack of standardized definitions (Ndao et al. 2013; Myers et al. 2005). To reduce confusion, the classifications developed by the NIH/NCCAM Advisory Board will be used in this chapter.

Many therapies have been found to support the natural healing process and are less invasive and sometimes less costly than comparable conventional medicine approaches. Consumer interest has significantly outpaced conventional medical education and training about complementary modalities. For example, in a survey of 90 pediatric oncologists, 99 % felt it was important to know what type of therapies their patients were using;

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however, fewer than 50 % asked their patients about use because of perceived lack of knowledge and time. Yet, over half of respondents expressed concern about possible harm especially from special diets, supplements/vitamins, and chiropractic treatment (Roth et al. 2009). Recently, the field of integrative medicine has been supported by better-defined research priorities (Briggs and Killen 2013), increased research funding, and organizations like the Consortium of Academic Health Centers for Integrative Medicine (http://www.imconsortium.org/).

The complementary therapies that might be considered in an integrative approach are presented in Table 16.1. No study has explored the usage of every possible modality. However, several practices are frequently reported including prayer, relaxation/imagery, supplements, massage, exercise, herbal medicines/teas, megavitamins/minerals, and special diets (McLean and Kemper 2006).

Why is an integrative approach developed with the oncology team preferable to independent use of complementary therapies?

Clear and open communication is critical to full disclosure of all therapies being used. This reduces the risk of unintended interactions (e.g., between drugs and supplements), a major concern of conventional providers. Good communication can also lead to consideration of an expanded range of therapies to accompany conventional treatment. Participating in such discussions enhances patients' self-efficacy, which may positively affect healing; addresses facts as well as uncertainty about treatment options; and more accurately informs the patient about the risks/benefits of the proposed therapies (Roth et al. 2009).

NCCAM suggests ways to begin the conversation at http://nccam.nih.gov/timetotalk. These "Time to Talk" pages include tip sheets for various topics, such as "5 tips on safety of mind and body practices for children and teens." These tip sheets include known evidence for the use of the modalities they cover. "Time to Talk" materials can be downloaded or ordered.

Table 16.1 NCCAM classifications of complementary therapies with selected examples

Practice	Examples
Whole medical systems	Naturopathy, Ayurveda, traditional Chinese medicine
Mind–body medicine	Meditation, prayer, mental healing, creative arts therapy (art, music, dance, writing)
Biologically based practices	Dietary supplements, botanical medicine
Manipulative and body-based practices	Chiropractic, osteopathy, massage
Energy therapies	Biofield therapies (Qigong, Reiki, therapeutic touch), bioelectromagnetics

Common Ethical Issues regarding Integrative Approaches

As in any medical encounter, ethical and legal considerations arise in integrative pediatric oncology treatment, especially if parents choose to forego conventional treatment in favor of an alternative therapy they perceive to be less toxic or dangerous. Kemper and colleagues have developed a table of efficacy and safety that can be used to evaluate any conventional or complementary therapy (Table 16.2).

Clinical decision making is complicated by the lack of research data currently available about complementary therapies, which introduce considerable uncertainty into specific clinical situations. The following guiding principles are especially applicable (Gilmour et al. 2011b).

- *Beneficence*: promote the well-being of the patient, regardless of the domain of medicine being considered.
- *Non-malfeasance*: "do no harm."
- *Patient autonomy*: does the patient have enough information to make an informed decision?

Training

A major challenge in developing an integrative oncology management plan is the variability of training, credentialing, and licensing in the

Table 16.2 Below is a 2 × 2 table illustrating an approach to evaluating a therapy based on efficacy and safety

		Efficacy	
		Yes	No
Safety	Yes	Use/recommend	Tolerate
	No	Monitor closely	Advise against

various modalities. Families and physicians must be well informed about the following issues (Gilmour et al. 2011a):

- Does sufficient evidence exist to suggest there is therapeutic benefit to using a particular modality?
- What are the practitioner's qualifications and pediatric experience?
- Is the practitioner's scope of practice clear?
- Is the proposed integrative treatment plan clear?
- Is consent for treatment informed?
- What is the duration of the trial of treatment?
- Will good quality treatment records be made available to the entire team of providers?

Integrative medicine is an evolving area. Board certification in IM for US physicians became available through a national certifying body in 2014. Fellowship training will be required for Board eligibility. Previously, the American Board of Integrative Holistic Medicine offered certification. Additional opportunities are available by modality. For example, the American Hypnosis Association offers in-person and online certification courses and seminars. Many training programs in nursing, psychology, dentistry, social work, and medicine offer courses in mindfulness training. The National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM) offers accelerated courses in acupuncture for physicians and nurses leading to the designation of NCCAOM Diplomate of Acupuncture.

While the body of evidence supporting IM is growing, an ongoing challenge in pediatric integrative oncology is lack of focused clinical outcomes research in children. The following sections provide an overview of selected integrative pediatric oncology treatment approaches; these sections are not designed to offer an exhaustive review.

Framing an IM Approach to the Pediatric Oncology Patient

Elements of an integrative approach are tailored to the patient's needs and may include one or more of the following categories.

Nutrition	Spirituality	Whole medical systems approaches
Dietary supplements	Sleep	Environmental exposures
Mind–body medicine	Physical activity	Relationships/social support

An IM approach to pediatric oncology patients has the potential to align with the Children's Oncology Group 2013 blueprint for research in several key areas including quality of life (QOL), nutrition, and approaches to reduce nausea and vomiting (Sung et al. 2013).

Selected topics will be discussed below using case vignettes.

Nutrition

Case Vignette
A 13- year-old boy is undergoing treatment for Ewing sarcoma. His parents are concerned about his weight loss and the quality of food he is getting in the hospital. They ask if they can bring him whole foods from home.

Nutrition is a critical component of cancer treatment and a foundation of IM treatment. Poor nutrition decreases survival rates, response to treatment, and quality of life and increases time in the hospital (Bauer et al. 2011; Brinksma et al. 2012). The primary goals of an integrative

nutrition plan are maintenance of existing body stores of healthy tissue, minimization of wasting due to illness and treatment side effects, support of age-appropriate growth, reduction of inflammation, and maintenance of good QOL (Bauer et al. 2011). Challenging confounding factors include presence of a hypermetabolic and pro-inflammatory state due to tumor metabolism, anorexia and cachexia, hormonal or other metabolic disruptions, stage of illness, infection, treatment regimen, and individual susceptibility to malnutrition. Unfortunately, the hypermetabolic state is often not reversible, even with adequate caloric supplementation. In addition, different malignancies have been associated with specific nutritional states. For example, children with solid tumors are at higher risk of undernourishment compared to children receiving high-dose steroids or cranial radiation, who are at high risk for fat accumulation, insulin resistance, and possible metabolic syndrome. Multimodal treatment regimens add to the complexity of nutrition management as each treatment may result in different or overlapping toxicities (Bauer et al. 2011).

The Mediterranean diet is a mainstay of IM and consists of a primarily plant-based diet with ample vegetables and fruits, whole grains, lean proteins with an emphasis on fish, low-fat dairy, and beverages and spices with potent anti-inflammatory and antioxidant properties. One study in 117 adult survivors of childhood leukemia showed that adherence to a Mediterranean diet pattern was associated with lower adiposity, waist circumference, body mass index, and odds of developing metabolic syndrome (Tonorezos et al. 2013). Few studies exist on the benefit of this diet pattern in patients undergoing treatment.

A concern about the use of the Mediterranean diet during cancer treatment is the potential of naturally antioxidant-rich foods to interfere with certain types of treatment especially anthracyclines, platinum-containing agents, alkylating agents, and radiation therapy, which act against cancer cells by generating free radicals. While no data exist to support outright interference with therapy, some sources, such as the American Cancer Society, recommend not exceeding 100 % of the RDA for antioxidant-type vitamins such as vitamins C and E during treatment (Doyle et al. 2006).

Case Vignette

The vegetarian parents of a 7-year-old boy with neuroblastoma being treated with chemotherapy and radiation ask about including raw and unprocessed foods (honey, sprouts) to promote cellular recovery.

NCI guidelines regarding food safety are consistent in recommending no raw foods that have not been packaged and then thoroughly washed; no foods from salad bars, buffets, sidewalk vendors, potlucks, delis, or bulk food bins; no fish, oysters, shellfish, or eggs that have not been thoroughly cooked (no sushi or cookie dough); no sprouts; no whole pieces of poultry not cooked to 180° or ground poultry cooked to 165°; and no beef, pork, lamb, or venison not cooked to 160°. All milk, yogurt, cheese, other dairy products, fruit juices, and honey should be pasteurized (National Cancer Institute 2014c).

For these vegetarian parents who are eager to help boost their child's immune system, the best approach is to provide a varied diet that contains adequate protein from cooked tofu, beans, and nuts; mono- and polyunsaturated fats; whole grains and fiber; vitamins and minerals from well-washed fruits and vegetables; and good hydration with water as well as pasteurized fruit juices. Small snacks of energy-dense foods (that might not typically be considered "healthy") may be needed to provide extra calories. Also, their son should avoid snacks that may make treatment-related side effects worse. If diarrhea is a problem, for example, avoid popcorn and raw fruits and vegetables. If mucositis is a problem, their son should avoid dry, coarse, or acidic foods. He should increase the amount of fiber he eats if constipation is an issue. In addition, taste can change with treatment. Some things that were formerly considered delicious may not appeal and vice versa. Getting enough protein may be a problem with a strict vegetarian diet. The parents may be willing to modify their child's eating

practices to allow more variety during treatment and the early days of recovery (American Cancer Society 2014).

Case Vignette
A 17-year-old boy is starting treatment for stage IV B Hodgkin's disease. The parents ask about using probiotics.

Probiotics are a heterogeneous group of live nonpathogenic strains of microorganisms that can be taken as foods (sea kelp, algae, yogurt) or supplements to modify gut microbial ecology, leading to beneficial structural and functional changes. Of all the gut microbiota, *Lactobacilli* and *Bifidobacteria* are considered the most important to maintaining good health. Because chemotherapy and radiation therapy target rapidly dividing neoplastic cells, they also affect rapidly dividing cell populations throughout the body. As a result, the epithelia of the GI tract are particularly susceptible, leading to the development of mucositis. It appears that intestinal damage is due both to increased apoptosis and to the activity of proinflammatory cytokines (Wardill et al. 2012). Most probiotic preparations available over-the-counter are heterogeneous. However, achieving the potentially beneficial effects of probiotic treatment appears to require a high degree of species and strain specificity (Prisciandaro et al. 2011).

Probiotics are classified as "generally regarded as safe" with most safety concerns related to risk of infection caused by the probiotic bacteria and transfer of antibiotic resistance. However, the antibiotic resistance is intrinsic and so nontransmissible. This resistance may benefit patients if their intestinal flora has become unbalanced due to the administration of multiple antimicrobial agents. On the negative side, some strains carry potentially transmissible plasmid-encoded antibiotic resistance genes that could be transferred to endogenous flora producing a new antibiotic-resistant pathogen. This risk is increased in immunocompromised hosts. Overall, despite a substantial number of publications, findings from the current literature are inconclusive about the use of probiotic interventions during treatment (Mego et al. 2013). Lastly, virtually all studies have been conducted in adults, and although the patient presented here might possibly fall into that physiological category, his risk is not fully represented by the data available.

Dietary Supplements

Case Vignette
A 7-year-old girl is undergoing treatment for ALL with vincristine, doxorubicin, cytarabine, 6-mercaptopurine, methotrexate, cyclophosphamide, and prednisone. Her parents ask if she can use coenzyme Q10 during treatment.

There are three primary concerns about the use of dietary supplements in pediatric cancer patients: (1) the paucity of evidence-based data to help guide safe use, (2) low rates of disclosure creating risk of unwanted drug–herb interactions; and (3) selected supplements high in antioxidant activity interfering with commonly used chemotherapies that act against cancer cells by generating free radicals.

Many patients have questions about coenzyme Q10, which is synthesized in the body and present in most tissues (e.g., heart, liver, kidneys, and pancreas). It has an active role as a carrier of electrons and protons in mitochondrial ATP synthesis and in its reduced form (ubiquinol), acts as an antioxidant, protecting cells from damage due to free radicals (Ernster and Forsmark-Andree 1993).

Coenzyme Q10 deficiency was correlated with certain cancers in the early 1960s, and interest remains high in its potential use in treatment due to its role in energy production, positive effect on the immune system (Folkers et al. 1982, 1991), and antioxidant properties that stabilize cell membranes and protect against free radical damage to tissue (National Cancer Institute 2014b). However, other studies raised concern that the free radical

scavenging action of coenzyme Q10 may interfere with the efficacy of some cancer treatments, such as radiation therapy (Lund et al. 1998).

Studies of coenzyme Q10 as either primary or adjuvant therapy in humans are limited, with mixed results. Other common antioxidants, such as vitamin C, vitamin E, and lycopene, have similarly limited evidence for use in cancer prevention or treatment, especially in pediatrics (van Dalen et al. 2008; Greenwald et al. 2007; Fortmann et al. 2013).

A comprehensive review of antioxidant supplementation by Ladas and Kelly (2010) concludes that insufficient evidence exists to broadly recommend antioxidant therapies. Current NCI recommendations urge caution in the use of any antioxidant supplement during cancer treatment. However, ingestion of normal amounts of antioxidants in foods is not contraindicated (National Cancer Institute 2014a).

Case Vignette
A 3-year-old boy with ALL is being discharged after hospitalization for fever and neutropenia. His father asks if the boy can take elderberry syrup as an immune booster.

Black elderberry extract has an excellent safety profile and has been shown to have strong antiviral properties, especially against some strains of influenza. Small studies have also investigated its potential to activate a healthy immune system by increasing cytokine production. One study in 12 healthy adult volunteers using black elderberry extract demonstrated increased production of inflammatory cytokines, especially TNF-alpha, compared to controls (Barak et al. 2001). However, similar studies on the immunostimulating properties of elderberry, or other natural immune stimulants, are lacking in immunocompromised children making it difficult to recommend using the supplement. Simple supportive measures (e.g., adequate sleep/good nutrition) are low risk and may provide benefit.

Case Vignette
A 10-year-old girl has significant anticipatory nausea and vomiting associated with chemotherapy. Her parents ask if she may use ginger as an antiemetic.

Ginger has been shown to be safe and effective in clinical trials for motion sickness and postoperative vomiting and in pregnancy. Although some studies have shown promise and low risk for the use of ginger in anticipatory nausea and vomiting in cancer treatment, results have been limited by variable study design and quality issues. Randomized, double-blind, placebo-controlled trials are underway in adults; similar studies are needed in children (Marx et al. 2014). Interest in the use of other approaches, for example, antinausea lollipops, is high; however, there are currently no evidence-based recommendations for the use of other dietary supplements in pediatric anticipatory nausea and vomiting. Research is ongoing in this area (Gottschling et al. 2014).

Case Vignette
A 5-year-old girl with ALL has developed chemotherapy-related hepatotoxicity. Is milk thistle a viable treatment option?

Milk thistle (*Silybum marianum*) has historically been used to treat hepatic and biliary disorders and in detoxification of hepatic toxins (Greenlee et al. 2007; Tamayo and Diamond 2007). A double-blind study of 50 children with ALL and hepatic toxicity given a 28-day course of milk thistle showed a significantly lower AST level and a trend toward a lower ALT level in the treatment group at day 56. No evidence of interference with treatment was observed (Ladas et al. 2010a, b).

These brief vignettes demonstrate the complexity of dietary supplement use in pediatric

oncology and reinforce the importance of having an organized approach to researching the dietary supplement in question. A systematic review of articles examining the prevalence of CT use in pediatric cancer patients identified 28 studies ($n = 3526$ patients with varied cancer diagnoses). Herbal remedies were the most commonly used modality and occurred in up to 48 % of patients. *Only 50 % of patients disclosed use of the dietary supplement or botanical to their doctor* (Ndao et al. 2013).

A five-step approach to dietary supplement use in pediatric oncology:

1. Encourage open, nonjudgmental discussion of supplement use, at every visit.
2. Verify product name and examine the label if possible.
3. Establish safety, efficacy, and potential side effects using a reputable resource.
4. Consult with a colleague trained in integrative oncology.
5. When in doubt, err on the side of caution.

Counteracting Nondisclosure

To help counteract high rates of nondisclosure of dietary supplement use, providers should create an atmosphere of receptive listening and openness so a thoughtful risk–benefit analysis can take place (Girard and Vohra 2011). To help facilitate the discussion, the Society of Integrative Oncology Clinical Practice Committee (2014) developed a list of ten of the most commonly used supplements in oncology patients, including mechanism of action in cancer, safety and side effects, dosage recommendations, drug interactions, and cautions. Because there are so little data on children, recommendations are largely extrapolated from adult studies (Frenkel et al. 2013).

Mind–Body Medicine

Mind–body medicine is the deliberate harnessing of positive interactions between thought, emotion, and physiology for the specific purpose of enhancing health. In a 2007 US population study, mind–body therapies were identified as the second most common CT used by people <18 years old (Birdee et al. 2010). Mind–body therapies are also used to address caretaker stress and distress (Kanitz et al. 2013; Elkins et al. 2010). The need for more effective interventions to reduce pain and stress has increased with better understanding of the detrimental physiologic effects of chronic pain and stress in children (Garner et al. 2012; Zempsky 2008; Kennedy et al. 2008).

Some of the best studied mind–body modalities in pediatrics include:

Clinical hypnosis Guided imagery Meditation, mindfulness	Massage therapy Yoga	Creative arts/ Expressive therapy (McClafferty 2011) Biofeedback, EEG Neurofeedback

Case Vignette

A 14-year-old girl with ALL was learning about yoga in gym class. She wonders if she should do some poses to help her relax.

Yoga can be a gentle, safe approach to stress management and physical fitness. A study of 286 young-adult cancer survivors showed 32.8 % had practiced yoga from their initial diagnosis to promote relaxation and maintain flexibility. Average length of practice was 25 months, with a mean of 7 hours of practice/month. Positive benefit was noted, and no adverse outcomes were reported (Park et al. 2013). Studies have shown improvement in gross motor function and QOL (Geyer et al. 2011) and significant improvement in flexibility and fitness (Wurz et al. 2014).

Special considerations in oncology patients participating in any movement therapy such as yoga, tai chi, or Qigong include physician approval, verifying teacher credentialing, avoiding any pose that causes pain or discomfort, and attention to wounds or indwelling catheters.

Other Frequently Used Mind–Body Therapies

Hypnosis and Imagery

Clinical hypnosis, which often includes imagery, is a state of focused relaxation. Beneficial effects were reported in the early 1980s in studies comparing hypnotic versus non-hypnotic techniques for management of procedural pain in children (Olness 1981; Zeltzer and LeBaron 1982). Clinical hypnosis also helps improve anticipatory anxiety, nausea, and vomiting (Kanitz et al. 2013; Accardi and Milling 2009).

Caveats regarding the use of hypnosis or imagery include the importance of using only fully trained practitioners and early referral or consultation with a mental health professional for any child with a history of abuse or preexisting mental illness. Hypnosis training for licensed professionals is available through the American Society of Clinical Hypnosis www.asch.net. Pediatric-specific training for licensed professionals is available through the National Pediatric Hypnosis Training Institute http://www.nphti.net/.

Meditation and Mindfulness

Meditation and mindfulness are the focus of active research inquiry in medicine to help address stress, sleep disorders, fear, anxiety, and other challenging emotions (Jones et al. 2013). Mindfulness-based stress reduction (MBSR) is a structured approach to mindfulness involving breath work, relaxation exercises, meditation, and movement exercises developed by Kabat-Zinn (1982). Although there are no large studies of the use of MBSR in pediatric oncology, multiple randomized controlled trials (RCTs) in adults with cancer confirm positive effects on QOL, mood, stress, immune function, and sleep (Carlson et al. 2003; Henderson et al. 2013; Anderson et al. 2013; Wurtzen et al. 2013; Zainal et al. 2013; Post-White et al. 2009). Contraindications to the use of mindfulness are highly individualized and may include prior history of mental illness or trauma. Mindfulness has also been used to help prevent burnout in pediatric oncology staff (Moody et al. 2013). Training in this area remains variable; some programs may use the standardized MBSR curriculum developed by Kabat-Zinn.

Case Vignette

A 12-year-old girl with rhabdomyosarcoma of the pelvis asks if she can have massage therapy to help relieve her back pain.

Massage therapy is the systematic stroking, rubbing, or kneading of the skin, underlying muscle, and other tissues to promote physical and psychological relief, improved circulation, relaxation of sore muscles, and other therapeutic effects (National Center for Complementary and Alternative Medicine (NCCAM) 2014).

The gate control theory suggests that massage may provide stimulation that helps to block pain signals sent to the brain. Massage can release endorphins and serotonin, which can positively affect mood. Small RCTs have shown reduced anxiety and improvement in overall feeling of well-being in children in various stages of cancer treatment with no reported adverse effects (Post-White et al. 2009; Mehling et al. 2012). Massage has also been combined with aromatherapy with positive effect (Fellowes et al. 2004).

The massage technique often used in oncology is Swedish massage characterized by gentle, long rhythmic strokes. *Tapotement* (percussion) and *petrissage* (kneading or knuckling) should be avoided. Other precautions include avoiding deep pressure or trigger point massage techniques, especially near lesions or enlarged lymph nodes, surgical sites or medical devices, or radiation fields. Patients with bleeding tendencies should receive very gentle massage to avoid bruising.

Massage therapy is generally safe when given by a credentialed practitioner trained to work with oncology patients, especially children. Serious adverse events have been associated with exotic types of massage or inexperienced practitioners (Deng et al. 2009). For children who do not like to be touched by strangers, caregivers can be taught simple techniques to massage hands, feet, arms, shoulders, or other noninvolved areas. Studies have shown that massage has relaxation benefits for both the person receiving as well as the person providing the massage. This can be a critical addition to the care plan that allows caregivers to participate directly in alleviating pain and discomfort in their child.

Case Vignette
Nurses on the pediatric oncology unit would like to provide Reiki to all patients.

Reiki therapy uses spiritual, or universal, energy to assist the healing process through the "laying on of hands" in specific positions on or above the patient's body. The origins of Reiki trace back to Buddhist healing practices. It is one of several energy or biofield therapies that include therapeutic touch and healing touch. Common assumptions in considering biofield therapies include the following: (1) The human body is an energy system that extends beyond the body; (2) the normal self-healing properties of the body are supported by the free, balanced flow of energy throughout the system; and (3) disease or disorder can be detected in the energy system and can be affected therapeutically by the conscious healing intent and compassion of the practitioner.

Reiki is understood to be present in every healing encounter. It can be offered as a whole treatment of 60–90 min or as a brief encounter to provide comfort. The energy that is transferred from the practitioner to the recipient can be used as needed. Several hundred thousand nurses have been trained in energy therapy. The Leonard P. Zakim Center at the Dana-Farber Cancer Institute has offered Reiki since the early 2000s without any negative side effects. Patients report feeling peaceful and relaxed, less anxious, able to sleep better, and able to have decreased pain (Potter 2013).

Reiki can be used with patients of all ages. The *Reiki Handbook for Kids and All Ages* by Sara McGrath includes the history of Reiki, meditation and visualization exercises, and hand positions for self-treatment and to treat others. *Reiki for Children: A Reiki Kids Handbook* by Kytka Hilmar-Jezek was written to help children learn about their bodies, inner spirit, personal power, and connection to the universal life force, which is love. Although Reiki has been shown to be gentle and effective, some patients or families may be resistant or skeptical due to the novel nature of the treatment.

Clinicians should be open and respectful of family concerns and treatment preferences.

Creative Arts/Expressive Therapy

Case Vignette
A 15-year-old reserved girl is reticent to engage verbally while undergoing stem cell transplant for relapsed leukemia. The parents ask for psychological help for her.

Times of crisis are the least opportune for learning new interpersonal skills. If anything, behaviors tend to regress and become more child-like. If someone has typically found it difficult to express worries, concerns, or fears, it is unlikely that she will suddenly be able to verbalize feelings during a new crisis. Health care providers tend to be verbal; thus, working with someone that finds verbal self-expression difficult can be frustrating.

Sustained stress (including depression and anxiety) can cause suffering that has significant negative effects on health and well-being as noted in the Institute of Medicine report, "Cancer Care for the Whole Patient"(National Academy of Sciences and National Institutes of Health 2008). Expressive therapies (e.g., music, art, dance, creative writing/journaling) are considered mind–body modalities. Extensive research has shown that they can reduce anxiety, mood disturbance, and pain and improve QOL by reinforcing a sense of control. They have been widely accepted by child life specialists as especially useful in reducing procedural pain (Klassen et al. 2008).

Although many patients are eager to talk about their feelings and will benefit from supportive counseling or cognitive behavioral therapy, some patients, especially children and teens, are less adept in expressing themselves verbally. Indirect expression by composing a song, drawing a picture, or writing a poem that they then share and discuss with a trained therapist can reveal concerns and feelings to which they have not yet assigned a specific word. The use of an expressive therapy should be considered risk-free even if a session leads to distress as the patient comes to grips with what is bothersome but has been repressed.

Music therapy is a branch of health care designed to aid physical and emotional health

through the use of music, either through listening, songwriting, performing, or lyric analysis and is provided by a trained therapist with an agreed-upon goal for the session, such as relaxation or symptom reduction. Music therapy has a robust evidence base in pediatric oncology and is used extensively for self-calming and to inspire creativity, facilitate adjustment, and enhance self-image (Robb et al. 2008; Hilliard 2006; O'Callaghan et al. 2012, 2013). Research exploring the science of music therapy is revealing the highly complex nature of the positive effect of music on the neurohormonal and immune systems and its links to pain perception and emotional processing (Leardi et al. 2007). Functional neuroimaging (fMRI) examining the mechanism of action indicates that emotions evoked by music appear to modulate limbic areas of the brain (Koelsch 2010). Research into the effect of music therapy in neuroplasticity and auditory–motor coupling in stroke victims (Rodriguez-Fornells et al. 2012) raises intriguing questions about its possible application in children suffering from neurocognitive deficits after tumor resection or radiation therapy.

Biofeedback

Biofeedback is the use of an external instrument or monitor that helps an individual to learn how psychological state (anxiety, depression, relaxation) affects physiological activity. With practice, the individual learns how changing thinking or emotional state can improve health and performance. Examples of physiologic functions that can be monitored and "fed back" to the individual include brainwaves, muscle tone, skin conductance, finger temperature, heart rate, and respiratory rate. Biofeedback is widely used in children with headache or other pain. One recent study on preprocedural distress in 12 children with cancer showed the benefit of teaching effective relaxation techniques using biofeedback in a four-session intervention (Shockey et al. 2013). A relatively new area of research is the use of neurofeedback (i.e., EEG biofeedback) to improve function in children suffering neurocognitive decline after cancer therapy by training patients to focus on and enhance specific brain wave activity that aids attention, concentration, and organization (de Ruiter et al. 2012).

Traditional Chinese Medicine/ Acupuncture

Case Vignette
A 15-year-old girl is receiving cisplatin and has been vomiting 10–12 times/day. The parents ask about acupressure as adjunctive therapy to antiemetics.

Traditional Chinese medicine including acupuncture and herbal medicine is commonly used in cancer treatment in China (Li et al. 2013). The search for the active components of these traditional treatments has been increasing (Mohd et al. 2013; Gundeti et al. 2012). Available studies primarily focus on the use of acupuncture (Jindal et al. 2008). Small studies have shown benefit in reduction of chemotherapy-related nausea and vomiting (Gottschling et al. 2008).

In addition to possible needle phobia, another potential concern about acupuncture treatment in oncology patients is bleeding due to thrombocytopenia. This issue was studied retrospectively in 32 pediatric patients who underwent 237 acupuncture treatments by highly trained acupuncturists in an academic pediatric oncology center. Platelet counts ranged from $\leq$20,000/uL to $\geq$100,000/uL. Twenty percent of sessions were done in patients with severe thrombocytopenia, 8 % with moderate thrombocytopenia, 19 % with mild thrombocytopenia, and 53 % in those with normal platelet counts. No acute or serious side effects were recorded in any acupuncture session. This small study is reassuring and lays the groundwork for larger prospective studies (Ladas et al. 2010b).

Another option is acupressure applied to acupuncture point P6 using wristbands. Small pediatric studies have shown it to be well tolerated,

but no more effective than placebo (Jones et al. 2008). Findings have been more positive in adult studies (Shin et al. 2004).

Case Vignette
The mother of a 2-year-old boy with neuroblastoma would like to use lavender oil in an aromatherapy diffuser to help him sleep better.

Aromatherapy uses plant-based essential oils to treat a wide variety of health issues and can be administered via inhalation or topically, often in conjunction with massage (Lv et al. 2013; Fellowes et al. 2004).

The use of aromatherapy dates back thousands of years and has a wide safety margin, although occasional topical irritation or allergy can be seen, and ingestion is contraindicated – especially in children. Inhalation aromatherapy studies specifically in pediatric oncology patients are sparse. For example, one randomized placebo-controlled study by Ndao et al. found a small (yet not statistically significant) benefit to bergamot aromatherapy for anxiety and pain in pediatric stem cell infusion (Ndao et al. 2012).

However, lavender has a long history of use to promote relaxation and sleep. Lavender aromatherapy has been shown to aid sleep in adult patients in hospice (Soden et al. 2004) and has been used safely with massage in infants with colic (Cetinkaya and Basbakkal 2012) and in bath oil to promote infant relaxation, suggesting a reassuring safety profile in children (Field et al. 2008). Individual preference has a significant influence on aromatherapy. Cancer treatment may alter olfactory and taste preferences.

Other measures to improve sleep in and out of the hospital might include age-appropriate relaxation techniques (breath work, music therapy, progressive muscle relaxation, white noise), implementing a soothing bedtime ritual, minimizing sleep interruptions, reduced lighting at night, and daytime exposure to natural light if feasible (Tamrat et al. 2014).

Clinical Pearls
- Encourage open, nonjudgmental discussion of use of integrative therapies, especially dietary supplements at every visit to help avoid undesirable interactions.
- Consider the addition of mind–body therapies such as clinical hypnosis and guided imagery to help address fear, pain, and anxiety in children and their families.

Where can providers and patients find reliable Web-based information about complementary therapies?

SAFE is an appropriate acronym to use when judging information found on the Internet.

S – Staff. Who created the site? Usually, there is an "About this site" page stating who developed or maintains it, the board of directors or a history of the site. What are their credentials? If none are listed, they should explain who they are.

A – Address. If the domain in the URL address is .org, it is run by an organization, probably not for profit. .edu or .gov are reliable sites. Be wary of .com or .net.

F – Fit. How "fit" is this site? Do several links lead to "page not found?" One or two dead ends may be tolerable, but more indicates the site is missing reasonable fitness goals. Are dates listed for the material and are these current? If a page in a health-related site has not been updated in 2 years, be skeptical about the information.

E – Evidence. Is the content well referenced? Are medical journal articles and book chapters cited or does the site consist primarily of individual opinions and biases? If there are references, how old are they? In most cases, research is expanding so rapidly that currency is crucial. Online support groups, consisting of other families' experiences, may be useful, as long as readers are aware that the material is of personal opinion.

PubMed

The *subject filter* "complementary medicine" will yield hundreds of terms referring to modalities as well as herbs/supplements. The subject filter "dietary supplements" also includes vitamins. Using the *Medical Subject Heading* (*MeSH*), "complementary therapies" is not as inclusive as the filter, but can offer different results. Other possible MeSH headings include "dietary supplements," "functional food," "plants, medicinal" or "herbal medicine."

http://www.nccam.nih.gov

NCCAM contains video lectures/other resources for professionals, herbal/dietary supplement information, grants/funding opportunities, definitions of and the evidence for various complementary therapies, literature reviews in PubMed, and practice guidelines. It also includes information for patients.

http://cam.cancer.gov

The NCI Web site has a section from its Office of Cancer Complementary and Alternative Medicine, OCCAM.

http://www.integrativeonc.org

The Society for Integrative Oncology is composed of professionals from different backgrounds who promote the evidence base for integrative approaches to patient care. The Society's practice guidelines are located here.

http://www.medlineplus.gov

MedlinePlus, geared toward consumers, is a one-stop, high-quality Web site from the National Library of Medicine. It features background material on herbs and dietary supplements (most originating from Natural Medicines Comprehensive Database or NCCAM). Most links in the topic areas are to government agencies, patient organizations, or professional organizations.

http://www.mskcc.org/cancer-care/integrative-medicine/about-herbs-botanicals-other-products

Memorial Sloan Kettering Cancer Center offers free information on herbs and plants. Explanations are well referenced and managed by their Integrative Medicine Service.

http://www.mdanderson.org/patient-and-cancer-information/care-centers-and-clinics/specialty-and-treatment-centers/integrative-medicine-center/videos/index.html

MD Anderson's Integrative Medicine Center Web pages include audios and videos with such titles as "Music Therapy Inspires Cancer Patients" and "Laughter is Good Therapy."

http://www.cancer.org/treatment/treatmentsandsideeffects/complementaryandalternativemedicine/complementary-and-alternative-medicine-landing

The American Cancer Society's index page for complementary and alternative medicine.

http://www2.aap.org/sections/chim/default.cfm

The American Academy of Pediatrics has a Section on Integrative Medicine, which lists resources for parents as well as clinicians.

Subscription Databases

AMED, the Alternative and Complementary Medicine Database, is produced by the British Library and tends to index journals from European sources.

MANTIS (Manual, Alternative, and Natural Therapy Index System) includes journals on chiropractic, osteopathy, manual medicine, and homeopathy.

Natural Medicines Comprehensive Database is an evidence-based compendium on herbs and supplements, compiled by the Therapeutic Research Center. Search herbs or supplements by name or search by disease.

Natural Standard includes sections on food/herbs/dietary supplements, health/wellness, comparative effectiveness, genomics/proteomics, and brands/manufacturers.

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