The Effectiveness of Complementary Therapies in Treating Chemotherapy Induced Nausea and Vomiting

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Abstract

Four randomized controlled trials and one correlational/observational study revealed the effectiveness of complementary therapies in the treatment of chemotherapy induced nausea and vomiting (CINV). A total of 927 subjects were examined in studies addressing effleurage massage, acupressure, electroacupuncture, and acustimulation as adjuncts to traditional pharmaceutical antiemetic measures. Of these therapies, acustimulation alone failed to meet the standard of statistical significance, yet remains a viable clinical option. Patient expectations played a dual role in the effectiveness of these complementary methods in controlling CINV. Two groups of patients, those patients who expected these therapies to provide relief and those patients who expected severe nausea as a reaction to CINV, achieved better control of nausea and vomiting than those with no such expectations.

Just imagine that you need extensive treatment for a condition to improve your quality of life, but in order to continuously comply with treatment, serious nausea and vomiting will most likely be experienced. Cancer patients have to face a troubling dilemma that most individuals never need to consider. Unfortunately, some choose not to continue treatment due to these symptoms. While advances in medicine have decreased the occurrence of nausea and vomiting during treatments, patients still deal with anticipatory and delayed symptoms. As many as 60% of patients receiving moderately high emetogenic (having a high capacity to induce vomiting) chemotherapy experience nausea, and while newer antiemetic treatments have decreased vomiting, they have had an inverse effect in relation to nausea (Molassiotis, Helin, Dabbour, & Hummerston, 2007).

The importance of helping patients exhaust all possible interventions to assist in their treatment plan cannot be stressed enough. Introducing complementary therapies as an option to patients will help empower them to make more informed choices in their care, while helping to promote hope that they have other opportunities to help reduce these troubling side effects. Several studies have demonstrated the effectiveness of complementary therapies for treating refractory chemotherapy induced nausea and vomiting. The five papers examined here investigate four complementary therapies: acustimulation, acupressure, electroacupuncture, and effleurage massage. With the exception of acustimulation, these interventions significantly improved patient outcomes with respect to nausea and vomiting. However, the role of patient beliefs in complementary therapies cannot be discounted; patients who expect these interventions to be effective displayed less nausea and vomiting than those who did not.

Nursing Patient Care Problem

Patient difficulty with chemotherapy induced nausea or vomiting may interfere with treatment compliance (Roscoe et al., 2006). Severe nausea or vomiting may cause treatment delays or dose reductions that may harmfully affect the patient's survival. In addition to traditional medications, several adjunct complementary therapies have been shown to significantly reduce nausea and vomiting after the administration of chemotherapy. Complementary therapies that seemed to have the most effect were effleurage massage, self-hypnosis, relaxation, bio-

feedback, and acupressure (Bilhult, Bergbom, & Stener-Victorin, 2007). Standard and complementary therapies give the functional opportunity for both the patient and the nurse to work on managing and controlling nausea and vomiting. The patients can then continue treatment as prescribed and have a better quality of life, and hopefully, a better outcome. It is important that nurses work with their patients to find the appropriate treatment or the best combination of standard treatments and complementary options available for the management of nausea and vomiting (Molassiotis et al., 2007).

In order to review the evidence, a PICO, or evidence-based practice (EBP) question was developed with P identifying the patient population, I the intervention of interest, C the comparison intervention, and O the desired outcome. The following PICO addresses all key aspects of the identified clinical problem: In cancer patients receiving chemotherapy, how does the use of complementary therapies compared to the use of standard therapies affect the control of nausea and vomiting?

Selection of Evidence

To find material needed to address the PICO question, we utilized The Franklin D. Schurz Library. As a means to understand the search process thoroughly, our group met with Susan Thomas, Associate Librarian Director of Collection Services. Key words searched included: chemotherapy, cancer, nausea, vomiting, and alternative (rather than complementary) therapies. Her instructions helped us to use EBSCOhost, a search engine for specific databases, for our term search as well as explain why using evidence-based databases such as CINAHL Plus with Full Text and Cochrane Library were the most beneficial. Considering that the nursing practice is based on evidence, it made the most sense to use these particular databases.

Of the fifteen articles retrieved in our data search, 5 were selected for use. The Billhult et al. (2007) article was chosen primarily because it is a randomized controlled trial (level II evidence) that achieved significant positive results ($p = 0.025$) using massage as an adjunct treatment for chemotherapy induced nausea and vomiting. We selected the Roscoe et al. (2003) article because it is a much larger (n=739) randomized controlled trial (level II evidence) studying two different forms of complimentary therapy (acupressure and acustimulation) than the first paper, which studied effleurage massage. The Molassiotis et al. (2007) paper is also a randomized controlled trial (level II evidence). It was chosen because it tightly controlled the sample group for type and stage of cancer, type of cancer treatment, and type of conventional antiemetic therapies the subjects used during the experiment. The Choo et al. (2006) article describes a single correlational/observational study (level IV evidence). It was selected because it represents a very different approach than the first three articles. One selection criterion for inclusion in this study was refractory nausea and vomiting associated with previous chemotherapy. Most other studies used a control group to compare treated versus non-treated subjects. This study compared subjects' previous experience with CINV to their experience after the intervention.

Our last article, the Roscoe et al. (2006) study, is also a randomized controlled trial (level II evidence). This study tested the same therapies as the Roscoe et al. (2003) article. The main difference between the two Roscoe studies was the subjects chosen. The Roscoe et al. (2003) study selected chemotherapy patients of both genders with a variety of cancers and treatments. The Roscoe et al. (2006) study looked exclusively at women with breast cancer who believed they would experience severe chemotherapy-related nausea and vomiting. The Roscoe et al. (2003) study considered a wide, though heavily skewed, range of patients, disease states, and therapies. The Roscoe et al. (2006) paper attempted to tightly control these aspects with a very homogeneous sample. Not surprisingly, the two studies reached different conclusions. To clarify, the same Joseph A. Roscoe authored both papers, and Roscoe et al. (2006) is a re-analysis of data from the Roscoe et al. (2003) paper.

The other 10 articles that we chose not to use were rejected for a variety of reasons. Five of them were not primary research, two were deemed too old, two were too similar to studies already selected for use, and one was irrelevant to our PICO question. Of the fifteen articles obtained through our literature search, the five best studies retrieved in our search, with respect to our PICO question, were selected for this paper.

Analysis and Critique of Evidence

Four of our five articles are randomized controlled trials, Billhult et al. (2007), Roscoe et al. (2006), Molassiotis et al. (2007), and Roscoe et al. (2006). Randomized controlled trials are level II evidence. The final resource Choo et al. (2006) is a correlational/observational study. This is level IV evidence, and it approached the PICO question in a completely different manner. The randomized controlled trials attempted, in various ways, to determine whether or not specific interventions were effective across a given sample of subjects. Variations in the sample (age, gender, disease and state, expectations, etc.) must be controlled and accounted for in the analysis of results. The observational study, Choo et al. (2006), eliminated as much of that as possible by examining a very homogeneous group. Its sample consisted of Chinese female breast cancer patients with refractory emesis who expected severe nausea and vomiting as a side effect of chemotherapy.

One issue that runs through this research, and was considered by four of the papers except Billhult et al. (2007), is patient expectations about the complementary interventions. It is curious that Roscoe et al. (2003), Molassiotis et al. (2007), and Choo et al. (2006) found expectations to correlate well with the results obtained, and only Roscoe et al. (2006) did not. One paper, Roscoe et al. (2003) found a correlation between expectations and nausea, but not between expectations and vomiting. Two studies, Roscoe et al. (2003) and Molassiotis et al. (2007) showed variability across the duration of the treatments. The correlational study Choo et al. (2006) was the only one where patient expectations seemed to play no role in the results. This is a significant finding because the study in question involved only patients with nausea and vomiting that had proven refractory to standard antiemetic therapies. That study resulted in a p of 0.001; 96% of patients had fever episodes of vomiting and 37% of patients had no episodes at all post therapy (Choo et al., 2006). Sample sizes for three of these studies were small: Choo et al. (2006) 27, Molassiotis et al. (2007) 36, and Billhult et al. (2007) 39 subjects. One study utilized 86 subjects (Roscoe et al., 2006). That was a re-analysis of a portion of a larger study (Roscoe et al., 2003) in order to look at one particular subject trait: expectations. This subset expected to have severe nausea from their chemotherapy. At first glance, expectations appeared to be irrelevant here. This is not the case. The key point is that all subjects benefitted from the intervention because all subjects had higher than normal expectations. The other four papers addressed the issue of expectancy and raise the question, either directly or indirectly, of the placebo effect. This effect adequately explains how expectations can impact results. However, in the single study that addressed more than one complementary therapy, Roscoe et al. (2003), only the acupressure group showed significant positive correlation between expectations and results. The acustimulation method of controlling nausea and vomiting showed no such correlation. Unexpectedly, the efficacy of acustimulation was positively correlated with gender. Males displayed more of an effect than females. The number of males in the study was too small to determine whether expectations played any role in the differences. It is worth noting that even women who expected acustimulation to prove effective showed no positive response; this is a negative correlation. Obviously, something besides the placebo effect is occurring. The researchers admit that the results, positive and negative, with respect to expectations were possibly due to some factor not controlled for in the study. Factors mentioned that might have played a role were: differences in chemotherapy treatments, gender, and types of cancer (Billhult et al., 2007).

The electroacupuncture study showed statistically significant results, with p values of 0.0001; 96% of patients had fewer episodes of vomiting and 37% of patients had no episodes at all, post therapy (Choo et al., 2006). The invasive and scary-sounding 'electroacupuncture'

therapy could have helped self-select a study group that expected positive results. Only 42% of those offered this therapy chose to participate. This fact alone heavily influenced the makeup of the study group. It is easy to conclude that being afflicted with refractory emesis and voluntarily subjecting oneself to an invasive procedure with expected positive results could have some impact on the results obtained.

The last study, Roscoe et al. (2003) consisted of 739 patients across a wider range of cancers, treatments, antiemetic therapies, genders, ages, and other demographic data points. The range of variables in this study is wide, but is heavily skewed in so many directions that the purpose of such diversity may be defeated. The patients studied here were 88% Caucasian, and 92% female. Eighty five percent of the cancers were breast cancer with no mention of gender in the breast cancer statistics. Almost two-thirds of those cancers that were not breast cancers were hematologic in nature. Standard antiemetic therapies also varied widely. More than half took at least one such medication, 61% used one specific medication, while 21.6% used another, and just under 10% took no standard antiemetic agents.

Four of the papers, except Choo et al. (2006), directly commented on the accuracy and validity of their measurement tools, with three of those describing them as tools deemed acceptable to the task at hand. The Molassiotis et al. (2007) paper mentioned the tools with no comment on the value of the tool in that application. The last paper Choo et al. (2006) only described and defined the tool.

All papers included descriptive statistics about the samples used and results obtained. Four of the papers, except Choo et al. (2006), described results with parametric testing. While nausea and vomiting are subjective experiences, the measurement tools in those studies were described as accurate, valid, and repeatable. None of them specifically stated that ordinal (subjective experience of nausea and vomiting) data are being used in parametric testing, which requires at least interval level data. The accuracy, validity, and repeatability lend credence to treating ordinal data as interval data. The last test specifically states that it used nonparametric analysis because the sample size was so small.

These five studies investigated four different complementary therapies in the management and control of chemotherapy induced nausea and vomiting. They covered a wide range of diseases, disease treatments, standard antiemetic therapies, patient demographics, measurement methods and analysis methods. Acupressure, massage, and electroacupuncture were all found to significantly lower chemotherapy induced nausea. The fourth intervention, acustimulation, did not meet this standard. Three of the studies, Roscoe et al. (2003), Molassiotis et al. (2007), and Choo et al. (2006), also evaluated the effectiveness of lowering chemotherapy induced vomiting. The agreement here is more vague: two studies, Molassiotis et al. (2007) and Choo et al. (2006), obtained significant reduction in vomiting, and Roscoe et al. (2003) failed to achieve that standard.

The Roscoe et al. (2003) paper referred to two of the negative results as being suggestive of significance. Also stated is the strong possibility of a type II error, with regard to vomiting. The authors of this paper reject this phraseology. Proper research decides on the criteria for passing judgment on any results before the research begins. To make any claim that something almost passed the test is to blur the line between a pass and a fail. The researchers mentioned the potential for clinical significance even if the standard of statistical significance is not met.

Synthesis of Evidence

All five of these papers conclude that complementary therapies, as adjuncts to conventional antiemetics, have at least some beneficial effect in controlling chemotherapy induced nausea and vomiting. Billhult et al. (2007) used effleurage massage administered at the chemotherapy clinic at the time of the infusion. Significant reduction in CINV was noted among the homogeneous sample of 39 women with breast cancer. This agrees nicely with the Roscoe

et al. (2003) study, which examined a large heterogeneous sample of 739 participants using acupressure and acustimulation. In this five-day longitudinal study, significant reduction in nausea, but not vomiting, was noted only on the day of treatment, and only for the acupressure treatment group. The acustimulation group showed no significant improvement in CINV. The acupressure group showed no improvement in nausea on days two through five, and no improvement in vomiting at all.

The Molassiotis et al. (2007) study concluded that acupressure was beneficial in the treatment and reduction of both nausea and vomiting across a similar 5-day therapeutic time frame. Molassiotis et al. (2007) used the Rhodes Index of Nausea and Vomiting, a widely accepted tool that tracks patient perceptions of nausea, vomiting, and retching, by experience, occurrence, and distress. There was a negative blip in the data for actual retching distress on day three. This effect was postulated by the authors of the study to be due to those patients involved not using standard antiemetics on day two because of their lack of nausea on day one. Antiemetic therapy was not controlled on days two through five. The authors stated this limitation and considered intervening to be unethical and contrary to standard medical practices (Molassiotis et al., 2006). The primary differences between the Roscoe et al. (2003) and Molassiotis et al. (2007) patient samples were homogeneity and sample size. The former is a heterogeneous study examining 739 individuals. The latter is a homogeneous study with respect to diseases, treatments, antiemetic therapies, and gender, with a total sample size of 36 people.

Once again, the Choo et al. (2006) study uses a small homogeneous sample of 27 patients. It concluded that electroacupuncture is effective in the control of both nausea and vomiting. Nausea control reached significance. The standout result in this study was that $p < 0.0001$ for control of post-chemotherapy emesis. Differences between this study and others include: a very homogeneous sample and culture of the participants. The sample was 96% Chinese, where a long history of acupuncture and related techniques, such as electroacupuncture is well accepted. All patients in this sample are female breast cancer patients with previous experience of refractory CINV.

The Roscoe et al. (2006) study agreed with the Roscoe et al. (2003) study in two areas. Both find that acupressure was beneficial in the treatment of CINV and that acustimulation was not. To be clear, the Roscoe et al. (2006) study was not an independent study. It was a re-examination of data from a cohort of patients from the Roscoe et al. (2003) study. In this new analysis, data from 86 patients who believed they would suffer severe chemotherapy related nausea and vomiting were examined. The finding where these two analyses disagree is on the role of patient expectations regarding the effectiveness of the complementary therapy of acupressure. The larger analysis of the Roscoe et al. (2003) study showed a correlation between patient expectations and results obtained from the intervention. The more narrow cohort examined in the Roscoe et al. (2006) paper showed no correlation between patient expectation and results of the acupressure intervention. It is worth noting that both studies agreed that the effect was only observed on day one of the five-day post chemotherapy regimen.

The Billhult et al. (2007) study of effleurage massage does not examine patient expectations of intervention efficacy in the analysis of its positive findings. The authors do address a likely physiological relationship for the effect of effleurage massage on CINV. Billhult et al. (2007) described a phenomenon whereby massage decreases activity in the sympathetic nervous system. There is a proposed link between massage, relaxation, the release of the neurotransmitter oxytocin (which seemed to be an anxiolytic), and the observed decrease in nausea demonstrated by applying massage therapy (Billhult et al., 2007).

All of the other studies showed varying degrees of correlation between patient expectations and therapeutic benefit observed. Roscoe et al. (2003) found the correlation with acupressure, in women only, in a large, broad-spectrum patient sample, and only on day one post chemotherapy. The Molassiotis et al. (2006) study found a significant correlation between

patient expectations and results in a small study of very homogeneous patients across its entire five-day study. Choo et al. (2006) found the same positive correlation between expectations and results in a small, homogeneous sample, while using a much more invasive intervention (electroacupuncture). Finally, the Roscoe et al. (2006) study found no correlation between expectations and results, but the study limited itself to patients who expected to encounter severe chemotherapy induced nausea and vomiting. As this group was self-selected by severity of their expectations, the authors theorized that no difference in expectations was observed because all of these subjects had high expectations that the intervention would be beneficial (Roscoe et al., 2006). This coincides nicely with the fact that Roscoe et al. (2003) did find expectations to be correlated with treatment efficacy in their larger study.

Application of Findings

It is the position of the authors of this paper that complementary therapies may indeed be beneficial in controlling chemotherapy induced nausea and vomiting in cancer patients receiving chemotherapy. The effect may or may not be related to expectations and/or the placebo effect, but it is real. Acupressure, effleurage massage, and electroacupuncture therapies are effective in reducing these negative side effects of chemotherapy in these patients. Those patients with higher expectations of efficacy seem to derive more benefits, but so do those patients having higher expectations of severe nausea and vomiting reactions to their own chemotherapy treatments.

Several practice changes are suggested by examining the results of these studies. Foremost among those changes is that complementary therapies should be discussed with all chemotherapy patients prior to beginning their course of treatments. In doing so, the patient can be made aware of the magnitude of the CINV problem and its potential impact on their treatments, disease, quality of life, and potential outcome. Most importantly, patients will have some time to consider and investigate their options and preferences. These studies document the efficacy of complementary therapies as being directly correlated to patient expectations. By providing the patient with appropriate knowledge prior to beginning chemotherapy, the individual patient has time to investigate the issues, gain an understanding of the methods and benefits of complementary therapies, and therefore be more likely to benefit from them.

A second practice change would be to survey potential chemotherapy patients (possibly at cancer screenings) for their beliefs and attitudes about complementary therapies. Such a survey could be used to group patients by knowledge and their likelihood of use of complementary therapies, which allows clinicians to more effectively provide knowledge and training to patients who most need, or who will most benefit from, such therapies.

The most appropriate setting for implementing these practice changes is in screening facilities. Patients should be just as aware of the availability and effectiveness of such interventions as they are of their own condition. People who voluntarily seek cancer screenings are concerned enough about their health to be seeking information. They may be expected to be receptive to new types of treatments that could help them in the event of a positive screening and possible use of chemotherapy. This information should also be made available at the level of general practitioner, so as to expose those persons not actively seeking cancer screenings. Additionally, providing such information at the time of diagnosis and treatment would provide a variety of options for controlling their nausea and vomiting. One-on-one discussions could reinforce the usefulness of complementary therapies to those patients about to undergo chemotherapy.

Policy and procedure changes may be necessary to successfully implement such a program. Units providing this information should do more than hand out pamphlets or offer suggestions. Of course, printed documentation should be readily available. The need for a well-trained nurse, familiar with the availability and application of complementary therapies, who has the knowledge and ability to fully inform potential patients about the processes of

chemotherapy, the expected nausea, and its potential complications, cannot be underestimated here. Cancer patients with lower rates and experiences of CINV will have a better quality of life during that treatment and be more likely to comply with treatment regimens. This may lead to more effective treatments and better outcomes. Success in this area may lead to more individuals seeking screenings. In addition, more of those patients actually needing chemotherapy may choose complementary therapies as adjunct(s) to conventional antiemetic therapy. This may lead to better outcomes overall.

The nurse's evaluation is a key element, on several fronts, in the success of these practice changes. The nurse has to assess every patient for the need for this information, the potential usefulness of the information to the individual patient, the proper means to present this data, and the benefits derived from this change. It is not only an individual effort for each patient, but a collective effort to build on successes and learn from failures. The clinical expertise of the nurse in identifying need, providing resources, tracking results, and making adjustments where needed are all based on clinical evidence that are instrumental in refining practices and providing the best care possible to each individual patient. The studies referenced in this paper are evidence that complementary therapies are effective in the treatment of chemotherapy induced nausea and vomiting. It is up to the clinical nurse to follow through and provide the best options, choices, and recommendations for each individual patient.

Patient preferences and concerns will necessarily be foremost in the application of these clinical practice changes. All of these interventions are personal; some are invasive. Tailoring the means of addressing such interventions to the needs and culture of individual patients is the essence of nursing. The nurse has to work closely with the patient, and/or their families, in order to determine how best to approach each client and implement these potentially beneficial therapies. In some cases, personal, religious, or cultural beliefs may need to be assessed and considered before deciding how to proceed. Acupressure is an inexpensive, low-tech procedure that lends itself nicely to being done in private by close family members, if that offers someone access to these interventions without violating those beliefs. It may be that qualified nurses of each gender are needed in order to be available to provide information, knowledge, and training to patients and family members of either gender to best serve the entire client base.

Conclusions

In conclusion, some complementary therapies have proven to be effective adjuncts to standard antiemetic treatments. A significant number of cancer patients do not receive appropriate relief from medication alone. These complementary therapies are a convenient and inexpensive means of improving patient outcomes. Some do not require specialized training and can even be done safely by family members outside of the clinical environment. Lastly, an obstacle to the effectiveness is the patient belief system. Therapeutic communication between the nurse and each individual patient can foster acceptance of these interventions and potentially provide a measure of relief for refractory chemotherapy induced nausea and vomiting.

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