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# Self-Care Strategies to Cope With Taste Changes After Chemotherapy

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**C**hemotherapy agents can cause a wide range of adverse effects. One such cluster of manifestations that has gained greater attention in the literature is taste changes, which typically are described by severity, distress, and effects on usual activities. For instance, 38%–77% of patients with cancer have reported significant taste changes after receiving chemotherapy (Foltz, Gaines, & Gullatte, 1996; Lindley et al., 1999; Lockhart & Clark, 1990; Nail, Jones, Greene, Schipper, & Jensen, 1991; Rhodes, McDaniel, Hanson, Markway, & Johnson, 1994; Wickham et al., 1999). Patients have characterized taste changes as intense and distressing (Larsen, Nordstrom, Ljungman, & Gardulf, 2004) and most troublesome (Lindley et al.).

Patients often manage such taste changes using their own trial-and-error interventions, as well as with measures that seem logical or have some clinical support to nurses or physicians who suggest them. Although several anecdotal reports of intervention for taste changes exist, little research has examined the effectiveness and impact of such empirically selected interventions to provide nurses with an evidence base for patient education regarding self-management of taste changes. The purposes of this study were to describe factors related to taste changes, to examine patients' use of a self-care suggestion sheet to manage taste changes associated with chemotherapy, and to identify potentially useful strategies for managing specific taste changes after chemotherapy.

## Conceptual Framework

Orem's (1995) Self Care Theory was the conceptual framework used to guide the current study. Orem proposed that individuals initiate and perform self-care

**Purpose/Objectives:** To describe factors related to taste changes, to examine patients' use of a self-care suggestion sheet to manage taste changes associated with chemotherapy, and to identify potentially useful strategies for managing specific taste changes after chemotherapy.

**Design:** Quasi-experimental, pre/post design.

**Setting:** Four outpatient urban and suburban oncology centers in Illinois.

**Sample:** 42 patients who had received at least two cycles of chemotherapy previously identified to be associated with taste changes.

**Methods:** Pre- and postintervention survey of taste changes; patient education regarding self-care for taste changes.

**Main Research Variables:** Taste changes, taste change strategies, and self-care.

**Findings:** Most patients that reported taste changes had affected their ability to eat. Taste changes and strategies varied somewhat according to chemotherapy regimen. Avoiding strong-smelling or -tasting foods, eating blander foods, drinking more water with foods, oral care before eating, and eating smaller, more frequent meals were reported to help.

**Conclusions:** Taste changes are common in patients receiving cisplatin, carboplatin, or cyclophosphamide. At-risk patients may benefit from prechemotherapy teaching regarding specific taste change management suggestions. Use of a taste change suggestion sheet encouraged self-care, and counseling patients regarding strategies to deal with taste changes may help them during chemotherapy.

**Implications for Nursing:** Nurses should incorporate patient education tools that promote self-care regarding the management of taste changes in patients with known factors that could affect taste early in their chemotherapy.

activities to maintain life, health, and well-being. Deficits in self-care may be related to lack of knowledge, skill, motivation, or interest, or may occur because of disease or therapy effects. Evidence supports the notion

that individuals who are provided with appropriate education and resources can improve the quality and efficiency of their own care (Dodd, 1997; Foltz et al., 1996; McDaniel & Rhodes, 1998). In other words, patients who can anticipate how and when to appraise potential and expected side effects can take measures to prevent or alleviate them. If side effects are relieved effectively, patients will be more highly motivated to perform other self-care activities. In the current study, the authors informed patients and their families about different strategies to manage taste changes and examined whether patients used these and/or their own interventions to deal with taste changes.

## Background

Cancer-related pathogenic changes can affect taste and olfactory cues for taste and smell that may lead to changes in the normal or usual preferences in appetite and intake. For example, patients with cancer may develop distorted sensors for taste and smell secondary to direct tumor invasion or to cancer-induced zinc, copper, nickel, vitamin A, or niacin deficiencies (Cunningham & Huhmann, 2005; Yamagata et al., 2003). Other potential mitigating factors include iatrogenic causes (chemotherapy, surgery, radiation therapy, or other nonchemotherapy drugs), environmental factors, aging, and progressive malignant disease (Ackerman & Kasbekar, 1997; Ames, Gee, & Hawrysh, 1993; Chernenky, 1999; Cowart, Young, Feldman, & Lowry, 1997; Fanning & Hilgers, 1993; Grant & Kravits, 2000; Greene, Nail, Fieler, Dudgeon, & Jones, 1994; Jacobsen et al., 1993; Lockhart & Clark, 1990; Ng et al., 2004; Rhodes et al., 1994; Schiffman, 1997; Schiffman et al., 2000; Sherry, 2002; Wickham et al., 1999; Wilson & Rees, 2005). As a result, patients may develop ageusia (reduced taste) and dysgeusia (distorted taste)—experiences generally understudied in patients with cancer (Comeau, Epstein, & Migas, 2001).

Some research has focused on taste changes in different groups of patients receiving chemotherapy. In a study by Berteretche et al. (2004) that measured taste threshold, patients experienced temporary taste sensitivity deficits after chemotherapy, whereas healthy control subjects had no such changes over the same period. A study by Wickham et al. (1999) found that many patients receiving chemotherapy for lymphoma or colorectal, breast, lung, or ovarian cancer reported at least moderately severe taste changes that often were accompanied by dry mouth, decreased appetite, and nausea and vomiting. Similarly, Williams and Schreier (2004) confirmed that taste changes, fatigue, and nausea and vomiting were frequent in women receiving chemotherapy for breast cancer. Taste changes also have been documented in patients with colorectal cancer treated with 5-fluorouracil plus leucovorin

(Dikken & Sitzia, 1998), in patients with lung cancer at diagnosis and three and six months after diagnosis (Gift, Stommel, Jablonski, & Given, 2003), and in patients treated with high-dose chemotherapy followed by allogeneic or autologous stem cell or bone marrow transplantation (Epstein et al., 2002; Larsen et al., 2004; Uyl-de Groot et al., 2005). In addition, patients followed in a longitudinal qualitative study who experienced chemosensory taste changes during chemotherapy developed their own self-care strategies to cope with these changes (Bernhardson, Tishelman, & Rutqvist, 2007). The strategies included frequent oral hygiene, trying foods they could tolerate, and acceptance of taste changes.

Because therapy-related taste alterations are not life-threatening, clinicians may overlook them. For instance, although practitioners recognized that radiation therapy for head and neck cancer often leads to significant local adverse effects (i.e., taste changes, dry mouth, and dysphagia), the practitioners did not implement effective management protocols for patients with such symptoms (Huang, Wilkie, Schubert, & Ting, 2000). This finding was mirrored in other studies which found that oncology nurses and oncologists typically did not offer helpful self-management suggestions for taste alterations to patients receiving chemotherapy (Bernhardson et al., 2007; Wickham et al., 1999). In a study by Wilson and Rees (2005), only 17% of patients received education about taste changes prior to chemotherapy.

- Add more seasonings and spices to your foods. Examples include salt, oregano, basil, cinnamon, and ginger.
- Use less seasonings and spices.
- Use more condiments with your foods. Examples include gravy, butter, sour cream, and barbecue sauce.
- Use fewer condiments.
- Add something sweet to meat dishes. Examples include cranberry sauce, applesauce, and jelly.
- Avoid beef if it tastes bitter or rotten.
- Avoid foods that have strong smells, such as fish.
- Eat foods that are high in protein and have a lot of flavor. Examples include chicken, beans, and eggs.
- Let hot foods cool to warm or room temperature before eating.
- Eat foods that are bland. Examples include potatoes, bread, and crackers.
- Marinate meats to change the taste.
- Add fats or sauces to food.
- Boil foods to make them more bland.
- Eat small meals several times a day.
- Eat cold food.
- Brush your teeth before eating.
- Try sucking on hard candies (sugarless may be the best).
- Use plastic forks, knives, and spoons to eat.
- Drink more water with your meals to help swallow foods or rinse away bad taste.

### Figure 1. Suggestions to Reduce or Improve Taste Changes

Note. Based on information from Wickham et al., 1999.

**Table 1. Sample Characteristics**

Characteristic	n	%
<b>Gender</b>		
Male	7	17
Female	35	83
<b>Marital status</b>		
Married	30	71
Not married (single, widowed, or divorced)	12	29
<b>Most common cancer sites<sup>a</sup></b>		
Breast	20	53
Lung	6	16
Ovarian	6	16
Other	6	16
<b>Type of chemotherapy<sup>b</sup></b>		
Doxorubicin	1	4
Carboplatin	7	25
Cisplatin	3	11
Cyclophosphamide	14	50
Other	3	11

N = 42

<sup>a</sup> Because of four missing responses, n = 38.

<sup>b</sup> Because of 14 missing responses, n = 28.

Note. Because of rounding, not all percentages total 100.

Few published intervention studies for cancer therapy-related taste changes exist. Yamagata et al. (2003) implemented a small study (N = 12) based on the notion that zinc deficiency may be common during cancer and possibly affect chemotherapy-induced taste change. Patients with low serum zinc levels and altered taste thresholds before starting chemotherapy were randomly assigned to receive low-dose zinc infusions during cisplatin-based chemotherapy. No differences were found in patients who did or did not receive zinc, but the authors commented that small sample size, small dose of zinc, and limited duration of the study may have limited the study findings regarding the value of zinc to prevent chemotherapy-related taste changes.

Williams and Schreier (2004) sought to evaluate the impact of a structured audiotaped educational tool on self-care behaviors of patients with breast cancer who were randomized to standard teaching or to standard teaching plus an audiotape to reduce or alleviate chemotherapy side effects. Women in both groups used the same types of self-care behaviors for taste changes. Women in the audiotape teaching group reported that frequent mouth care, eating certain foods, and eating cold foods were more effective for them than patients in the control group. The study adds support to the view that helping patients develop a self-care repertoire is useful for coping with adverse effects of chemotherapy. In addition, other studies have documented advantages with using educational measures to teach self-care behaviors for patients during chemotherapy (Hagopian, 1996; Segal et al., 2001; Wilson, Taliaferro, & Jacobsen, 2006; Wydra, 2001).

## Methods

### Design

This quasi-experimental, multisite study employed a pre/post design. The convenience sample consisted of patients aged 18 years and older who had lymphoma or breast, lung, or ovarian cancer and who could read and write English. Eligible patients had received at least two cycles of chemotherapy or at least three weeks of weekly chemotherapy (e.g., doxorubicin, carboplatin, cisplatin, cyclophosphamide) and were experiencing taste changes. Patients were ineligible if they had previously undergone bone marrow transplantation, were receiving concurrent treatment with biologic response modifiers, or had current stomatitis or oral infection.

### Instruments

The two-section **taste change survey** developed for this study was based on the results of a large study of 254 patients undergoing chemotherapy (Wickham et al., 1999). The survey was evaluated for content validity by eight clinical nurses involved in the study and was reviewed by six patients in one clinic for clarity. Section one (eight demographic items) was shortened from 20 items in the original survey to decrease respondent burden. Eleven forced-choice items in the first section concerned taste changes and factors found to be related to altered taste in the previous study (e.g., nausea, vomiting, decreased appetite, and dry mouth). Items focused on symptom degree (i.e., how much have you noticed this?) and were rated on a four-point scale from 0 (not at all) to 3 (a lot). Symptom distress (i.e., how much does this bother you?) also was rated in the same fashion.

The second section was a 20-item self-care plan (see Appendix A) to elicit patient satisfaction with specific suggestions that had been derived from the previous pilot study (Wickham et al., 1999). The items included adding more seasonings or using less seasoning, eating bland foods, avoiding spicy foods, sucking on hard candy, and so forth. Participants were asked to evaluate these suggestions (e.g., did not try, tried but did not help, helped a little, helped a lot) and if they would recommend this strategy to other patients who experience taste changes. Two open-ended questions addressed other foods the patients may have avoided and other things that helped them.

A taste change suggestion sheet—the educational intervention—was given to each patient participating in the study (see Figure 1). This sheet included self-care measures that patients in the previous study had used to manage taste changes (Wickham et al., 1999).

### Procedure

After institutional review board approval at each study site, nurses were identified to assist with data

collection. An investigator then met with the nurse at each site to discuss the study and to review a suggested script to enhance uniformity of information presented to each participant.

Nurse data collectors subsequently recruited patients and explained the study to them, obtained written consent, and explained the questionnaires. Patients completed the first taste change questionnaire, independent of any clinical staff input, during a regular clinic visit. Afterward, the nurse data collector reviewed the taste change suggestion sheet with the patient. Patients were asked to complete the same questionnaire as well as a second questionnaire during their next visit (time 2). The second questionnaire sought to identify self-management strategies the patient had used for taste changes.

## Data Analysis

SPSS® 13.0 was used for data management and statistical analysis. Because the questionnaire's ordinal ratings had statistically non-normal distributions, nonparametric statistical methods were used to analyze data. Independent groups were compared with respect to percentages (e.g., foods avoided, other suggestions that were or were not helpful) using the chi-square test of association and Fisher's exact test and with respect to ratings of taste changes, nausea, vomiting, dry mouth, and helpfulness of specific suggestions using the Mann-Whitney test. The responses to the first and second surveys were compared with respect to percentages using the McNemar test and with respect to ratings using the Friedman test. Means are presented plus or minus standard deviation. A 0.05 significance level was used for all statistical tests. No one-sided statistical tests were compiled.

## Results

Forty-two patients agreed to take part in the study and 37 completed the survey at both time 1 and time 2. Of the 42, 35 (83%) were female and their mean age was  $59 \pm 12$  years (see Table 1). The median duration of previous chemotherapy at the time of visit one was two

**Table 2. Most Frequently Reported Taste Changes by Study Sample**

Change	%
Metallic taste	78
No sense of taste	68
Bitter taste	57
Dry mouth	83
Affected ability to eat	75
Decreased appetite	73
Nausea	69 <sup>a</sup>

<sup>a</sup> Significant decrease at visit two ( $p = 0.014$ )

**Table 3. Relationships Between Significant Taste Changes and Other Variables**

Significant Change	Other Variables Noticed With Taste Changes	p
No sense of taste	Dry mouth	0.021
Bitter taste	Decreased appetite	0.001
Sour taste	Nausea	0.043
	Decreased appetite	0.007
	Dry mouth	0.046

months. Of the five patients who did not complete the study, one patient died and four were lost to follow-up. The Cronbach alpha for the survey was 0.84 at time 1 and 0.85 at time 2.

The taste changes patients reported most frequently were metallic taste (78%), no sense of taste (68%), and bitter taste (57%). In addition, 83% of patients reported dry mouth, 75% reported that taste changes had affected their ability to eat, and 73% reported decreased appetite. Sixty-nine percent of patients reported nausea at visit two. However, a small but statistically significant decrease existed in how bothersome patients viewed nausea at their time 2 visit ( $\bar{X} = 1.8 \pm 1.0$ ) compared to the time 1 visit ( $\bar{X} = 2.2 \pm 0.8$ ;  $p = 0.014$ ). No other statistically significant changes were found in degree of bothersomeness of manifestations from time 1 to time 2 visits (see Table 2).

## Taste Changes and Nausea, Vomiting, Decreased Appetite, and Dry Mouth

Statistically significant relationships were found when associations between taste changes and nausea, vomiting, decreased appetite, and dry mouth were investigated. Patients who were bothered by having no sense of taste at all had higher ratings for how much they had noticed a dry mouth than did other patients ( $\bar{X} = 2.1 \pm 0.8$  versus  $1.3 \pm 1.2$ ;  $p = 0.021$ ). Patients with a bothersome bitter taste reported higher ratings for how much they had noticed a decreased appetite than did other patients ( $\bar{X} = 2.3 \pm 0.9$  versus  $1.0 \pm 1.0$ ;  $p = 0.001$ ). Patients who were bothered by a sour taste had higher ratings for how much they had noticed nausea than did other patients ( $\bar{X} = 1.8 \pm 1.3$  versus  $1.0 \pm 0.9$ ;  $p = 0.043$ ) as well as higher ratings for how much they had noticed a decreased appetite ( $\bar{X} = 2.2 \pm 0.8$  versus  $1.3 \pm 1.1$ ;  $p = 0.007$ ) and higher ratings for how much they had noticed a dry mouth ( $\bar{X} = 2.2 \pm 0.8$  versus  $1.5 \pm 1.1$ ;  $p = 0.046$ ) (see Table 3).

## Impact of Taste Changes on Important Activities

Patients were queried about the effects of taste changes on usual activities. At time 1, 45% reported that taste

changes had affected their ability to grocery shop, make meals, eat meals, spend leisure time with family, and go to social events with friends. At time 2, 71% of patients reported changes in the same important activities (see Table 4).

### Self-Care Interventions Used by Patients

At time 2, 91% of the study participants reported they used the taste change suggestion sheet; 71% responded that it helped “a little” and 16% that it helped “a lot.” No single suggestion was tried by all of the patients. More than 50% of the patients reported that they tried using more fats and sauces, eating smaller and more frequent meals, using more condiments, eating blander foods, adding something sweet to meats, sucking on hard candy, eating more boiled foods, and avoiding beef (see Table 5). The strategies were helpful for the majority (74%–87%) of patients who tried them. Fewer patients tried other strategies, including marinating meats, using more salt, oral care before eating, and eating cold foods, although they also were usually helpful. Interestingly, less than 50% of the patients tried avoiding foods with strong odors, but all of the patients that did reported this strategy as helpful.

Study participants suggested 21 additional self-care interventions (see Table 6), such as eating specific bland foods (e.g., macaroni and cheese, pudding, eggs, milk, pasta) or cold foods (e.g., ice cream, popsicles, ice chips, yogurt). Others suggested eating smaller portions of certain foods (particularly meat) and trying new flavors that had not been in their usual diet. Other strategies included avoiding some foods, mainly spicy food, greasy foods, and foods with tomato sauces. At time 2, some patients found using more salt, eating more flavored protein foods, and eating smaller and more frequent meals to be more helpful than at time 1.

Patients were compared according to the chemotherapy regimen. Patients receiving cyclophosphamide were more likely to report that using condiments was helpful than patients receiving cisplatin or carboplatin

**Table 5. Patient Strategies to Manage Taste Changes**

Strategy	Successful (n)	%
Use more fats and sauces (N = 34).	27	79
Eat smaller, more frequent meals (N = 33).	28	85
Use more condiments (N = 31).	24	77
Eat more bland foods (N = 31).	27	87
Add something sweet with meats (N = 30).	24	80
Sucking on hard candy (N = 24)	19	79
Eat more boiled foods (N = 23).	17	74
Drink more water with food (N = 22).	17	77
Avoid beef (N = 22).	17	77
Marinating meat (N = 18)	16	89
Avoid foods with strong smells (N = 17).	17	100
Eat more protein foods (N = 17).	14	82
Use more salt (N = 17).	14	82
Brush teeth before eating (N = 17).	13	76
Eat cold foods (N = 14).	10	71
Increase seasonings or spice use (N = 8).	6	75

( $p = 0.01$ ). In addition, patients receiving cyclophosphamide rated nausea as more bothersome than patients receiving carboplatin ( $\bar{X} = 2.6 \pm 0.8$  versus  $1.2 \pm 0.5$ ;  $p = 0.025$ ) at time 1.

Different relationships were found between types of taste changes and the helpfulness of particular strategies. Patients bothered by a metallic taste found eating cold foods to be more helpful than patients who were not bothered by a metallic taste ( $\bar{X} = 2.0 \pm 0.7$  versus  $1.0 \pm 0.0$ ;  $p = 0.014$ ). Conversely, patients bothered by no taste found that eating foods at room temperature and eating more flavored protein foods were *less* helpful than did patients without agusia ( $\bar{X} = 1.6 \pm 0.5$  versus  $2.4 \pm 0.5$ ;  $p = 0.020$ , and  $\bar{X} = 1.9 \pm 0.7$  versus  $2.4 \pm 0.7$ ;  $p = 0.043$ , respectively). Patients bothered by a bitter taste reported two strategies as more helpful than patients without bitter taste: avoiding beef ( $\bar{X} = 2.7 \pm 0.5$  versus  $1.8 \pm 0.8$ ;  $p = 0.036$ ) and eating smaller, more frequent meals ( $\bar{X} = 2.4 \pm 0.6$  versus  $1.8 \pm 0.7$ ;  $p = 0.025$ ). Understandably, patients bothered by a salty taste reported that adding less salt was more helpful than other patients ( $\bar{X} = 2.8 \pm 0.4$  versus  $1.7 \pm 0.5$ ;  $p = 0.008$ ) but also reported that eating cold foods was less helpful ( $\bar{X} = 1.4 \pm 0.5$  versus  $2.1 \pm 0.7$ ;  $p = 0.044$ ) (see Table 7).

Bothersome accompanying symptoms also appeared to affect patient ratings of helpfulness of the taste change strategies. Patients who were bothered by nausea found two strategies more helpful than patients without nausea: adding more fats or sauces to foods ( $\bar{X} = 2.2 \pm 0.5$  versus  $1.6 \pm 0.5$ ;  $p = 0.021$ ) and eating more flavored protein foods ( $\bar{X} = 2.3 \pm 0.7$  versus  $1.7 \pm 0.7$ ;  $p = 0.041$ ). Patients with bothersome vomiting found increased seasoning or spice use *less* helpful than patients not bothered by emesis ( $\bar{X} = 1.4 \pm 0.5$  versus  $2.1 \pm 0.6$ ;  $p = 0.041$ ). In addition, patients bothered by decreased appetite also found increased seasoning

**Table 4. Effects of Taste Changes on Patients' Usual Activities**

Tastes Changes Affect	Visit 1		Visit 2	
	n <sup>a</sup>	%	n <sup>a</sup>	%
Grocery shopping	23	55	17	46
Making meals	23	79	19	51
Eating meals	34	73	26	72
Spending leisure time with family	20	48	19	51
Going to social events	19	51	18	50

<sup>a</sup> Values represent patients who answered “a little” or “a lot” to the question, “How much do taste changes affect your ability to . . . ?”

**Table 6. Strategies Patients Reported to Be Most Helpful for Taste Changes**

Strategy	Visit 1		Visit 2		p
	$\bar{X}$	SD	$\bar{X}$	SD	
Using more salt	1.6	0.5	2	0.4	0.025
Eating more flavored protein foods	2.1	0.8	2.3	0.7	0.034
Eating smaller, more frequent meals	2.2	0.7	2.5	0.8	0.011

Note. Range = 1–3

or spice use to be *less* helpful than did other patients ( $\bar{X} = 1.7 \pm 0.6$  versus  $2.3 \pm 0.5$ ;  $p = 0.048$ ), and they also found using more condiments *less* helpful ( $\bar{X} = 1.8 \pm 0.6$  versus  $2.5 \pm 0.5$ ;  $p = 0.017$ ) (see Table 8). No significant associations were found between the bothersomeness of dry mouth and helpfulness of any suggested strategy.

## Discussion

Patients in this study experienced similar taste changes reported in other studies with patients receiving chemotherapy, particularly metallic taste, decreased sense of taste or even aguesia, and bitter taste (Duhra & Foulds, 1988; Rhodes et al., 1994; Wickham et al., 1999). In addition, nausea, decreased appetite, and dry mouth were common for patients in the current study's sample. The findings reinforce other study findings about taste changes and concomitant manifestations.

Of note, the majority of patients who experienced taste changes also reported an impact on usual activities associated with food and eating. This supports the findings of previous studies that patients who report taste changes during chemotherapy also report limitations in social activities, such as going out or eating with friends, spending time with family during grocery shopping, and so forth (Bernhardson et al., 2007; Stubbs, 1989; Wickham et al., 1999). However, depression and other factors that also may have affected such activities were not measured.

Although most of the patients used the taste change suggestion sheet, few found it more than a little helpful to alleviate taste changes. Several possible explanations exist for this finding. Patients may not have tried the suggestions at all, or perhaps were already using their own self-care strategies. Of note, the self-care interventions that patients added at time 2 were often similar to strategies listed on the taste change suggestion sheet. Providing such information before chemotherapy initiation may be useful to help patients anticipate taste changes and potentially helpful self-care strategies as suggested by Bernhardson et al.

(2007). Another factor that may have limited the differences in the two data collection points was the short time interval between visits one and two.

In Wickham et al. (1999), patients identified the most helpful strategies to deal with taste changes were increasing seasonings, fats and sauces, or eating blander foods. The number of self-care interventions study participants suggested supports Orem's Self Care Theory regarding patient self-motivation. The authors could not determine whether a greater proportion would find other strategies, such as oral care, eating cold or room temperature foods, and so forth, to be helpful. Whether the nurse data collectors in this study knew what type of taste changes patients were experiencing at visit one when they educated patients on the taste change suggestion sheet is unknown. However, pursuing the potential benefit of incorporating the suggestions into prechemotherapy education and following patients over a longer time may be useful. The education might be tailored to include strategies found to be helpful for specific taste changes (i.e., eating cold foods for metallic taste; avoiding beef; and eating smaller, more frequent meals, which may be better tolerated and have less taste and aroma for bitter taste) (Williams & Schreier, 2004). Confirming that some strategies may not be helpful at all for patients, such as patients who develop aguesia or a salty taste who reported eating room temperature or cold foods and more flavorful protein foods helpful, may be important. Therefore, helping patients develop strategies for specific taste changes may be challenging.

Why patients receiving cyclophosphamide found using condiments to be more helpful than those receiving carboplatin is unclear. Perhaps different chemotherapy agents are more or less likely to result in taste changes in general, or to specific types of changes. Rather than trying to quantify degree of taste change by chemotherapy agent or regimen, it may be more useful to remind patients that taste changes are variable. In addition, the desire to increase condiments such as mustard, ketchup,

**Table 7. Potential Recommended Strategies to Manage Particular Taste Changes by Study Patients**

Taste Change	More Helpful Strategies	Less Helpful Strategies
Metallic taste	Eat cold foods.	–
No taste	–	Eat room temperature foods. Eat more highly flavored protein foods.
Bitter	Avoid beef. Eat smaller, more frequent meals.	–
Salty	Season with less salt.	Eat cold foods.

**Table 8. Potential Recommended Strategies to Manage Bothersome Symptoms**

Symptom	More Helpful Strategies	Less Helpful Strategies
Nausea	Add more fats or sauces to foods. Eat more flavored protein foods.	–
Vomiting	–	Increase seasonings or spice.
Decreased appetite	–	Increase seasonings or spice. Use more condiments.

pickle, relish, or hot peppers might be related to other factors such as age, vitamin deficiencies, or other drugs (Coward et al., 1997; Cunningham & Huhmann, 2005; Schiffmann et al., 2000).

### Limitations

Small sample size clearly restricts the generalizability of the study findings. Initially, patients were eligible to participate if their diagnosis was lymphoma or breast, lung, or ovarian cancer and they were receiving doxorubicin, carboplatin, cisplatin, or cyclophosphamide. Chemotherapy regimens change somewhat over time and these strict inclusion criteria may have affected accrual. Ultimately, any patient with cancer and undergoing chemotherapy was included, but slow accrual continued and only 12 additional patients completed the study. Low accrual also was likely affected by the loss of key data collectors and co-investigators at four study sites, lengthy institutional review board approval processes (one year at one study site), and to the addition of targeted therapies to standard therapy regimens.

Although the pre/post design was intended to measure patient responses at two different times, the interval between visits typically was only two weeks because of changes to dose-dense chemotherapy regimens. As pointed out previously, this interval was probably inadequate to evaluate changes in patients' self-care measures, particularly as related to the use and efficacy of the teaching intervention to deal with taste changes. In addition, the authors' instruments may not have been sufficiently sensitive to capture changes in patient experiences.

The dosages and intensity of the chemotherapy of patients were not known, nor was the exact onset and duration of the taste changes. From a previous study, onset of patients' taste changes occurred during or shortly after the first cycle or after the second or third cycle

(Wickham et al., 1999). Patients in the current study were selected if they had taste changes after two cycles of chemotherapy. This information would be helpful to include in future studies because specific dosages of chemotherapy may affect types and onset of taste changes as well as duration of taste changes.

Whether patients changed or added self-care strategies as a result of the suggestion sheet is unknown. Patients could suggest their own strategies that they felt were useful for them, but this was not tracked from visit one to visit two. The suggestion sheet had negative and positive strategies to try and it may have been confusing for some patients, resulting in them adding their own strategies. But the sheet primarily gave patients additional strategies to try for different types of taste changes. Most patients tried more than one strategy that had been effective for other patients (Bernhardson et al., 2007).

### Implications for Nursing

Additional nursing research that focuses on assessment tools and preventive strategies for taste changes is needed (Sherry, 2002). Studies that evaluate teaching or other interventions beginning with the first chemotherapy cycle and continue over time may enhance self-care strategies. Specifically, chemotherapy treatment plans should consider ways to decrease risks for anorexia and other physical issues associated with treatment-related taste deficits (Berteretche et al., 2004). Patient information should help the patient to anticipate taste changes and follow-up should focus on self-care to cope with actual taste change perceptions; both should be evidence-based whenever possible (Mast, 2000). Patient education should include information about treatment and side effects, as well as self-care behaviors that might minimize the adverse effects of chemotherapy, decrease symptom distress, and perhaps improve quality of life (Dodd & Dibble, 1993; Hoskins, 1997; Orem, 1995).

Data from this and other studies could be used to develop more simplified data collection instruments and clinically useful patient teaching tools. For instance, informational audiotapes and interactive media may be effective and cost-effective in providing instruction about self-care behaviors (Hagopian, 1996; Williams & Schreier, 2004; Wydra, 2001). Pretreatment assessment and education also should be accompanied by ongoing assessment of taste changes and associated effects during cancer therapies. Inclusion of specific dosages and intensity of chemotherapy regimens also would be helpful to determine the impact on specific patient populations.

Continued inquiry is needed to determine if specific taste changes, such as aguesia or dysguesia, or taste changes in general occur within a symptom cluster that might include anorexia or nausea. This type of study

could increase the understanding of particular symptoms, treatment strategies, and outcomes (Barsevick, Whitmer, Nail, Beck, & Dudley, 2006; Dodd, Miakowski, & Paul, 2001). Data gained might aid oncology nurses to recommend effective and specific interventions for specific taste changes. With the focus on specific strategies to manage taste changes, nurses can help patients use and try different ones that hopefully motivate them to perform self-care activities.

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The following suggestions about how to deal with taste changes were offered by patients or by nurses who care for patients receiving cancer treatment. Things that might help:

1. **Increase seasonings or spices.** Examples: oregano, basil, cinnamon, ginger, etc.
 

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
2. **Decrease seasonings or spices.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
3. **Eat more bland foods.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
4. **Boil foods to make them more bland.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
5. **Use more salt.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
6. **Use less salt.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
7. **Use more condiments.** Examples: mustard, ketchup, pickle relish, hot peppers
 

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
8. **Add fats or sauces to foods.** Examples: gravy, butter, sour cream
 

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
9. **Eat foods at room temperature.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
10. **Eat cold foods.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
11. **Add something sweet with meats.** Examples: cranberry sauce, applesauce
 

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
12. **Avoid beef.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
13. **Avoid food with strong smells.** Example: fish
 

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
14. **Eat more protein foods that have been flavored.** Examples: eggs, beans, chicken
 

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
15. **Drink more water with food to help with eating or rinse away bad taste.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
16. **Eat smaller, more frequent meals.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
17. **Brush your teeth before eating.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
18. **Suck on hard candy.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
19. **Use plastic silverware.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No
20. **Marinate meats to change taste.**

<input type="checkbox"/> Did not try	<input type="checkbox"/> Tried but did not help
<input type="checkbox"/> Helped a little	<input type="checkbox"/> Helped a lot

Would you recommend this to others who have taste changes?  
 Yes                       No

## Appendix A. Time 1: Self-Care Plan Sheet

Note. Based on information from Wickham et al., 1999.