

Cost Savings in Inpatient Oncology Through an Integrative Medicine Approach

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The Urban Zen (UZ) Initiative at Beth Israel Medical Center, New York, was a pilot project evaluating the impact of a multifaceted “optimal healing environment”¹ intervention—incorporating yoga therapy, holistic nursing practices, a patient navigator, and a renovated physical environment—on quality of life and cost outcomes for inpatients on a medical oncology floor. Our findings regarding quality of life and patient experience, which have been published elsewhere,² showed significant decreases in anxiety, fatigue, and depression in the intervention group compared with controls, as well as improved energy and decreased pain. In this article, we present a summary of our findings on cost outcomes.

Although a fair amount of research has been published on the impact of integrative/complementary medicine interventions on costs of care in the workplace and outpatient settings, to date very little research exists on the question of potential cost savings in the inpatient setting.³ What research exists has primarily focused on cost savings in the perioperative setting. For example, Montgomery et al found that a brief hypnosis intervention produced a substantial cost savings in patients undergoing excisional breast biopsy.⁴ The savings were primarily from reduced medication use and consequently reduced operating room and recovery time per patient; the authors hypothesized that this may have been due to reduced anxiety induced by the hypnosis intervention. Other studies have looked at the impact of nutritional supplementation, music therapy, and mind-body interventions on length of stay following surgical procedures and have found a modest benefit.^{5,6}

Because implementation of this type of intervention in the inpatient setting does require potentially substantial initial investment by the hospital, and because maintaining these types of services does entail additional ongoing cost, it is critical to generate data regarding the potential cost savings that can result from this type of approach. To date such data are not available, especially regarding medical rather than surgical admissions; this study sought to determine what, if any, potential for cost savings could result from an integrative, “healing-oriented” intervention on an inpatient medical unit.

METHODS

The clinical intervention which made up the UZ Initiative took place on 9 Dazian, a

Objectives: To evaluate the cost impact of an integrative medicine intervention on an inpatient oncology service.

Study Design: This study used nonrandomized, nonequivalent groups. A baseline sample of inpatient oncology patients at Beth Israel Medical Center admitted to the medical oncology unit before implementation of the Urban Zen Initiative were compared with patients admitted after the Urban Zen Initiative was in place.

Methods: The Urban Zen Initiative incorporated yoga therapy, holistic nursing techniques, and a “healing environment” into routine inpatient oncology care. Length of stay and medication use data were extracted from Beth Israel’s decision support electronic database. We compared length of stay, total medication costs, and costs of as-needed medications for both groups: the baseline sample of inpatient oncology patients and patients exposed to the Urban Zen healing environment initiative.

Results: We had complete cost data on 85 patients in our baseline group and 72 in our intervention group. We found no difference in length of stay between the 2 groups. We found a significant decrease in use of antiemetic, anxiolytic, and hypnotic medication costs as well as a decrease in total medication costs in the Urban Zen sample compared with the baseline group.

Conclusions: An integrative medicine approach including yoga therapy, holistic nursing, and a healing environment in the inpatient setting can decrease use of medications, resulting in substantial cost savings for hospitals in the care of oncology patients.

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Take-Away Points

An integrative medicine approach incorporating yoga, holistic nursing, and a “healing environment” added to the inpatient care of oncology patients can significantly reduce hospital costs.

- Significant cost savings were realized on as-needed medications including antiemetics and anxiolytics in intervention patients compared with controls.
- Overall medication costs were reduced as well, resulting in an overall cost savings of \$156 per hospital day for patients in the intervention group.
- There was no difference in length of stay between the 2 groups.

24-bed teaching service at Beth Israel Medical Center delivering the full spectrum of inpatient medical oncology care, and included 5 components:

1. Remodeling of the physical space.
 - Conversion of the patient lounge into a healing sanctuary for meditation, yoga practice, and quiet visiting.
 - Lighting and color changes on the floor that deemphasized standard hospital ambience.
 - Renovated staff lounge to provide a quiet space for the staff.
2. Holistic nursing training for the nursing staff. These skills were imparted during a required series of workshops attended by the entire nursing staff on 9 Dazian, including nursing aides as well as staff nurses and nurse managers.
 - Relaxation therapies including breathwork and healing touch skills.
 - Imagery and visualization techniques, specifically to be used to address symptoms of pain, anxiety, insomnia, and nausea.
 - Aromatherapy protocol using specific essential oils such as lavender and ylang-ylang to address common inpatient complaints including insomnia and anxiety; nurses were taught a protocol for administering aromatherapy via hand massage, which is easily applied to debilitated hospitalized patients.
3. Yoga therapists on the unit to work with patients using breathing and yoga techniques. These were registered yoga teachers, generally with at least 5 years of yoga experience, who were interested in gaining more experience in the hospital setting.
 - Yoga practitioners were specifically trained in restorative yoga techniques developed through the UZ Integrative Therapist Training Program, a 500-hour interdisciplinary course designed to prepare yoga therapists for care of hospitalized patients.
 - Yoga protocol was specifically adapted for use in the hospital setting and was designed to address common symptoms including pain, anxiety, nausea, insomnia, and constipation.

- Other than the full-time yoga coordinator, the therapists worked on a volunteer basis.
4. “Patient navigator” position to facilitate a smooth and efficient process of care.
 - This full-time staff position, available Monday-Friday, was fully integrated with nursing functions on the unit; the navigator typically has either a social work or a health education background.
 - Navigator greets the patient on arrival on the unit and then visits each patient 1 to 2 times daily to assess for any issues regarding the process of care that might need attention, as well as to assist with general emotional support.
 5. Audiovisual materials demonstrating yoga and relaxation techniques for patients to use in bed.

Every patient admitted to the unit once the intervention was in place was offered access to all of these services, regardless of their willingness to participate in our study. As part of the admission process, the admitting nurse described the services to each patient, as did the patient navigator. Referral from the physician was not required for patients to access the UZ services; however, a series of educational experiential sessions were held for physician staff on the unit, in which they were exposed to the yoga and holistic nursing techniques used in the protocol. The goal of this training was to ensure that physicians were comfortable with the therapies to be offered to their patients through the UZ project.

Because our funder required that all patients admitted to the unit be offered the UZ services, and because there is no comparable medical oncology unit at Beth Israel that could have served as a control, we chose a nonrandomized, “before/after” design for this study. Using a quasi-experimental nonequivalent-groups design, we compared a control group consisting of patients admitted to 9 Dazian prior to the implementation of the UZ intervention (baseline/control group) with a treatment group consisting of patients who were admitted to 9 Dazian after the UZ intervention was implemented. Inclusion/exclusion criteria were age 18 to 85 years; admission as an inpatient to Oncology Services on 9 Dazian at Beth Israel Medical Center; Karnofsky score of 60 or better; life expectancy of 6 months or more; and English speaking.

The goal of the component of the project reported here was to examine whether this type of intervention can shorten length of stay and reduce medication costs. Medication cost data were extracted from the hospital’s decision support

■ **Table 1.** Comparison of Sample Characteristics^a

Characteristic	Baseline Sample (n = 85)	Urban Zen Initiative Sample (n = 72)	P
Age, mean, y	55.4 ± 12.2	52.6 ± 15.1	.22
Female	39 (46)	36 (50)	.61
Ethnicity			.57
White	44 (52)	35 (49)	
Black	22 (26)	15 (21)	
Hispanic	7 (8)	13 (18)	
Other	12 (14)	9 (12)	
Marital status			.56
Single	26 (31)	26 (36)	
Married/partner	44 (52)	29 (40)	
Other	15 (18)	17 (24)	
Education			.66
Less than high school	10 (12)	10 (14)	
High school graduate	14 (16)	18 (25)	
Technical school, some college	17 (20)	10 (14)	
College graduate	21 (25)	17 (24)	
Post college	23 (24)	17 (24)	
Cancer diagnosis			.75
Gastrointestinal	8 (9)	8 (11)	
Lung	10 (12)	12 (17)	
Head and neck	41 (48)	28 (39)	
Hematologic	9 (11)	10 (14)	
Other	17 (20)	14 (19)	

^aValues are number (percentage) unless indicated otherwise.

database, which contains both cost and charge data for all hospitalizations.

Statistical Analysis

All descriptive data are presented as mean ± standard deviation in the case of normally distributed variables (eg, age), median (minimum, maximum) in the case of skewed variables (eg, length of stay), and frequency (percentage) in the case of categorical variables (eg, sex). In order to correct for skewness, medication cost data were normalized using a log transform prior to significance testing, as recommended by Bland and Altman.⁷ Mean ± standard deviation costs in terms of actual dollars were computed using the antilog of the mean and standard deviation based on the log transformed values. Simple comparisons between the groups were carried out using *t* tests in the case of normally distributed variables and χ^2 tests in the case of categorical variables. Interactions between treatment group and demographic fac-

tors in terms of cost were tested for significance using analysis of variance. All quantitative analyses were done using SAS version 9.1 (SAS, Inc, Cary, North Carolina).

RESULTS

A total of 89 patients were originally enrolled in the baseline sample, and 74 patients were enrolled in the UZ sample. Length-of-stay data were available for all patients, while complete medication cost data were available for 85 patients in the control group and 72 in the intervention group. Overall, there were no significant differences between the 2 groups in age, sex, other demographic factors, type of cancer, or reason for admission (Table 1).

The overall length of stay was virtually the same in both groups, with a median (minimum, maximum) of 3 (1, 34) days in the baseline group and a median (minimum, maximum) of 3 (1, 37) days in the UZ group (*P* = .20). The differences between

■ **Table 2.** Comparison of Costs Between Baseline and Urban Zen Initiative Groups by Medication Type

Type of Medication	Baseline Group		Urban Zen Initiative Group		Difference, \$	P
	Cost, \$	No.	Cost, \$	No.		
All medications	888.91 ± 4.10	85	419.89 ± 6.23	73	469	.006
Antianxiety	5.93 ± 2.89	17	3.03 ± 1.79	14	3	.03
Antinausea	115.58 ± 3.29	73	33.78 ± 7.10	45	82	<.001
Nonopiate analgesics	5.58 ± 2.14	41	5.53 ± 2.32	31	0	.98
Opiate analgesics	11.36 ± 4.57	49	7.77 ± 3.13	29	6	.25

the baseline control group and the UZ intervention group in terms of medication costs are shown in **Table 2**. Total mean medication costs were significantly higher for the baseline group (\$889) than for the UZ group (\$420), for a cost savings on average of \$469 per patient. In terms of medication categories of specific interest, there were significant differences in favor of the UZ group with regard to antinausea medications ($P < .001$) and antianxiety medications ($P = .03$).

Analysis of variance was used to look at possible interactions between background characteristics such as age and sex on one hand and the costs of different types of medication in the baseline group versus the UZ group. No significant differences were found.

DISCUSSION

Although patient-centered outcomes such as anxiety, depression, and pain experience are critical in evaluating the impact of an intervention, ultimately the widespread adoption of an integrative medicine approach, especially in the inpatient setting, will require clear evidence that these interventions are cost-effective, or at minimum cost neutral. A small but growing number of studies document the clinical effectiveness of several of the specific interventions that comprised our “optimal healing environment” and their impact on patient care in the inpatient setting. For example, the presence of a patient navigator on an inpatient oncology floor has been shown in at least 2 studies to decrease patient distress and improve quality of life and patient satisfaction.^{8,9} Similarly, recent studies of yoga therapy modified for inpatient use have been shown to decrease stress and anxiety levels in pediatric cancer patients¹⁰ and in adults with breast cancer.¹¹ Holistic nursing¹² and “physical environment” interventions^{13,14} in the inpatient setting have also been described. However, despite this growing literature very few studies have examined the impact of a multifaceted inpatient intervention such as the UZ project, and even fewer have addressed the issue of cost-effectiveness.

Length of stay is considered the gold standard marker for cost-effectiveness in the inpatient setting. We were not able to demonstrate an impact of the UZ program on length of stay; this may have been in part because the medical oncology floor where the program was implemented has a relatively short average length of stay compared with many inpatient oncology units. Because the Beth Israel Cancer Center sees a high proportion of head and neck cancers, roughly 50% of the admissions to this floor are specifically for placement of a percutaneous gastric tube and initiation of chemotherapy. These are standardized procedures that generally require a 2- to 3-day stay. Change in symptoms or pain does not generally determine the time of discharge, as it might on a floor where more of the admissions were unscheduled and the diversity of diagnoses greater. We are planning to study a similar protocol on a surgical oncology floor, where length of stay is longer at baseline and where time to discharge is more dependent on individual patient recovery factors, which are potentially more responsive to a UZ type of intervention.

We were able to demonstrate a significant decrease in medication costs in the UZ group compared with controls, on the order of \$469 per patient. Although this decrease may seem modest in light of the overall costs of a given hospital stay, if we extrapolate this savings of approximately \$156 per patient per day to a total of 6264 patient days per year (24 beds × 261 days, since services are not available on weekends), the total savings to the hospital would be \$977,184 annually. Even if we assume that only half the patients on the floor choose to actively utilize the UZ services—a conservative estimate based on the participation we saw during our study—the cost savings would amount to \$488,592 annually.

The largest cost of the UZ intervention was the one time expense of physical space renovation, which was approximately \$300,000. The other one time costs were for holistic nursing training for the floor staff—which cost approximately \$40,000, including missed work time for nursing staff and salary support for the holistic nurse trainers—and production of audiovisual materials (\$15,000). These investments do not have to be repeated, and thus can be amortized over the life of the program.

Cost Savings From Integrative Medicine

The ongoing costs of the program consist of salary support for the patient navigator (\$92,000 annually including fringe benefits) and the yoga coordinator (\$117,000 annually including fringe benefits). Thus, the total costs of the UZ program including both one time (\$355,000) and ongoing (\$209,000 per year) costs were approximately \$564,000. Even utilizing the most conservative estimate of cost savings (\$488,592/year), by the second year of the program, with the start-up costs included, the hospital realizes a savings of \$204,184 based on decreased medication costs. This annual savings rises to \$279,592 in the third year, with the initial investment in space and training completed. These ongoing cost savings then continue for the remainder of the life of the program.

Studies to date of the cost-effectiveness of integrative medicine approaches have mostly focused on the outpatient setting. Many of these have focused specifically on pain syndromes such as headache and lower back pain, examining therapies ranging from acupuncture to chiropractic to naturopathy; some found a small to moderate benefit over conventional therapy in terms of costs and others found no difference.¹⁵⁻¹⁹ The few studies that have examined inpatient interventions have focused on surgical patients^{4,6}; we were unable to locate any cost-effectiveness-oriented studies of integrative medicine interventions on an inpatient medical unit such as this one. Conclusions also differ in the narrative and systematic reviews addressing cost-effectiveness, with some authors claiming significant cost savings from integrative medicine interventions and others finding no such benefits.²⁰⁻²³ However, in 2 recent reviews, Block makes the important point that even if only some of the inpatient or surgery-oriented integrative interventions are found to generate cost savings, the implications for the healthcare system could be enormous: for example, the intervention described in the hypnosis for breast surgery study by Montgomery et al, if implemented widely in the United States, could potentially lead to more than \$180 million in savings annually.^{24,25} In the most comprehensive review published to date, Pelletier et al conclude that regarding surgery and inpatient medicine, hypnotherapy and nutritional supplementation have been shown to be cost-effective and should be incorporated into routine care.³ These authors call for cost-benefit analysis to be incorporated into every study of complementary and alternative medicine or integrative medicine interventions.³

Limitations

As this was a small pilot study, there were some significant limitations in design. The nonrandomized design makes it difficult to draw definitive conclusions regarding whether the UZ intervention was in fact responsible for the cost savings, as opposed to other unidentified factors. The fact that the program consisted of multiple interventions offered simultaneously makes it impossible to tease out which aspects of the UZ Initia-

tive may be most critical in generating the cost savings described here. This important information must be clarified in future studies: if the same benefits could be delivered with only 1 or 2 of the components of this intervention, the potential cost savings for the hospital would be even greater than what we found here. Similarly, our lack of data on how often and to what degree specific patients accessed the UZ services makes it impossible to make any comment regarding the “optimal dose” of these services; this again will need to be charted in future studies.

CONCLUSIONS

Despite the limitations of the current study, we were able to demonstrate a significant cost savings from the implementation of the UZ Initiative on our inpatient oncology floor at Beth Israel. Although substantial start-up costs are involved, this type of innovative, patient-centered, “optimal healing environment” intervention in the inpatient setting has the potential to significantly reduce patients’ need for medication to treat anxiety, insomnia, nausea, and pain. This decreased use of medications can create substantial cost savings for hospitals in the care of oncology patients.

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