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Eliminating Transportation Barriers to Outpatient Therapy for Underserved Patients with Cancer

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Abstract

Background: The cancer patients of Bellevue Hospital (BH) and Woodhull Hospital (WH) represent an underserved community, and are referred to New York University Clinical Cancer Center (NYUCCC) for outpatient radiotherapy (RT). Commuting to NYUCCC poses a financial burden hindering treatment compliance.

Purpose: To assess the impact of free metro-cards on the compliance rate of outpatient RT for BH/WH cancer patients with financial needs.

Methods: Cancer patients at BH and WH were screened once referred for outpatient RT; met New York State qualifications for Medicaid; did not live within 1 mile of NYUCCC; could use public transportation, did not have transportation assistance otherwise. Each patient received 1 free metro-card for the initial RT consultation and metro-cards for the entire course of planned RT.

Results: From 12/01/2012 until 12/12/2013, 103 patients were enrolled, 102 patients completed RT sessions. The major ethnicities were Hispanic and Black, the average course of RT was 28.8 sessions, 90/102 patients (88%) compliance rate was achieved. 12/102 patients (12%) had at least 1 treatment delay or missed RT sessions solely attributed to urgent medical visits.

Conclusion: Eliminating the financial burden of transportation costs leads to a high compliance rate of 88% with outpatient

RT for underserved cancer patients, much higher than that of historical compliance rate of 50% in BH. Future studies in a larger underserved cancer patient population may help define the role of financial assistance during outpatient RT in patient compliance.

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Keywords: Disparities, Cancer, Radiation Therapy, Metro Cards, Compliance.

Abbreviations List: NYC: New York City, BH: Bellevue Hospital, WH: Woodhull Hospital, NYS: New York State, RT: Radiation therapy, NYUCCC: New York University Clinical Cancer Center.

Introduction

Eliminating health care disparities in cancer care is a major challenge in urban population of large cities such as New York City (NYC). While cancer represents the second cause of mortality in all populations, it is the number one cause of mortality in Hispanics. Implementation of cancer care is linked not only to provision of oncology and radiation services, but to the process of enabling access. Access to cancer care is directly linked to socio-economic disparities and multiple studies even

linked access to care with outcomes. Many factors influence access to cancer care, facilitating transportation and ensuring completion of prescribed therapy is one of the key elements.

Bellevue Hospital (BH), located at Manhattan, together with Woodhull Hospital (WH) situated in Brooklyn, both serve a large number of patients who would otherwise have minimal means to receive medical care. Enrollees in Medicaid qualify for metro-cards for their medical visits to the above facilities. However; for patients who need urgent cancer related treatments, eligible for but have not obtained New York State (NYS) Medicaid, are not yet eligible to receive transportation assistance. Cancer care such as radiation therapy (RT) in both BH and WH is provided at New York University Clinical Cancer Center (NYUCCC). BH and WH patients who qualify for but have not obtained medical coverage from NYS Medicaid will not be able to receive transportation assistance for their travel to the RT facility.

For patients without financial means to supplement transportation cost related to RT, receiving RT as an outpatient could be a challenge. We designed a study to provide transportation funding for cancer patients who cannot afford it otherwise, in which RT is scheduled to begin. This study fulfills a crucial but often ignored need for patients who have to travel daily to receive outpatient RT.

At BH from 2010 to 2011, among all the patients with financial needs that underwent outpatient RT at NYU, approximately 50% of patients were able to finish planned RT sessions without interruptions.

Materials and Methods

This study is in compliance with human studies committees of NYU School of Medicine and US Food and Drug Administration guidelines.

The institutional committees on human research approved the study protocol. This study was approved by Protocol Review Monitoring Committee of Perlmutter Cancer Center of NYU Langone Medical Cancer, and by the Institutional Review Board of NYU School of Medicine. According to the definition of Institutional Review Board of NYU School of Medicine, informed consent was waived for this study.

Among BH and WH, there are approximately 300 cancer patients undergoing RT each year, and at least 50% of patients need outpatient transportation assistance. A typical duration of RT lasts 6 weeks (29 sessions). If we use metro-cards, \$5 for a round trip fare, a monthly pass metrocard that covers 22 sessions costs \$96, it will add up to \$131 for an average patient.

We had obtained a non-restricted Philanthropy source from Capital One Bank of \$13,500 through NYU Cancer Institute to provide funding for this pilot, and that was intended to serve close to 103 patients.

Eligible cancer patients were referred from BH or WH for outpatient RT. Each patient was screened by a financial counselor. Once found to be financially eligible for transportation assistance, the patient received metro-cards from patient navigators. Patient navigators contacted each patient weekly through phone calls to record the number of RT sessions missed and any unscheduled visits to medical facilities.

All patients met NYS qualifications for Medicaid; but did not receive Medicaid during RT. They lived beyond 1 mile of NYUCCC, and were able to use public transportation. Each patient was offered 1 free metro-card to cover the round-trip fare for the initial RT consultation. Once the patient obtained a treatment schedule, additional metro-cards were provided to cover the transportation expense for the entire course of planned RT.

The primary goal of this study is to increase the number of underserved patients who can complete the entire course of RT without interruption by offering outpatient transportation at no cost.

Among underserved cancer patients at BH, we expect 50% to complete the full course of RT without transportation funding support, a compliance rate derived from retrospective chart review of 20 BH cancer patients that underwent outpatient RT from 10/2011 to 12/2011. Once offered transportation at no additional cost, we expect 75% of subjects to complete RT.

Sample Size Calculations

Our sample size of 102 patients achieves 100% power to detect differences of 25% between the historical rates and new rates mentioned in the goals section above. Our sample size calculations used a two-sided binomial test with a significance level of 0.05.

All subject and tumor information was summarized using descriptive statistics (such as frequencies for qualitative variables and means and standard deviations for continuous variables). Differences in patient characteristics at each hospital were calculated using Chi-Square Test or Fisher's Exact Tests for categorical variables and Wilcoxon Rank Sum Tests for continuous variables.

Results

Overview

From 12/01/2012 until 12/12/2013, 103 patients from BH and WH were enrolled. The major ethnicity groups were Hispanic, followed by African American and Asian. The average course of RT was 28.8 sessions. One hundred and two patients completed their planned course of RT. One patient did not complete the planned treatment after 1 RT course due to intolerable RT-related adverse effects and withdrew from this study.

Twelve of 102 patients (11.8%) had at least 1 treatment delay or missed RT sessions; the sole reason for the treatment interruptions for 11 patients was unscheduled visits to medical facilities. A total of 10 patients missed 5 or fewer sessions.

No gender-based differences were present.

Demographics

Seventy-two patients from BH and 30 patients from WH participated in this study. Both patient groups had median ages of 58. At BH, a similar number of men and women participated, while at WH, 63% of participants were men (Table 1). Among the patients at both hospitals, the most common ethnic group was Hispanic, and the most commonly spoken native languages were English, followed by Spanish. At BH, 23.6% of the study patient population was Asian, making it the 2nd most common ethnic group and Chinese was the 3rd most common native

Table 1: Demographics

		Bellevue (N=72)	Woodhull (N=30)	P-Value
Age	Median (range)	58 (29-77)	58 (39-75)	0.205***
Gender	Male	34 (47.2%)	19 (63.3%)	0.138*
	Female	38 (52.8%)	11 (36.7%)	
Ethnicity	African American	9 (12.5%)	8 (26.7%)	0.016*
	Caucasian	8 (11.1%)	1 (3.3%)	
	Hispanic	29 (40.3%)	16 (53.3%)	
	Asian	17 (23.6%)	0	
	Other	9 (12.5%)	5 (16.7%)	
Native Language	English	37 (51.4%)	18 (60.0%)	0.046**
	Spanish	18 (25.0%)	9 (30.0%)	
	Chinese	13 (18.1%)	0	
	Other	4 (5.6%)	3 (10%)	
Diagnosis	Breast	21 (29.2%)	8 (26.7%)	0.004**
	Lung	8 (11.1%)	1 (3.3%)	
	Prostate	3 (4.2%)	9 (30.0%)	
	Gastrointestinal	12 (16.9%)	8 (26.7%)	
	Head and Neck	12 (16.7%)	2 (7%)	
	GYN	6 (8.3%)	1 (3.3%)	
	Other	10 (13.9%)	1 (3.3%)	

*Chi-Square Test, **Fisher's Exact Test, ***Wilcoxon Rank Sum Test

language spoken. At WH, no patients were Asians and nobody spoke Chinese. The differences in ethnicity and native language between the two hospitals were both statistically significant.

In addition, the most common diagnosis at BH was breast cancer, while the leading diagnosis at WH was prostate cancer; each represented 30% of the study patient population. The percentage of head and neck cancer, gynecological cancer and lung cancer at BH were all much higher than those at WH, while WH had higher percentage of patients with gastrointestinal cancers relative to BH. According to the tumor registry data in 2011, the top 3 most common cancers at BH and WH were breast, prostate, gastrointestinal and prostate, gastrointestinal, breast; respectively. Both head and neck and gynecological cancers were more prevalent at BH compared to WH.

Missed RT sessions

The median number of RT sessions for patients at both BH and WH were similar (29 and 30, respectively) (Table 2), so was the

percentage of patients who missed RT sessions: 11.1% and 13.3%, respectively. Among the 12 patients who did not complete RT as planned, the majority of them missed 5 or less RT sessions at both BH and WH (7/8 and 3/4, respectively) (Table 3.1). At BH, 87.5% of patients who missed RT carried a diagnosis of either head and neck cancer, gynecological cancer or gastrointestinal cancer, yet only 25% of patients at WH who missed RT had head and neck cancer, the rest of patients didn't have either gynecological or gastrointestinal cancer (Table 3.2).

Unscheduled visits to medical facilities

The proportion of patients who presented with unscheduled visits to medical facilities was similar in both hospitals (63.9% and 53.3%, respectively). Every patient with the diagnosis of either gynecological cancer or gastrointestinal cancer in both hospitals encountered unscheduled visits, with head and neck cancer being the 3rd highest proportion of patients, the same trend at both hospitals (Table 4).

Table 2: Missed RT sessions and number of unscheduled medical visits

		Bellevue (N=72)	Woodhull (N=30)	P value
Number of Patients Who Missed RT Session	yes	8 (11.1%)	4 (13.3%)	0.744**
	no	64 (88.9%)	26 (86.7%)	
Number of Unscheduled Medical Visits	0	46 (63.9%)	16 (53.3%)	0.004**

**Fisher's Exact Test

Table 3.1: Distribution of patients based on number of missed RT sessions

Number of missed RT sessions	Bellevue (n= 8)	Woodhull (n=4)
	Number /percentage of pts	Number/percentage of pts
1	1 (12.5%)	1 (25%)
2	1 (12.5%)	1 (25%)
3	2 (25%)	0
4	1 (12.5%)	0
5	2 (25%)	1 (25%)
>5	1 (12.5%)	1 (25%)

Table 3.2: Diagnosis and unscheduled visits for patients with missed RT sessions

Cancer Diagnosis	Bellevue (n=8)	Woodhull (n=4)
	Number/percentage of pts	Number/percentage of pts
Head and Neck	3 (37.5)	1 (25%)
Gynecological	2 (25%)	0
Gastrointestinal	2 (25%)	0
Lung	1 (12.5%)	1 (25%)

Table 4: Distribution of patients who presented for unscheduled visits to medical facilities

	Bellevue Hospital (n= 72)	Woodhull Hospital (n=30)
# of patients with unscheduled visits	46 (63.9%)	16 (53.3%)
proportion of patients with unscheduled visits within each diagnosis in descending order		
Gynecological	6/6 (100%)	1/1 (100%)
Gastrointestinal	11/11 (100%)	6/6(100%)
Head and Neck	11/12 (91.7%)	1/1 (100%)

Discussion

Ethnicity and Cancer Diagnosis

Although both BH and WH are city hospitals of New York City, they serve different patient population. BH provides cancer care for a diverse patient population, the top 3 ethnicities as Hispanics (40.3%), Asians (23.6%), followed by African American patients (12.5%). On the other hand, WH serves predominantly Hispanics (53.3%), followed by African American patients (26.7%). BH serves a patient population that covers both local Manhattan and distant boroughs of NYC where Chinese Communities reside, and WH mostly captures local residents in Brooklyn with minimal Chinese patient population. Such difference also contributed to the slight variation in the leading cancer diagnosis in the 2 patient groups. The most common cancer diagnosis at BH in this study was breast cancer, followed by head and neck cancer (Asian patients have a relatively high proportion of head and neck cancers relative to African Americans), while the top two cancer diagnosis at WH was prostate cancer (much more prevalent in African American and Hispanic patients compared to Asian patients) and breast cancer.

Compliance Rate in Head and Neck Cancer Patients

This is the first prospective study focusing on the effect of transportation assistance on patient compliance for underserved cancer patients. The compliance rate of 88% for such patients is the highest ever reported. If we focus on head and neck cancer

patients in our study (12 patients at BH) over the study period of 1 year, the compliance rate was 75%, lower than the overall 88% compliance rate for the entire patient population. This is, however; significantly higher than the 40% reported in a retrospective study in 80 head and neck cancer patients treated at BH over a 5 year period [1]. The small number of sample size over short 1 year duration could introduce potential bias of limited sample, but the much higher compliance rate in our study is still suggestive of the benefit of transportation assistance through free metro cards in underserved patient population. The compliance rate for this subpopulation of head and neck patient remains the same for both WH and BH, again demonstrating the potential benefit of transportation assistance for compliance.

Among patients who missed RT sessions, 3 of 8 patients (37.5%) at BH belonged to the relatively high risk patient population with head and neck cancer. At WH, only 1 of 4 patients (25%) had the diagnosis of head and neck cancer. This difference could be due to a relatively smaller sample size of patients who participated in this study from WH and its less proportion of head and neck cancer patients compared to BH, 6.7% and 16.7%, respectively.

In a retrospective study at Vancouver Cancer Center in 471 patients with head and neck cancer, 74% of patients missed at least 1 RT session, and 11% of patients missed at least 3 days of treatment. This phenomenon was confirmed in another retrospective study for 280 patients with head and neck cancer that underwent RT in California [2]. Up to 75% of patients

missed at least 1 session of RT, and 17% of patients missed more than 5 RT sessions, indicating that patients with head and neck cancer is at high risk for treatment interruptions during RT [1].

For all the patients that missed RT sessions, the vast majority of them only missed 5 or fewer sessions during the entire period of RT treatment, indicating that 87.5% of BH patients and 75% of WH patients were able to complete RT with minimal interruptions. Both numbers are higher than the historical controls.

Ethnicity and Compliance Rate

Black patients with diagnosis of early breast cancer have much less portion of patients receiving RT after curative intent surgery, as supported by SEER data from 1983 through 1998 [3-7]. According to the 2004 to 2008 data in the National Healthcare Disparity Report, minority women such as African Americans, Asians and Hispanics were less likely to receive RT after curative intent surgery for breast cancer within 1 year of diagnosis, compared to Non-Hispanic White [8]. In 2008, the proportion of breast cancer patients who received RT within 1 year of diagnosis among African Americans, Asians and Whites were 72%, 75% and 80%; while the rates among Hispanics and Non-Hispanic Whites were 75% and 82%, respectively. In a retrospective analysis of SEER data from 1998 to 2005, a total of 12, 653 patients had stage III breast cancer that underwent curative surgery, but only 50% received RT[9]. In fact, Hispanic and African American patients were 20% and 24% less likely to receive RT than their White counterparts in that study, respectively. In our study, up to 30% of patients from both BH and WH had a diagnosis of breast cancer, most of which were early stage cancers, all of which received RT within 1 year of cancer diagnosis, and no patients experienced a delay or missed session of RT, even though the majority of patients with breast cancer in both BH and WH in this study were Non-Whites.

Compliance Rate and Cancer Relapse

Compliance with outpatient RT for curative intent is highly associated relapse. In a retrospective study from 1903 breast cancer patients undergoing conserving surgery and RT between 2003 and 2008, noncompliant patients had a 5.02-fold increased risk of local recurrence than compliant patients[10]. Any increase in compliance is a potential for decrease in relapse rate, a step closer to a cure.

Interruption or prolongation of outpatient RT for patients with curative intent compromises the potential for cure. In a study of 209 patients with cervical cancer that underwent outpatient RT, when RT sessions extended beyond 55 days, both local regional failure and overall survival were worsened, pointed to the detrimental effects of RT interruption[11]. In a retrospective study looking at 78 patients with head and neck cancer who received outpatient RT, when RT interruption was longer than 5 days, the local regional failure rate dramatically increased, again indicating the crucial reason to minimize RT interruptions[12]. In another retrospective study that examined 153 patients using 11 prognostic factors, when a patient completes RT course without interruptions or delay, the overall survival rate is 3 fold higher than any patient who misses even 1 RT session, suggesting the ultimate goal of outpatient RT therapy in patients with curative cancer is to not miss any RT sessions at all [13].

Role of Patient Navigator in Compliance Rate

In addition to free transportation, a potential benefit for patients enrolled in our study is the weekly calls from patient navigators. It could serve as a reminder to help increase compliance for patients to adhere to their RT schedule.

In a retrospective study among American Indians patients who underwent curative intent RT and enrolled in a patient navigation program, patient navigators helped reduce the average missed RT sessions [14]. Compared to historical control of 70 patients prior to the patient navigation program, 123 patients who interacted with patient navigators experienced much shorter average time of RT interruptions (1.7 days vs. 4.9 days), indicating the benefit of patient navigation program in reducing treatment interruptions for outpatient RT. In the retrospective studying American Indian patients utilizing patient navigation program, the average number of interactions between patient navigators and patient was 25, much higher than the interactions in our study. However, in our study, the patient navigators' contacts with patients were limited to weekly phone calls; each patient's average number of interaction with our patient navigator was 6.

Compliance Rate Overview

Despite the differences in geographic locations, patient ethnic group distribution and cancer diagnosis, both BH and WH patients in this study achieved a modest compliance rate of 88.9% and 86.9%, respectively. Although this study contains a relatively small number of patients over only 1 year period, our study met its primary endpoint by achieving a 25% higher compliance (>75%) compared to the historical control (50%).

Conclusion

This is the first report of a prospective study in underserved cancer patients from 2 different facilities that focuses on compliance rate in outpatient RT with free metro cards to supplement the cost of public transportation. Eighty-eight percent of patients finished outpatient RT without any interruptions, which is higher than predicted 75% in this study. Among patients who missed RT sessions, 83% of patients only missed 5 or less RT sessions, making this study feasible and helpful for such patient population to achieve a high compliance rate and allowed majority of RT delivery among the small percentage of patients who had RT interruptions.

Providing free transportation assistance in the form of metro cards in an urban inner city underserved cancer patient population eliminates disparities in cancer care due to cost. It helps to achieve a significantly higher compliance rate during outpatient RT therapy, and indicates the feasibility of such approach in future directions in treatment compliance with the potential of improving overall cancer patient outcomes.

Considering a modest cost with anticipated positive impact on long term patient outcomes, such strategy should be studied and implemented in a larger patient population over a longer period of time to better assess its value in patient compliance.

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