Weighted Blankets

Anxiety reduction in adult patients receiving chemotherapy

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BACKGROUND: Weighted blankets have been used as a deep touch pressure (DTP) tool to alleviate anxiety in many patient populations. Patients with cancer can experience anxiety related to diagnosis and treatments, such as chemotherapy infusions. Research on the effectiveness of weighted blankets as a DTP tool to alleviate anxiety in patients receiving chemotherapy is limited.

OBJECTIVES: This study assessed the effectiveness of a medical-grade therapeutic weighted blanket on anxiety in patients receiving their first and second chemotherapy infusions at an outpatient infusion center.

METHODS: A randomized controlled trial with a crossover design was performed with new patients in the outpatient chemotherapy infusion center. Patients were randomized to one of two study arms (given the weighted blanket during their first infusion or given the weighted blanket during their second infusion). Anxiety was measured using an anxiety inventory and a visual analog scale.

FINDINGS: Anxiety was reduced among patients receiving chemotherapy when the weighted blanket was used. Based on the results, a standard-weight, medical-grade therapeutic weighted blanket can be safely used to reduce anxiety in patients of various weights, and a visual analog scale can be a reliable indicator of patients' state anxiety.

KEYWORDS
weighted blanket; deep touch pressure; anxiety; infusion; chemotherapy; cancer

DIGITAL OBJECT IDENTIFIER
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PATIENTS WITH CANCER CAN EXPERIENCE HIGH ANXIETY related to their diagnosis and treatment (Grassi et al., 2017; Spiegel & Riba, 2015). Oncology nurses are often at the forefront of implementing complementary interventions for patients' levels of comfort, coping, and overall well-being. Complementary interventions for anxiety, such as massage, music therapy, and progressive muscle relaxation, have been shown to be effective in reducing anxiety among patients (Satija & Bhatnagar, 2017; Sheldon et al., 2014). Implementing similar interventions may also help oncology nurses to care for patients receiving chemotherapy who are experiencing anxiety.

Literature Review

The American Psychological Association (2019) defines anxiety as "an emotion characterized by feelings of tension, worried thoughts, and physical changes" (p. 1). Other symptoms of anxiety can include muscle tension, restlessness, sympathetic hyperactivity, gastrointestinal issues, increased heart rate, sweating, shaking, or fear of losing control. Anxiety is a common response to a cancer diagnosis and can continue throughout treatment, such as during chemotherapy infusions (Bates et al., 2017; Curran et al., 2017; Sheldon et al., 2014). According to Jadoon et al. (2010), adults with cancer have a high prevalence of depression and anxiety (66%) compared to patients with other diagnoses. In addition, anxiety levels are increased in patients receiving chemotherapy treatment compared to patients receiving other forms of cancer treatment (Lim et al., 2011).

Weighted blanket therapy has been identified as a method to decrease anxiety in autistic, psychiatric, dental, and nonmalignant patient populations (Champagne et al., 2015; Chen et al., 2012; Gee et al., 2017; Zimmerman et al., 2019). However, there is a lack of research on the effectiveness of weighted blankets as a method to alleviate anxiety in patients with cancer receiving chemotherapy infusions in an outpatient setting. Implementing a nonpharmacologic therapy option, such as a weighted blanket, can help to reduce anxiety in patients receiving chemotherapy, improve the patient experience during treatment, and decrease the use of medications to manage anxiety.

Deep Touch Pressure

Previous studies in different patient populations have found a reduction in anxiety with the use of weighted blankets (Champagne et al., 2015; Chen et al., 2012; Mullen et al., 2008; Zimmerman et al., 2019). A study by Mullen et al. (2008) discovered that 78% of nonhospitalized participants self-reported being more relaxed when using weighted blankets. This same study also

noted that, when participants were asked, body weight did not correlate with reports of the weighted blanket being too heavy. The authors did not expand on the possible correlation between body weight and anxiety reduction (Mullen et al., 2008).

Research on weighted blankets has typically focused on individuals who have autism spectrum disorder or attention-deficit/hyperactivity disorder (Blairs et al., 2007; Champagne et al., 2015; Losinski et al., 2016, 2017; Mullen et al., 2008; Sylvia et al., 2014; Zimmerman et al., 2019). The mechanism of action for weighted blanket therapy is deep touch pressure (DTP), which is a type of touch pressure that provides a mechanical deformation of the skin, underlying fascia, and periosteum (Mountcastle, 1968). Grandin (1992) described DTP as touch pressure applied to the body that provides some of the same sensations as a firm hug, holding, swaddling, or massage. DTP input can lead to improved arousal modulation consistent with a state of calmness (Chen et al., 2016; Olson & Moulton, 2004). DTP can also stimulate parasympathetic arousal (Chen et al., 2016; Reynolds et al., 2015). Parasympathetic nervous system engagement is inhibitory of stress and anxiety; it slows the heart rate and breathing and encourages digestion (Nazarewicz et al., 2015). In addition, when DTP is self-administered or gradually introduced, it has been shown to produce virtually no adverse effects (Sylvia et al., 2014).

When providing DTP, the following four components are necessary: conformation, consistency, compression, and constant contact with the nerve. This can be achieved through the use of swaddling; long, tight hugs; deep massage; compression sleeves; compression vests; and weighted blankets. This constant, consistent, and conformed compression stimulates proprioception—the subconscious sensation of body and limb movement and position—which is obtained from sensory input from the muscle spindles and joint capsules (Miller et al., 2003).

Weighted Blanket Guidelines

No previous research was found that supported an appropriate weight or pressure recommendation for weighted blanket therapy. However, many manufacturers have published guidelines for weighted blanket use, which recommend that a weighted blanket should be 10% of the individual's body weight and add one or two pounds (Drillinger, 2020; Mosaic Weighted Blankets, 2020; Price, 2019; Sensory Direct, 2020). Some studies have recommended using a weighted blanket weighing more than 10% of the individual's body weight, up to 30 pounds (Champagne et al., 2015; Mullen et al., 2008). Price (2019) suggested that weighted blankets should not be used by individuals who have diabetes, difficulty breathing, poor circulation, blood pressure issues, fragile skin, rash, or open wounds, or by those who are claustrophobic or cleithrophobic. Weighted blankets should not be used by children without adult supervision, used as a restraint, or used in conjunction with other weighted products (Sensory Direct, 2020).

Theoretical Framework

The theoretical framework for this study included sensory integration theory and polyvagal theory. Sensory integration theory is used by occupational therapists to explain why deep pressure causes a calming effect (Champagne et al., 2015; Mullen et al., 2008). Ayres and Robbins (2005) defined sensory integration as the central nervous system's translation of information into action. The theory is based on the belief that behavior is linked to neurologic processes, and brain stem–level sensory processing enables higher neural centers to develop and specialize (Roley et al., 2007).

DTP input influences the parasympathetic nervous system (Chen et al., 2012, 2016; Reynolds et al., 2015). Previous studies have suggested that stimulation of pressure receptors beneath the skin increases vagal tone and decreases cortisol and skin conductance levels (Field et al., 2010; Mullen et al., 2008; Reynolds et al., 2015). Polyvagal theory is a psychophysiologic theory that describes two vagal motor pathways and explains the body's phylogenetic neurophysiologic changes, adaptive reactions, and self-regulation, as well as the stress response in reaction to cues from the environment (Porges, 2014). This theory provides a biologic construct between sensory processing and psychophysiologic responses via the dorsal or ventral vagal motor pathways (Porges, 2014). Individuals may view a weighted blanket as a cue of safety, similar to swaddling in infants. When the body feels safe, the ventral vagus is activated, allowing the individual to access positive emotions (Dana, 2018). Not everyone perceives this subtle confinement as safe or comfortable depending on their individual neuroception molded from their life experiences (Dana, 2018; Porges, 2014).

Methods

Purpose

The purpose of this study was to assess the effects of a weighted blanket as an intervention to reduce anxiety in patients with cancer receiving chemotherapy infusions in the outpatient setting. The secondary aim of the study was to evaluate whether weighted blankets are safe for use and to examine whether anxiety reduction differed between weight classes. The third aim of the study was to determine the reliability of using a visual analog scale for anxiety (VAS-A) to measure state anxiety in this patient population.

Study Design

This randomized controlled trial with a repeated crossover design used a convenience sample to evaluate the effects of weighted blankets as an intervention to reduce anxiety in patients receiving chemotherapy in an outpatient infusion center. Data were collected during patients' first and second infusion visits. Rather than using a between-groups design, a crossover design was used to remove patient variation between the first and second visits.

A repeated crossover design has greater power than a between groups design and can reduce the chance of a type 2 error (Sibbald & Roberts, 1998).

The study took place at a large regional medical center in an outpatient infusion center located in the midwestern United States. The infusion clinic has 48 infusion bays and offers IV chemotherapy, IV hydration, phlebotomy, blood transfusions, and chemotherapy injections. The study was approved by the Parkview Health System Institutional Review Board in Fort Wayne, Indiana.

Sample

The study consisted of a convenience sample of 58 adult patients. Because there are no previous studies on the use of weighted blankets in patients receiving chemotherapy infusions, a power analysis was not completed. The goal was to recruit a small initial sample size to determine effect and feasibility for future studies. Patients were included if they were aged 18 years or older and were receiving their first and second chemotherapy infusions at the outpatient infusion center. Patients having specific cancers, cancer stages, or a mental health diagnosis were eligible but not targeted for this study. Based on the weighted blanket guidelines at the time that this study took place and to err on the side of safety, patients were excluded if they weighed 45 kg or less or were currently enrolled in another research study. Because of the possibility for altered sensory perception, patients who had a diagnosis of peripheral neuropathy or fibromyalgia were also excluded.

Instruments

Anxiety was measured using the State-Trait Anxiety Inventory for Adults Form Y-1 (STAI-AD) and the VAS-A. The STAI-AD is a 10-item self-rated questionnaire, with scores ranging from 1 (not at all) to 4 (very much so), was designed to evaluate the current state of anxiety of an individual in the moment. The STAI-AD was determined to be a valid and reliable measure of an individual's level of anxiety (Bergua et al., 2016; Metzger, 1976).

The VAS-A is a 100 mm horizontal line, with the left end representing no anxiety and the right end representing very anxious. Patients indicate their state anxiety by drawing one vertical slash on the line. The line is later measured in millimeters with a ruler from the left end of the line to the vertical slash mark to find the patient's VAS-A score. The VAS-A was determined to be reliable in measuring state anxiety in perioperative settings (Facco et al., 2013; Hernández-Palazón et al., 2018; Zemła et al., 2019).

Procedure

After obtaining informed consent, patients were randomized using blinded envelopes, which included a unique study identification number and identified which arm the patient was assigned to. Group A was given a weighted blanket to use during the first chemotherapy infusion and standard of care with no weighted blanket during the second infusion, and group B was given standard of care with no weighted blanket during the first chemotherapy infusion and a weighted blanket to use during the second infusion. Data were collected, including demographic information (e.g., gender, age), vital signs, weight, and STAI-AD and VAS-A scores. During the experimental visit (first infusion for group A and second infusion for group B), the weighted blanket was applied by the researcher to the patient from waist to feet, and the patient was instructed to keep the weighted blanket in place for at least 15 minutes. Patients were permitted to adjust the weighted blanket if desired. After the first 15 minutes of mandatory weighted blanket use, patients could don or doff the weighted blanket at their discretion throughout the remainder of the infusion. A digital clock was provided, and patients were instructed to record the times at which they donned or doffed the blanket during their infusion. At 30 minutes (plus or minus 5 minutes) after the weighted blanket was applied, the researcher returned to administer the STAI-AD and obtain the patient's VAS-A score and vital signs. These data were also collected following completion of the infusions at discharge, with the exception of STAI-AD because of the length of the measure. After the mandatory 15 minutes of blanket use and the 30-minute data collection, weighted blanket use and data collection times varied at discharge because of the varying lengths of infusion for each patient.

The standard-weight, medium-sized, medical-grade weighted blanket used in this study was obtained from CapeAble® Weighted Products. The weighted blanket was a one-piece design and measured 34 inches by 62 inches. The outer fabric was a Herculite's Sure-Chek® antimicrobial fabric, and the inner weight bladders were filled with clean recycled glass beads. These bladders were permanently internally fixed into the weighted blanket so that the weight did not shift when manipulated, which is important for providing consistent and accurate DTP. The weighted blankets

"Implementing a nonpharmacologic therapy option, such as a weighted blanket, can improve the patient experience during treatment."

were easily wiped clean after each patient's use with professional Sani-Cloth® AF3 germicidal disposable wipes.

Statistical Analyses

Linear mixed-effects models were paired with random patient-level intercepts to examine the association between weighted blanket use and each anxiety-related clinical outcome variable, accounting for the crossover design of this study and period effects. For each outcome, interactions with period were examined, and those that were statistically significant ($p < 0.05$) were retained in the model. To account for potential confounding, analyses were repeated with adjustment for patient age, weight, and gender. All patients were included in the analyses, even if they did not complete both visits. In a secondary exploratory analysis, the change in VAS-A and STAI-AD scores from admission were compared across weight classes by fitting linear mixed-effects models with random patient-level intercepts and restricting the data to include only observations during which the weighted blanket was used. To assess the correlation between STAI-AD and VAS-A scores, a repeated-measures correlation analysis was performed. All tests were performed using a Cronbach alpha of 0.05, and all analyses were conducted using R, version 3.6.0.

Results

The sample consisted of 58 patients, and most patients were female (n = 38). The mean age of patients was 63.2 years, and the mean weight of patients in the sample was 85.1 kg (median = 63 and 80.7, respectively). For those visits in which it was used, patients applied the weighted blanket for 156.6 minutes (median = 148) on average (see Table 1). Six patients attended only one appointment, and, of those, only four used the weighted blanket during their visit.

Missing observations and mean scores for the anxiety-related outcomes are presented in Table 2. All outcomes were collected at each of the three time points (at admission, after 30 minutes of weighted blanket use, and at discharge), with the exception of STAI-AD scores, which were only measured at admission and after 30 minutes of weighted blanket use.

The results from the unadjusted linear mixed-effects model are summarized in Table 3. Based on the STAI-AD and VAS-A scores, weighted blanket use resulted in a larger reduction in anxiety after 30 minutes compared to no blanket with standard of care. During visits where a weighted blanket was used, patient STAI-AD scores were reduced by an additional 2.15 points on average (95% confidence interval [CI] [4.05, 0.25]) as compared to visits where the weighted blanket was not applied. Similarly, weighted blanket use was associated with an additional reduction in VAS-A scores by a mean of 8.89 points (95% CI [16.59, 1.18]) at 30 minutes. Repeating the analyses while adjusting for patient age, gender, and weight did not substantially alter the results.

Patients were divided into five weight classes (70 kg or less, 70.1–85 kg, 85.1–100 kg, and 100.1–115 kg, and more than 115 kg). Differences in the reduction of STAI-AD and VAS-A scores at 30 minutes by weight class are presented in Table 4. Although patients in the highest weight class had smaller reductions in anxiety scores on the VAS-A on average than patients in the lower four weight classes, none of the differences reported were statistically significant. Because weighted blanket use was only required during the first 15 minutes of chemotherapy infusion, discharge anxiety data were not analyzed.

Additional analysis was completed to assess the validity of the VAS-A as compared to the STAI-AD. The correlation analysis of VAS-A and STAI-AD scores indicated a strong positive correlation between the two anxiety scores ($p = 0.7$, 95% CI [0.6, 0.78]).

Discussion

To the authors' knowledge, this is the first study to explore the use of weighted blankets as an intervention for reducing anxiety in patients receiving chemotherapy in the outpatient setting. A statistically significant reduction in anxiety was found with weighted blanket use compared to standard of care with no weighted blanket. For some patients, chemotherapy infusions can be a time of increased anxiety (Bates et al., 2017; Curran et al., 2017; Lim et al., 2011; Sheldon et al., 2014). Having a therapeutic weighted blanket available for patients undergoing infusion provides nurses with a complementary anxiety reduction strategy that they can implement immediately. In addition,

TABLE 1.
SAMPLE CHARACTERISTICS (N = 58)

CHARACTERISTIC	$\bar{X}$	SD
Age (years)	63.2	10.8
Weight at first visit (kg)	85.1	24.9
Blanket usage (minutes)	156.6	108.9
CHARACTERISTIC		**n**
Gender		
Female		38
Male		20
Weight class (kg)		
70 or less		16
70.1–85		20
85.1–100		11
100.1–115		3
More than 115		8

TABLE 2.
OUTCOME VARIABLE RESULTS WITH AND WITHOUT WEIGHTED BLANKET APPLICATION

	AT ADMISSION				AFTER 30 MINUTES				AT DISCHARGE			
VARIABLE	$\bar{X}$	SD	MEDIAN	MISSING	$\bar{X}$	SD	MEDIAN	MISSING	$\bar{X}$	SD	MEDIAN	MISSING
With weighted blanket (N = 54)												
Temperature (°F)	97.7	0.5	97.8	–	97.9	0.4	97.9	–	97.9	0.5	97.9	1
SBP (mmHg)	136.2	22.4	135	1	126.1	18.9	124.5	–	130.6	20.1	126	1
DBP (mmHg)	73.9	13.7	74	1	69.3	12.5	69.5	–	69.8	12.1	69	1
Heart rate (bpm)	78	14.6	75.5	–	73.6	12.6	72.5	–	79.5	11	78	1
Respirations (breaths per minute)	17.8	1.4	18	1	17.8	0.7	18	2	17.3	1.2	18	2
O_2 saturation (%)	98.2	2	98	–	97.9	2.3	98	–	97.3	2.4	98	1
Anxiety (VAS-A)	29.2	24.9	24	–	26	23.1	19.5	–	15.9	17.6	10.5	–
Anxiety (STAI-AD)	19.3	7	19	–	18.3	6.5	18	–	–	–	–	54
Without weighted blanket (N = 56)												
Temperature (°F)	97.8	0.5	97.8	1	97.9	0.4	97.9	–	98	0.5	98	3
SBP (mmHg)	133.8	22.9	128	–	125.7	20	123	–	130	20	127.5	2
DBP (mmHg)	71.4	13.2	69	–	66.8	12	65	–	69.3	13.4	67	2
Heart rate (bpm)	78.5	16.4	74	–	74.9	13.1	75	–	78.9	10.2	80	2
Respirations (breaths per minute)	18	1.7	18	3	17.3	1.1	18	–	16.9	1.3	16	3
O_2 saturation (%)	98.1	1.9	99	–	98.1	2.1	99	–	98.8	2	98	2
Anxiety (VAS-A)	34	26.5	25	–	21.9	19.2	14	–	15.4	16.9	6.5	–
Anxiety (STAI-AD)	20	6.4	20	–	16.9	5.6	17	1	–	–	–	56

bpm—beats per minute; DBP—diastolic blood pressure; SBP—systolic blood pressure; STAI-AD—State-Trait Anxiety Inventory for Adults Form Y-1; VAS-A—visual analog scale for anxiety
Note. 6 patients only attended 1 visit. Anxiety was measured using the STAI-AD and the VAS-A. Total scores on the STAI-AD range from 10–40, with higher scores indicating greater anxiety. Total scores on the VAS-A range from 0–100, with higher scores indicating greater anxiety.

patients in this study were able to remove the weighted blanket if they did not like the sensation it provided, unlike pharmaceutical anxiety interventions, whose effects can only decrease with time.

Based on the results of this study, weighted blankets are a safe therapy option for adult patients receiving chemotherapy in the outpatient infusion setting who weigh at least 45 kg. The use of weighted blankets was not tested in patients diagnosed with fibromyalgia or peripheral neuropathy. No statistical differences were found among vital signs among patients in the two study arms. No adverse events were reported following the use of weighted blankets in this study, which is consistent with the findings of previous studies that used a weighted blanket weighing up to 30 pounds (Ackerley et al., 2015; Champagne et al., 2015; Chen et al., 2012; Mullen et al., 2008).

Although most weighted blanket manufacturer guidelines suggest that weighted blankets should ideally weigh 10% of the individual's body weight (Drillinger, 2020; Mosaic Weighted Blankets, 2020; Price, 2019; Sensory Direct, 2020), the total weight of a weighted blanket does not indicate the exact amount of pressure that the weighted blanket provides. A more effective method for finding an appropriate weighted blanket would be to use one that provides the desired coverage for the patient (i.e., area of body covered receiving DTP) based on individual diagnosis or needs. Some patients, such as those diagnosed with restless leg syndrome, traumatic brain injuries, chronic pain, or

IMPLICATIONS FOR PRACTICE

- Offer weighted blanket therapy as an alternative nonpharmacologic strategy for reducing anxiety in patients receiving chemotherapy.
- Standardize the use of a reliable indicator to measure state anxiety among patients receiving chemotherapy in an outpatient setting, such as a visual analog scale.
- Use a standard-weight, medical-grade weighted blanket to effectively reduce anxiety for patients in any weight class who are receiving treatment in the outpatient infusion setting.

Parkinson's disease, may require more or less DTP (CapeAble Weighted Products, 2020; Price, 2019). The weighted blanket chosen for this study was the size of a standard throw blanket, which did not cover as much body area on larger-sized patients compared to smaller-sized patients. For larger-sized patients, a larger blanket could have provided more coverage and produced a better DTP response. According to the results of this study, patients of various weights reported reduced anxiety using the weighted blanket, but statistical significance was not demonstrated. This may be because of the limited number of patients in each weight class.

Another aim of this study was to compare the STAI-AD to the VAS-A to ensure reliability of using the VAS-A as a measure of state anxiety in patients in the outpatient infusion setting. In this study, the STAI-AD and VAS-A produced similar results, confirming reliability. During data collection, it was noted that patients seemed to prefer the VAS-A instead of the STAI-AD because of the length of time it took to complete the STAI-AD. This may be because one-item assessment tools are less of a burden to patients than assessment tools consisting of many items (Butts & Rich, 2018). In addition, one-item assessment tools do not pose the burden of calculation to find the assessment score (Butts & Rich, 2018). For anxiety, the STAI-AD is more likely to be skewed by the test-retest effect than the VAS-A. When marking the VAS-A at 30 minutes, it was not likely that patients remembered exactly where they had previously placed a mark. This study established significant correlation between the VAS-A and the STAI-AD, indicating that the VAS-A may be an option for measuring self-reported anxiety in future studies.

Limitations

The primary limitation for this study was its small sample size. Although nurses ensured that weighted blankets were used during the required 15 minutes, patients were not monitored by study investigators continuously during that time. Patients also self-reported blanket use on a time log. Because patients were only required to use the blanket for the first 15 minutes of their visit, variations in treatment and infusion lengths may have affected the results in the discharge data. Patient attrition was also a limitation. Data were collected during both visits; however, data from the first visit were added to the aggregate data for statistical analysis, regardless of which study arm patients were assigned to.

TABLE 3.
UNADJUSTED LINEAR MIXED-EFFECTS MODEL RESULTS (N = 58)

	WITHOUT WEIGHTED BLANKET			WITH WEIGHTED BLANKET			DIFFERENCE		
MEASURE	EST	95% CI	p	EST	95% CI	p	EST	95% CI	p
Change after 30 minutes									
VAS-A (visit 1)	−4.14	[−10.7, 2.41]	0.215	−13.03	[−19.56, −6.5]	< 0.001	−8.89	[−16.59, −1.18]	0.024
VAS-A (visit 2)	−2.19	[−9.05, 4.66]	0.53	−11.08	[−17.77, −4.39]	0.001	−8.89	[−16.59, −1.18]	0.024
VAS-A[a]	−3.24	[−8.78, 2.3]	0.251	−12.09	[−17.51, −6.67]	< 0.001	−8.85	[−16.62, −1.08]	0.026
STAI-AD[a]	−1.04	[−2.39, 0.31]	0.131	−3.18	[−4.51, −1.86]	< 0.001	−2.15	[−4.05, −0.25]	0.027
Change at discharge									
VAS-A (visit 1)	−17.6	[−24.16, −11.04]	< 0.001	−23.09	[−29.62, −16.56]	< 0.001	−5.49	[−13.2, 2.22]	0.162
VAS-A (visit 2)	−8.3	[−15.16, −1.45]	0.018	−13.79	[−20.48, −7.11]	< 0.001	−5.49	[−13.2, 2.22]	0.162
VAS-A[a]	−13.3	[−18.84, −7.75]	< 0.001	−18.61	[−24.02, −13.19]	< 0.001	−5.31	[−13.08, 2.46]	0.179
STAI-AD[a]	–	–	–	–	–	–	–	–	–

[a]Model was not associated with a visit.
CI—confidence interval; est—estimated mean change in score; STAI-AD—State-Trait Anxiety Inventory for Adults Form Y-1; VAS-A—visual analog scale for anxiety
Note. Anxiety was measured using the STAI-AD and the VAS-A. Total scores on the STAI-AD range from 10–40, with higher scores indicating greater anxiety. Total scores on the VAS-A range from 0–100, with higher scores indicating greater anxiety.
Note. Because of the time it took to administer, STAI-AD scores were not collected at discharge.

TABLE 4.
DIFFERENCE IN 30-MINUTE CHANGE SCORES WITH WEIGHTED BLANKET THERAPY BY WEIGHT CLASS (N = 58)

	VAS-A		STAI-AD	
WEIGHT CLASS (kg)	EST	p	EST	p
85.1–100 versus 70 or less	−0.333	0.967	0.9	0.605
85.1–100 versus 70.1–85	−2.516	0.747	0.784	0.638
100.1–115 versus 70 or less	3.267	0.751	2.115	0.373
100.1–115 versus 70.1–85	1.084	0.914	1.999	0.389
100.1–115 versus 85.1–100	3.6	0.742	1.215	0.627
More than 115 versus 70 or less	14.438	0.114	1.943	0.319
More than 115 versus 70.1–85	12.256	0.164	1.827	0.332
More than 115 versus 85.1–100	14.771	0.133	1.043	0.62
More than 115 versus 100.1–115	11.171	0.339	−0.172	0.948

est—estimated mean change in score; STAI-AD—State-Trait Anxiety Inventory for Adults Form Y-1; VAS-A—visual analog scale for anxiety
Note. Anxiety was measured using the STAI-AD and the VAS-A. Total scores on the STAI-AD range from 10–40, with higher scores indicating greater anxiety. Total scores on the VAS-A range from 0–100, with higher scores indicating greater anxiety.

Nurses in the outpatient infusion center do not administer anxiety or pain medications. Therefore, patients may have taken their own medications prior to receiving treatment, which may have affected their levels of anxiety, making the lack of investigation into self-administered medication a limitation.

Future Research

Additional research with a larger sample size is needed to validate the results of the current study. A replication of this study should include a more rigorous time schedule and ensure blanket use fidelity. More research is also needed to determine whether differences in anxiety reduction are based on a patient's weight when using a weighted blanket that delivers the same consistent DTP.

An optimal time frame for weighted blanket use is yet to be determined. Future studies are needed to identify the time needed to elicit the effects of weighted blankets or DTP. Laboratory tests done before, during, and after blanket use that measure oxytocin, melatonin, and cortisol levels could also help determine any lingering effects from weighted blanket therapy. Measurements, such as heart rate variability, can be used to evaluate relaxation response as well (Chen et al., 2012, 2016). Research establishing whether different amounts of pressure are required for individuals with varying diagnoses is also needed to determine better guidelines for varying blanket weights.

Implications for Nursing

Nonpharmacologic interventions are often underused by nurses in treating anxiety. The somatosensory self-stimulation of DTP provided by a weighted blanket can reduce anxiety in patients with cancer receiving treatment in outpatient infusion centers. Weighted blankets may be an alternative strategy for reducing anxiety in patients receiving chemotherapy that can help to decrease the use of pharmacologic medications. A standard-weight, medical-grade weighted blanket can be safely used; no adverse events were reported during this study. If patients do not like using the weighted blanket, they are able to remove it, unlike medications whose effects can only be eliminated from the body over time.

Based on this study's results, the VAS-A is a valid and reliable instrument to measure state anxiety compared to the STAI-AD. Because the VAS-A is an easy instrument to use and takes less time to administer, it may be preferred by patients. By administering one-item instruments as compared to instruments with many items like the STAI-AD, nurses can also decrease the burden on patients.

Conclusion

This study explored the use of weighted blankets for anxiety reduction in patients receiving chemotherapy. Using a standard-weight, medium-sized, medical-grade therapeutic weighted blanket as a complementary modality can reduce anxiety in patients with cancer of various weights in the outpatient infusion setting. No clinically significant changes in vital signs or adverse events were noted, demonstrating that weighted blankets are safe to use in this adult population. A weighted blanket offers nurses the option to provide a nonpharmacologic intervention that can reduce anxiety in patients. Future studies can reliably use the VAS-A to measure state anxiety instead of the STAI-AD for patient convenience.

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