STATISTICAL ANALYSIS PLAN

Title: Optimizing Delivery of Diabetes Management During Cancer Care

NCT #: NCT05565534

Document Date: November 1, 2022

STATISTICAL DESIGN AND POWER: Patient Intervention Pilot Study

Study Design: The proposed pilot study uses a quasi-experimental pre-post design with non-randomized intervention and control groups. I plan to recruit 76 women over two years from the Weill Cornell Medicine (WCM). Thirty-eight of these women will be in the control group and 38 women in the intervention group.

Sample characteristics: For each baseline covariate (demographics, cancer data, medical history, diabetes data, and health service use), we will examine the distribution using descriptive statistics. We will test whether baseline covariates are balanced between intervention and control groups using parametric or non-parametric bivariate tests, as appropriate. All tests will be conducted at α=0.05.

***Primary and Secondary Outcome analyses*:** The outcomes selected for this proposed pilot study were guided by the implementation science framework, RE-AIM: Reach (how many people received the intervention), Efficacy (effectiveness of intervention, tested in future R01), Adoption (feasibility, acceptability, appropriateness), Implementation (fidelity), and Maintenance (assessed in future R01). Our primary and secondary measures are organized by the RE-AIM domains in Table 1.

- The primary outcomes are implementation process measures including Reach, Adoption, and Implementation. To determine Reach, I will calculate recruitment success and data completion ratios; and for intervention participants, an intervention completion ratio. Among intervention participants, I will assess Adoption using psychometrically-validated measures of acceptability, feasibility, and appropriateness. Implementation will be assessed by fidelity (degree to which the intervention was implemented).
- The secondary outcomes for this pilot study are preliminary Effectiveness measures. I will test differences between groups using chi-square tests for categorical variables, t-tests for normally distributed continuous and Wilcoxon signed rank test for non-normal continuous ones. Given the quasi-experimental, pre-post design with nonrandomized control and intervention groups, I will use a difference-in-difference (DID) approach to examine changes in effectiveness outcomes from baseline to follow-up between the groups.
- Maintenance of the intervention will be evaluated in the future R01 trial.

Table 1: Study Outcomes Guided by the RE-AIM Framework

RE-AIM Domain	Measure	Measure Description	Data Type	Base-line	Follow-up
R – Reach*	Recruitment Success Ratio	# participants recruited/# participants approached	Study data	**X**	
	Intervention Completion Success Ratio	# participants completed intervention/# participants enrolled	Study data		**X**
	Data Collection Success Ratio	# participants completed both surveys/# participants enrolled	Study data		**X**
E – Effective-ness	DM Satisfaction	DM Treatment Satisfaction Questionnaire (8 items, α=0.92)[62]	Self-report	**X**	**X**
	DM Distress	DM Distress Scale (17 items, α=0.93)	Self-report	**X**	**X**
	Patient breast cancer QoL	Functional Assessment of Cancer Therapy -Breast (44-items, α=0.90)	Self-report	**X**	**X**
	Hospitalizations	# of inpatient stays since cancer diagnosis	Self-report		**X**
	ED visits	# of ED visits since cancer diagnosis	Self-report		**X**
	Missed/delayed chemotherapy	total # planned doses - # doses given	EHR		**X**
A – Adoption*	Feasibility	Feasibility of Intervention Measure (4 items, α=0.89)[63]	Self-report		**X**
	Acceptability	Acceptability of Intervention Measure (4 items, α=0.85)[63]	Self-report		**X**
	Appropriateness	Intervention Appropriateness Measure (4 items, α=0.91)[63]	Self-report		**X**
I –Imple-mentation*	Fidelity	Mean # NP of contacts; # who had a care summary created	Study data	**X**	**X**
M - Maintenance	Assessed in Future R01	N/A	N/A	N/A	N/A

Key: * Indicates primary outcomes; QoL (quality of life), ED (Emergency Department); EHR (electronic health record); # of (number of), α refers to Cronbach's α (measure of a scale's internal consistency with values >0.80, indicating high reliability.

***General Statistical Considerations*:** Analyses for the primary and secondary outcomes will be based on intent-to-treat principles. When normality assumptions are not tenable, log-transformation will be considered. Sensitivity analyses will be performed with respect to missing data when appropriate.

Power Analysis and Sample Size: As the primary outcomes are implementation process measures, the study is not powered to test the intervention's effectiveness. However, with an anticipated 30 patients in each group (assuming 20% attrition from the 38 women enrolled per group), I will be able to detect effectiveness differences as small as 4.68 points (assuming power of 0.80, alpha=0.05) in patient satisfaction, as measured by the Diabetes Treatment Satisfaction Questionnaire (range 0-36; mean 25.7, standard deviation 6.5). This difference is considered clinically significant.[62, 67, 68] The DM satisfaction questionnaire was selected because it represents how satisfied patients are with their DM care, which is critical to the objective of this intervention. Analyses will be conducted in SAS version 9.4 and will not be controlled for multiplicity given the pilot nature.