



# Managing diabetes during treatment for breast cancer: oncology and primary care providers' views on barriers and facilitators

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## Abstract

**Purpose** Diabetes is a prevalent comorbid condition among many women with breast cancer. The roles and responsibilities of managing diabetes during cancer care are unclear, as oncologists lack interest and clinical expertise and many patients stop seeing their primary care providers (PCPs). Uncertainty around who should manage diabetes for cancer patients can result in gaps in care for survivors. We sought to elicit the perspectives of providers about a novel diabetes care delivery intervention for women undergoing chemotherapy for breast cancer.

**Methods** We conducted nominal group sessions with PCPs and breast oncologists across the USA. We introduced a novel care delivery model, which involved a nurse practitioner (NP) specifically trained in diabetes to work within the oncology team to manage diabetes for women during chemotherapy. PCPs and oncologists were asked to identify potential barriers and facilitators to the intervention's success and then vote on the top three most important barriers and facilitators, separately. Votes were aggregated across sessions and presented as frequencies and weighted percentages.

**Results** From November to December 2020, two 60-min sessions with PCPs and two 60-min sessions with breast oncologists were held virtually. In total, 29 providers participated, with 16 PCPs and 13 breast oncologists. At the health system level, financial support for the NP-led intervention was identified as the most important barrier across both provider types. Clearly defined roles for each care team member were identified as the most important facilitator at the care team level. At the patient level, lack of cancer-specific diabetes education was identified as an important barrier.

**Conclusion** Our findings underscore the need to engage various stakeholders including policy makers, institutional leadership, care team members, and patients to improve diabetes care for patients undergoing chemotherapy for breast cancer. As such, multi-disciplinary interventions are warranted to increase awareness, engagement, and self-management practices among breast cancer patients with diabetes.

**Keywords** Breast cancer · Chemotherapy · Diabetes mellitus · Supportive care

## Introduction

In the USA in 2020, 20% of the 280,000 incident breast cancer patients had diabetes at the time of their cancer diagnosis [1–3]. With an aging population and rising prevalence of diabetes risk factors like obesity, the number of breast cancer patients with diabetes will grow over the coming years. Diabetes receives less attention than usual during active cancer treatment because patients, oncologists, and primary care providers (PCPs) often prioritize cancer care over management of other chronic diseases [4]. Although this choice may be appropriate, some cancer treatment modalities such as certain types of chemotherapy can worsen glycemic control, which puts patients with diabetes and cancer at increased

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risk for poor outcomes including emergency department visits, hospitalizations, and even death. In fact, breast cancer patients with diabetes have a 50% increased risk of all-cause and breast cancer–related mortality, compared to breast cancer patients without diabetes [5, 6]. Both oncologists and PCPs recognize the need for glycemic control during chemotherapy in individuals with breast cancer and diabetes [7]. However, diabetes management during this phase of care is not straightforward and it is unclear which provider should be responsible for managing diabetes during cancer chemotherapy.

Uncertainty around who should manage diabetes for cancer patients on chemotherapy can result in gaps in care [8]. Identifying a provider who could effectively manage diabetes may be an appealing solution to patients, PCPs, and oncologists alike. Notably, nurse practitioners (NPs) have already been successfully integrated into many oncology care teams to support general cancer care [9]. NPs have also been shown to successfully manage DM in ambulatory [10, 11], inpatient [12], and community [13] settings, but, to our knowledge, having an NP on the oncology care team to manage DM for breast cancer patients on chemotherapy has not yet been tried. This study sought to elicit the perspectives of NPs, oncologists, and PCPs about barriers and facilitators to a proposed approach of having an NP manage diabetes during breast cancer chemotherapy. Insights generated from this qualitative study will be used to inform and refine the proposed NP-led intervention to ensure it meets the needs of both oncologists and PCPs.

## Methods

### Conceptual framework

This qualitative study was guided by the Institute of Medicine's (IOM) four-level conceptual model for healthcare delivery change [14, 15]. This systems approach framework to healthcare delivery [16] considers the influences of the [1] patient, [2] care team, [3] organization, and [4] environment on healthcare delivery (Fig. 1).

### Provider eligibility and recruitment

PCPs, NPs, and breast oncologists across the country were recruited through professional networks, emails, and CME newsletters. Providers who cared for at least 10 women with both breast cancer and type 2 diabetes during their careers were eligible. Trainees were not eligible to participate. Eligible providers were approached via email by a research assistant to schedule the nominal group sessions. To thank providers for their time and participation, each provider was given a \$100 gift card.



**Fig. 1** Institute of medicine's systems level approach to healthcare delivery, customized for this study [15]

### Setting

In order to include providers nationally and to be mindful of the risks associated with the COVID-19 pandemic, this qualitative study was conducted virtually from November to December 2020. We utilized ZOOM, a secure HIPAA-compliant video-conferencing software, to conduct the qualitative sessions. To facilitate small-group discussions, participants entered the virtual ZOOM conference room with their cameras. All participants provided verbal consent. This study was approved by the Institutional Review Board at Weill Cornell Medicine (IRB #20-03021653).

### Nominal group protocol

Nominal groups are a widely used technique for eliciting expert feedback on a topic and reaching consensus [17, 18]. This qualitative methodology is especially appealing in clinical research [18] and healthcare intervention development [19]. A semi-structured topic guide was developed to facilitate the nominal group discussion. The nominal group sessions were led by a trained moderator (R.O.) from the University of Alabama. At the beginning of each session, the moderator described the problem (poor diabetes management during breast cancer chemotherapy). Then, participants were told to consider a potential solution, which was to integrate a NP into the oncology care team specifically to manage diabetes during chemotherapy. After explaining the background of the study and the

proposed NP-led intervention in detail (see narrative in Supplemental Figure I), participants were asked to discuss two questions. First, they were asked, “What do you think are the biggest barriers to the success of this intervention?” After brainstorming for 5 min, the moderator asked the participants to share a barrier. Once a unique list of barriers was created, there was clarification of ideas. The participants then voted on the three most important barriers, in successive order, to the success of this intervention. After that was completed, the moderator posed the second question, “What suggestions do you have to facilitate or enhance the success of this intervention?” The same process was taken to generate a unique list of facilitators and participants then voted on their three most important facilitators. The entire process took approximately 60 min.

### Demographic survey

At the end of each nominal group session, participants completed a demographic questionnaire that asked the following: gender, medical specialty (generalist or breast oncologist), years since completing medical school, race and ethnicity, zip code area of practice, and practice setting (academic medical center or community medicine). Participants then received their \$100 gift cards.

### Data analysis

The nominal group moderator (R.O.) calculated a relative priority score for each unique item generated during the nominal group sessions. Because the participants voted on the three most important barriers and facilitators in successive order, a weight of 3 points was assigned to the item deemed most important, 2 for the second most important, 1 for the third most important, and 0 for the remaining items. The points were summed for each item and divided by the total number of available points which depended on the number of participants in each nominal group session (i.e., each of  $n$  participants contributed 6 points; thus, the total number of available points was  $n*6$ ). A total weighted score that represented the priority of each item while accounting for the different numbers of participants in each session was calculated by dividing the total sum for the item by the number of available points.

Then, three team members trained in qualitative research (J.C., N.H., and L.P.) reviewed the list of unique barriers and facilitators that the participants had identified and voted on during the nominal group sessions. Items that received zero votes across all providers were removed from data analysis. After generating a list of total barriers and total facilitators, each unique item was assigned into one of the four themes of the IOM conceptual framework: [1] patient, [2] care team, [3] organization, and [4] environment (Fig. 1). The three

reviewers met and discussed their categorizations and reconciled any differences. Through the discussion, each unique item was further categorized into common subthemes. Finally, two senior members of the team (L.K. and M.S.), who are both clinicians, reviewed the subthemes and provided clinical feedback. We generated a final list of barriers and facilitators organized by both framework level and subtheme and with the priority scores and percentages of providers' votes.

## Results

### Setting and participants

Four virtual nominal groups of 29 providers total were conducted in November and December 2020. Two of the sessions included only oncology physicians and NPs ( $N=13$ ) and two sessions included only primary care physicians and NPs ( $N=16$ ). Among PCPs, 69% were female, 37% were not non-Hispanic White, and 63% practiced in the Northeast (Table 1). The mean number of years in practice was 24.6 (SD 10.5) years and only 1 practiced in a community setting. Among breast oncology providers, 92% were female, 31% were non-White, and 62% practiced in the Northeast. The mean number of years in practice was 21.3 (SD 12.2) and only 1 practiced in a community setting.

**Table 1** Provider characteristics

	Primary care ( $n=16$ )	Oncologists ( $n=13$ )
Gender, $n$ (%)		
Male	5 (31%)	1 (8%)
Female	11 (69%)	12 (92%)
Hispanic/Latino origin, $n$ (%)	0 (0%)	2 (15%)
Race, $n$ (%)		
White	10 (63%)	9 (69%)
Asian	5 (31%)	2 (15%)
Black or African American	1 (6%)	2 (15%)
Number of years since completed training, mean years (SD)	24.6 (10.5)	21.3 (12.2)
Location of practice, $n$ (%)		
Academic medical center	15 (94%)	12 (92%)
Community	1 (6%)	1 (9%)
Region of practice, $n$ (%)		
Northeast	10 (63%)	8 (62%)
Midwest	4 (25%)	0 (0%)
South	1 (6%)	4 (31%)
West	1 (6%)	1 (8%)

## PCP-identified barriers

The sixteen PCPs identified 26 unique barriers to implementing the NP-led intervention (Supplemental Table I). These barriers were grouped into 14 subthemes organized by the four levels of the conceptual framework (Table 2). At the health system level, PCPs reported barriers related to financing the intervention, which included concerns about if insurance companies would reimburse for the intervention and if the NP and oncologist could bill for services on the same day. Finance-related barriers were identified as the most important barriers among PCPs. At the organization level, barriers related to clinical workflow and oversight of the NP (if the NP would report to endocrinology or primary care) were also reported. Barriers related to the care team were the most prevalent including challenges with communication (how would the PCP know what the NP was doing), uncertainty regarding goals of care (what if the oncologists did not have the same glucose control goals as PCPs), and scope of care (what exactly would the NP be responsible for in relation to diabetes care). Finally, at the patient level, PCPs reported concerns regarding patient education (concern was expressed that there is no diabetes-specific cancer education) and missing other preventive care services (if patients saw the NP would they postpone more PCP visits and miss out on things like cholesterol screening).

## Oncology-identified barriers

The thirteen oncology providers identified 23 unique barriers to implementing the NP-led intervention (Supplemental Table I). These barriers were categorized into ten subthemes organized by the four levels in the IOM framework (Table 2). Like the PCPs, financing at the health system level was considered the most important barrier among oncology providers. Oncologists wondered if the hospital would offer resources to support this intervention, if the NP and oncologist would be able to bill on the same day, and if costs would be translated to the patients. At the organization level, oncologists considered lack of endocrinology and primary care oversight of the NP's diabetes management as an important potential barrier. At the care team level, oncologists thought uncertainty regarding goals of care (the oncologists may not prioritize diabetes control the same as the NP or as the patient), reconciling recommendations from different providers (concern about disagreements between NP and oncologist), and uncertainty regarding appropriateness of combining diabetes and cancer care (wondered if diabetes management should remain a responsibility of the PCP only) were the most important barriers. Finally, unlike PCPs, the oncologists did not vote for any patient-level barriers as one of the key barriers to the proposed intervention.

**Table 2** Provider-perceived barriers

Framework level	Subthemes	Oncology votes	PCP votes
Health system/environment	Financing	14 (18%)	14 (15%)
Organization	Endocrine vs. primary care oversight	11 (14%)	1 (1%)
	Clinical workflow	5 (6%)	8 (8%)
Care team	Uncertainty regarding goals of care	12 (15%)	11 (11%)
	Reconciling recommendations from different providers	8 (10%)	10 (10%)
	Challenges with communication	7 (9%)	3 (3%)
	Uncertainty regarding suitability of combining DM and cancer	10 (13%)	7 (7%)
	Unclear scope of NP's responsibilities	2 (3%)	6 (6%)
	Primary care responsibilities and scope of care	1 (1%)	5 (5%)
Patient	Uncertainty regarding who is in charge	1 (1%)	13 (14%)
	Provider-perceived patient challenges	--	5 (5%)
	Risk of missing other preventive primary care	--	5 (5%)
	Uncertainty regarding patient willingness to participate	--	5 (5%)
	Need for cancer-specific diabetes education for patients	--	3 (3%)
Total points		78	96

Subthemes are listed in alphabetical order. Total votes and percentages were calculated and ranked based on priority. Percentages were calculated based on the total number of available points in each session

PCP, primary care provider; NP, nurse practitioner; DM, diabetes mellitus

--" = the subtheme did not receive any votes

## PCP-identified facilitators

The first nominal group session of PCPs ran out of time discussing the barrier question and did not discuss the facilitator question. As such, we report results from the second session only, which included 9 (56%) out of 16 PCPs. There were nine unique facilitators suggested to support the success of the intervention, categorized into two levels of the framework: organization and care team (Supplemental Table II). The most important facilitator reported was the need to clearly define roles for each care team member (Table 3). Clear communication across providers about the patient's care, buy-in from the institution (financial support, resources such as administrative support and physical space), leveraging telehealth to support patients and providers (replacing in-person visits with telehealth to reduce burden for the patient and avoid space restraints in the hospital), and hiring an experienced NP (who was well trained in diabetes management and comfortable practicing primary care in an oncology setting) to deliver the intervention were also identified as important facilitators.

## Oncology-identified facilitators

Both oncology sessions discussed the facilitator question. The 13 oncology providers offered 16 unique facilitators for the intervention, which covered only two levels of the framework: organization and care team (Supplemental Table II). Expanding the NP's responsibilities to include other health-care services such as cholesterol screening, weight management, nutrition, and physical activity recommendations

was identified as the most important facilitator among oncologists. Clear communication across providers about the patient's care, buy-in from the institution (financial support from the hospital), and stakeholder engagement (making sure that the oncology team members and PCP team members were in support and aware of how the intervention worked) were also reported as priority facilitators (Table 3).

## Discussion

In this qualitative study, we elicited the perspectives of 29 primary care and oncology providers on a NP-led intervention to manage diabetes among women with breast cancer undergoing active cancer treatments. Across both oncologists and PCPs, financing at the health system level, which included rules about billing and insurance company reimbursement, was identified as the most important barrier to the success of the intervention. Clearly defined roles for each care team member were identified as the most important facilitator. To date, existing qualitative studies have largely focused on capturing patient perspectives on cancer care delivery [20–22]. In tandem with their clinical expertise, providers are uniquely positioned to share their perspectives on cancer care delivery interventions for cancer patients with diabetes. To our knowledge, our study is the first to elicit the perspectives of primary care and oncology providers on a proposed NP-led intervention to optimize cancer care delivery for diabetic patients. Existing studies that have been conducted with providers broadly focus on managing chronic conditions during general cancer care and are not specific

**Table 3** Provider-perceived facilitators

Framework level	Subthemes	Oncology votes	PCP votes <sup>1</sup>
Organization	Stakeholder engagement	13 (17%)	--
	Getting buy-in from institution	12 (15%)	4 (10%)
	Integrate intervention into the existing clinical window	6 (8%)	--
	Leveraging telehealth to support patients and providers	2 (3%)	3 (7%)
	Experienced NP to deliver intervention	--	3 (7%)
	Endocrinology support for NP	1 (1%)	1 (2%)
	Administrative support for NP	--	1 (2%)
Care team	Clearly define roles for each care team member	7 (9%)	23 (55%)
	Expand NP's responsibilities	18 (23%)	
	Clear communication across providers	10 (13%)	7 (17%)
	Getting buy-in from providers	4 (5%)	--
Total points		78	96

Subthemes are listed in alphabetical order. Total votes and percentages were calculated and ranked based on priority. Percentages were calculated based on the total number of available points in each session

PCP, primary care provider; NP, nurse practitioner; DM, diabetes mellitus

--" = the subtheme did not receive any votes

<sup>1</sup>PCP percentages were calculated based on the total number of available points for PCPs from the first session

to diabetes [23]. However, managing diabetes during cancer care requires careful attention and should be tailored to the specific needs of each patient [24, 25].

At the health system/environment level, financing the intervention (reimbursement by insurance companies, billing ability of the NP and oncologist on the same day) was identified as the key barrier to the success of the proposed intervention by both PCPs and oncologists. This finding is consistent with studies revealing healthcare providers citing barriers at the greater healthcare policy level on how to optimize cancer treatment delivery [26]. When developing the intervention protocol, it will be critical to establish how the services provided by NPs can be reimbursed by insurance companies.

At the organization level, PCPs and oncologists identified clinical workflow (ensuring NP was integrated) and potential lack of endocrine and primary care oversight of the NP as barriers to the intervention. PCPs and oncologists in the present study expressed concerns regarding whether the primary care, endocrinology, or oncology team will be supervising the NP. Oncologists voted NP oversight as a greater barrier than any of the barriers that the PCPs identified. Recent studies have identified oncologists' discomfort with providing diabetes care for their active cancer patients [24, 27]. Our finding contributes to the existing literature by highlighting that in addition to oncologists' concerns about providing diabetes care for cancer patients, they are also concerned about educating and overseeing other members of the care team who may provide diabetes care during active cancer treatments. PCPs and oncologists also identified stakeholder engagement and telehealth as key facilitators at the organization level. We further note that oncologists specifically voted integrating NPs into the existing clinical workflow as an important facilitator. This finding is consistent with existing studies highlighting oncologists and NPs increasingly collaborating in patient care [28–30].

At the care team level, PCPs and oncologists identified the following barriers: uncertainty regarding goals of care, reconciling recommendations from different providers, communication challenges, and unclear scope of NP's responsibilities. These findings contribute to existing studies reporting challenges with integrating NPs into the oncology care team [31–33]. Providers highlighted clearly defining specific roles for each care team member, improving communication among the care team members, and expanding the NP's clinical responsibilities as facilitators for the proposed NP-led intervention. These findings parallel the existing challenges in cancer care coordination that have previously been reported [34, 35]. Our study is the first to identify and report challenges that are specific to breast cancer patients with diabetes. We note that while oncologists in our study specifically voted on expanding NP's responsibilities as a facilitator to the success of this intervention, no PCP voted for this. It is possible that

oncologists seek to increase NP's responsibilities in providing patient care because the proposed NP-led intervention is designed to take place in the oncology infusion suite. Oncologists may also seek to expand NP's responsibilities because oncologists recognize the need for chronic disease management (e.g., hyperlipidemia, hypertension) beyond diabetes during cancer care [36, 37]. This is not surprising because patients often expect their oncologists to manage all the patient's medical needs during cancer care [38]. However, these medical needs go beyond the scope of oncologists' expertise and experiences [37, 39]. As such, increasing NP's responsibilities, such as managing not only diabetes but also cholesterol, arthritis, etc., may improve patient outcomes during active breast cancer treatment without placing additional burden on oncologists.

Although patient-level barriers were considered in the oncology sessions, no oncologists voted for barriers (i.e., indicating they were the top 3 most important) at the patient level. This observation was not surprising because patients often view their PCPs as the first point of contact in the healthcare system [40]. PCPs play an integral role in a patient's care coordination, and they are uniquely positioned to observe patient-level barriers that specialists may be less aware of. As such, risk of missing other primary care services and the need for cancer-specific diabetes education were voted on as important barriers by the PCPs. Indeed, both hyperglycemia from prednisone and other chemotherapeutic agents and hypoglycemia from nausea and vomiting from chemotherapy are common in women with diabetes undergoing breast cancer treatment. To our knowledge, there are no existing patient education tools in English for such patients. A recent pilot study in Turkey developed some patient education materials in tandem with clinical pharmacy recommendations and found that the combination improves glycemic control, diabetes self-management, and medication adherence [41]. Future interventions aimed to increase and evaluate patient education materials in English for this specific patient cohort co-managing diabetes and breast cancer may be warranted.

## Limitations

Our findings may not generalize to providers in non-academic settings. Given the differences in cancer care management and coordination of care in community vs. tertiary care settings, additional qualitative work with community providers may be warranted.

## Conclusions

This qualitative study of oncology and academic PCPs identified multi-level barriers and facilitators to a NP-led intervention aimed to care for adults with diabetes undergoing

breast cancer treatment. We highlight the importance of bridging PCPs' and oncologists' specific and individualized recommendations to optimize care for breast cancer patients with diabetes. A potentially successful intervention would need financial and administrative support from the health-care institution; coordination across primary care and oncology; clear oversight of the NP; integrating the NP into the oncology clinical workflow; standardized communication across primary care and oncology; potentially leveraging telehealth to reduce patient burden; and providing cancer-specific diabetes education for patients. Taken together, insights from this work underscore the need to engage various key stakeholders including policy makers, institutional leadership, care team members, and patients in an intervention to improve diabetes management for women undergoing breast cancer treatment.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s00520-022-07112-4>.

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**Data availability** Given the sample size ( $n=29$ ), qualitative data will not be shared, given concerns about participant privacy.

## Declarations

**Ethics approval** This study was performed in line with the principles of the Declaration of Helsinki. This study was approved by the Institutional Review Board at Weill Cornell Medicine (IRB #20-03021653).

**Consent to participate** All participants provided verbal consent.

**Competing interests** Dr. Monika Safford receives salary support for investigator-initiated research from Amgen, Inc. The other co-authors have no conflicts of interest to disclose.

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