What is the hold up?—Mixed-methods analysis of postoperative radiotherapy delay in head and neck cancer

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Abstract
Background: Delays in postoperative radiotherapy (PORT) for head and neck cancer (HNC) increase the risk for recurrence and mortality. The multifactorial nature of delays calls for an in-depth understanding of potential contributors from the patient's and provider's perspectives. We sought to identify causes of delays in adjuvant radiotherapy initiation for HNC.

Methods: We performed a mixed-methods study including patients with HNC care team members. Forty in-depth interviews were performed (26 patients; 14 care team members). Timing and demographic data were collected from medical records.

Results: Median time from surgery to radiotherapy initiation was 45 days; 15 participants began after 42 days. Process delays and failure to communicate the urgency and significance of PORT initiation contributes to delays. Patients with a strong social support system experience less delays.

Conclusions: Achieving reductions in PORT initiation requires efficient care coordination, improved communication between interdisciplinary teams, and strengthening social support systems for patients with HNC.

KEYWORDS
adjuvant radiation, delays, head and neck cancer, qualitative analysis, radiotherapy

1 INTRODUCTION

Postoperative radiation therapy (PORT) after primary surgery in head and neck cancer (HNC) is indicated for advanced stage tumors or in the presence of high-risk features.1 Within complex multimodality treatment protocols, fragmentation of care may influence suboptimal outcomes. Delays occur for 40% to 60% of patients undergoing PORT.2-4 Delaying PORT for HNC may worsen oncologic outcomes and survival.2,3,5,6 Prolonged total treatment package time correlates directly with risk of recurrence and worsens survival.3 Although there is no clear consensus on the magnitude of the impact of delays, it is clear that treatment packages for HNC should be as temporally compact as possible.7

Reasons for PORT delays are complex and multifactorial. Existing publications utilize retrospective cohort review or secondary data analyses, thus presenting a limited perspective.8-11 Patients treated at academic medical centers may experience improved oncologic outcomes; however, some literature suggests benefits may be compromised by delays in treatment experienced at these facilities.4,12 One study challenges the association between treatment delays and treatment at a high
volume center. Patients may face delays related to surgical complications or due to difficulties with transportation, housing, or social support. The focus on immutable patient characteristics and the shallow nature of secondary data analysis fails to capture the complexity and depth of the barriers to timely treatment initiation. In the absence of these details, patients are unfairly classified as “noncompliant,” and an opportunity to intervene is missed.

There is an urgent need to better understand system-level and patient-level challenges that contribute to PORT delays, a problem historically viewed solely as a contributor to poor outcomes rather than an opportunity for intervention. This knowledge could support the development of effective multilevel interventions to mitigate those factors and reduce treatment delays, thus improving oncologic outcomes. Our study utilizes semi-structured interviews to focus on the patient’s and provider’s experience, allowing for an in-depth examination of the reasons delays in PORT initiation occur.

2 | METHODS

The reporting of our research is in alignment with COREQ guidelines for reporting qualitative research. Institutional Review Board (IRB) approval was obtained for in-depth interviews with both patients and members of the HNC treatment team (IRB#: STUDY00140923). Adult patients receiving primary surgical treatment at our tertiary care facility from June 2015 to December 2016 were eligible to participate. Included patients had a diagnosis of HNC requiring PORT with or without chemotherapy. All patients received surgical care at the primary study institution, but those pursuing PORT at outside facilities remained eligible. To reduce recall bias, patients were excluded if their treatment ended greater than 18 months prior to the baseline visit (median: 3.2 months; IQR: 1.60-4.58 months). Patients were divided into two groups for analysis: PORT initiation within or after 42 postoperative days. The decision to recommend PORT was based on National Comprehensive Cancer Center (NCCN) guidelines, and patients with equivocal indications for PORT were managed based on consensus recommendations of a multidisciplinary tumor board.

Care team participants who provide direct cancer care as part of an interdisciplinary team were recruited for participation. We intentionally included radiation oncologists from the primary study facility and from outside partner facilities that routinely treat patients operated on by surgeons at the primary study site.

2.1 | Patient recruitment

Patients were initially identified in one of three ways: (a) from the clinic at routine surveillance appointments, (b) at HNC Support Group meetings, and (c) by HERON i2b2 system queries of the electronic medical record using ICD-9/10 codes cross-referenced with a variable that identifies Pioneers Participants (a local database of self-identified individuals previously consented to be contacted for study participation).

Participants were subsequently enrolled as a convenience sample in conjunction with their routine clinical cancer surveillance appointments with their head and neck oncologic surgeons. All providers from the primary academic center actively involved in the treatment of this patient population were approached and recruited in person. All agreed to participate. Outside providers were sampled purposively to represent providers to whom patients from our academic practice are most commonly referred. Outside providers were recruited via e-mails followed by phone calls for enrollment. The trustworthiness and transferability of this study are enhanced by multiple validated qualitative research techniques. The credibility was established by cultivating a safe, nonjudgmental atmosphere during interviews to learn from patients. Interviews were transcribed verbatim to reduce the chance for bias. We employed peer debriefing to enhance both credibility and conformability of the interpretation of results. Finally, thick description was sought through the number of respondents and duration of interviews to promote transferability of our results.

2.2 | Interviews and qualitative analysis

In-depth semi-structured interviews were conducted either at a location selected by the participant for convenience or via telephone by a single female interviewer (E.M.) with extensive experience and training as a qualitative researcher in biomedical settings. Prior to beginning the interview, participants were consented on an IRB-approved consent document. Interviews were performed using a standardized interview guide pilot-tested with patients and providers. Interviews ranged from 45 to 75 minutes in duration and were recorded for verbatim transcription. Field notes were also taken throughout the interviews. In 3 of 26 interviews, patients were unable to speak or their speech was limited secondary to surgery, notepads were given to the patients, and caregivers were present with the patient while the interview was being conducted. In these instances, notes from the notepad and statements from the caregivers served to relay information about the patient’s experience. All input from caregivers was affirmed during the interview by the patient on the
notepads or through nonverbal gestures and thus treated as direct report by the patient. Notes from the notepad were read out loud by the caregiver or interviewer for inclusion in the recording and subsequent transcript.

Data collection, transcription, and preliminary analysis occurred simultaneously. Repeat interviews were not conducted for this study. The principal investigator (K.J. S.) trained and supervised the principal interviewer during the data collection process and reviewed transcripts as interviews were completed to ensure completeness and consistency. Using the constant comparative method of qualitative analysis, we analyzed the transcribed interviews and used open-coding to arrive at themes. The constant comparative method generates hypotheses about a phenomenon through comparisons of incidents that fit within a theme, integrating the themes and their components, defining the theme, and finally ends with a better understanding of the phenomenon.

The coded transcripts served as the catalysts for the themes and reviews of the complete transcripts further characterized them. Transcribing interviews within a few days of completion allowed the team to pursue emerging ideas in more depth with future informants. Transcripts were not returned to participants for comment but were taken verbatim from audio recordings to minimize the risk of error. In the end, two members of the study team (K.J.S. and E.M.) reviewed all the transcribed interviews and utilized open coding in QSR International’s NVivo 11 software. The interview guide and the codebook were collaboratively developed based on previously published reasons for delays, discussions with members of a local HNC Support Group, and the experience of the clinician co-investigators. The codebook was reviewed during routine meetings throughout the coding process to ensure adaptability and consistency in coding. All conflicts or variability in coded transcripts were discussed and resolved as coding progressed. Each of the three final themes originated from the initial codebook. Member checking to verify themes was performed with a limited subset of participants.

Qualitative research relies on reaching the point of thematic saturation, in which no new concepts or themes emerge in the interviews. Specifically in the context of this project, this meant that (a) the broad concepts presented in the results gained no new themes beneath them, (b) the themes were well understood in their depth and variability, and (c) the relationships among themes were established.

### 2.3 Quantitative analysis

Descriptive data were extracted from electronic medical records (EMRs) and recorded in a REDCap database. Median income by zip code of residence was based on values from the 2017 United States Census estimates. Categorical comparisons were made using Fisher’s exact tests. Continuous variables were compared using Mann-Whitney U tests. All statistical comparisons were made using the SPSS statistical software (version 25; IBM Corp).

## 3 RESULTS

Among 73 identified patients, 34 did not meet inclusion criteria. Of the remaining 39, 2 died prior to participation, 3 transferred their care to an outside facility, 3 declined participation. Ultimately 26 agreed to participate and were interviewed prior to thematic saturation, and 5 agreed to participate but were not contacted because thematic saturation was reached.

Descriptive statistics for the HNC care team participants are presented in Table 1. Patient sample characteristics are presented in Table 2. Radiotherapy was initiated beyond 42 days in 15 (58%) participants. The median time from surgery to PORT initiation was 45 days (range, 29-76 days), and the median time from PORT completion to the interview was 4 months (range, 2-17 months). All patients were insured during their treatment, with 46% (n = 12) holding more than one type of insurance at the time of surgery; payor type did not contribute significantly to delays (P = .61). There was no significant

<table>
<thead>
<tr>
<th>TABLE 1 Provider sample characteristics</th>
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<tbody>
<tr>
<td><strong>Sex</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Role</strong></td>
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</tr>
<tr>
<td>Medical oncologist</td>
</tr>
<tr>
<td>Nurse navigator</td>
</tr>
<tr>
<td>Head and neck surgeons</td>
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<tr>
<td>Radiation oncologist</td>
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<tr>
<td>Radiation oncology nurse</td>
</tr>
<tr>
<td>Physician assistant</td>
</tr>
<tr>
<td><strong>Years in position</strong></td>
</tr>
<tr>
<td>5 years or less</td>
</tr>
<tr>
<td>More than 5 years</td>
</tr>
<tr>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>Primary study site</td>
</tr>
<tr>
<td>External site</td>
</tr>
</tbody>
</table>
difference in the median income for the zip code of residence between those with delays and those without delays ($52,708 and $60,208, respectively; \( P = .46 \)). Distance from the primary study site had a significant impact on treatment delays; 89% (8/9) of patients living more than 1 hour away were delayed vs 41% (7/17) of those living within an hour (\( P = .04 \)).

In addition to the factors discussed above, three themes emerged from the qualitative analysis: process-related issues, communication gaps, and problems pertaining to social support (Figure 1). No subthemes or minor themes were identified within the larger themes, further targeted studies with larger populations would be necessary to explore additional details within these larger themes.

### Table 2: Patient sample characteristics

<table>
<thead>
<tr>
<th>Total</th>
<th>PORT initiation 42 days or less</th>
<th>PORT initiation 43 days or later</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td></td>
<td>11 (42.3)</td>
<td>15 (57.7)</td>
<td>26 (100)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Male</td>
<td>6 (33.3)</td>
<td>12 (66.7)</td>
<td>18 (69.2)</td>
</tr>
<tr>
<td>Female</td>
<td>5 (62.5)</td>
<td>3 (37.5)</td>
<td>8 (30.8)</td>
</tr>
<tr>
<td>Site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral cavity</td>
<td>5 (33.3)</td>
<td>10 (66.7)</td>
<td>15 (57.7)</td>
</tr>
<tr>
<td>Oropharynx</td>
<td>4 (66.7)</td>
<td>2 (33.3)</td>
<td>6 (23.1)</td>
</tr>
<tr>
<td>Larynx</td>
<td>0 (0.0)</td>
<td>1 (100)</td>
<td>1 (3.8)</td>
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<tr>
<td>Skin/cutaneous</td>
<td>0 (0.0)</td>
<td>2 (100)</td>
<td>2 (7.7)</td>
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<tr>
<td>Other</td>
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<td>0 (0.0)</td>
<td>2 (7.7)</td>
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<tr>
<td>Pathologic stage</td>
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<tr>
<td>1</td>
<td>0 (0.0)</td>
<td>2 (100)</td>
<td>2 (7.7)</td>
</tr>
<tr>
<td>2</td>
<td>1 (14.3)</td>
<td>6 (85.7)</td>
<td>7 (26.9)</td>
</tr>
<tr>
<td>3</td>
<td>2 (66.7)</td>
<td>1 (33.3)</td>
<td>3 (11.5)</td>
</tr>
<tr>
<td>4</td>
<td>8 (57.1)</td>
<td>6 (42.9)</td>
<td>14 (53.8)</td>
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<tr>
<td>PORT treatment location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary study site</td>
<td>8 (50.0)</td>
<td>8 (50.0)</td>
<td>16 (61.5)</td>
</tr>
<tr>
<td>Outside site</td>
<td>3 (30.0)</td>
<td>7 (70.0)</td>
<td>10 (38.5)</td>
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<tr>
<td>Driving time to the primary site</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1 hour or less</td>
<td>10 (58.8)</td>
<td>7 (41.2)</td>
<td>17 (65.4)</td>
</tr>
<tr>
<td>Greater than 1 hour</td>
<td>1 (11.1)</td>
<td>8 (88.9)</td>
<td>9 (34.6)</td>
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<tr>
<td>Insurance type(a)</td>
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<td></td>
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<tr>
<td>Commercial</td>
<td>10 (47.6)</td>
<td>11 (52.4)</td>
<td>21 (80.8)</td>
</tr>
<tr>
<td>Medicare</td>
<td>7 (50.0)</td>
<td>7 (50.0)</td>
<td>14 (53.8)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>0 (0.0)</td>
<td>1 (100)</td>
<td>1 (3.8)</td>
</tr>
<tr>
<td>VA/Tricare</td>
<td>0 (0.0)</td>
<td>2 (100)</td>
<td>2 (7.7)</td>
</tr>
</tbody>
</table>

Abbreviation: PORT, postoperative radiotherapy.
\(a\)Twelve of 26 participants held two forms of insurance at the time of surgery; therefore, the total number exceeds 26.

### 3.1 Process

Process-related issues were raised primarily by providers, who called for improvements in the processes of tracking people through multimodality treatment:

Surgeon, ID #7: Our Physician Assistants are sending me notes about the people who need radiation, like, “Oh, this person showed up, we’re getting them referred to this person”, but again if we had some system like a visibility board or whatever, to say “this person had surgery this day, they’re gonna need radiation starting this day, this is who they’re
getting sent to, these are the ongoing issues.” That’d be helpful.

Providers considered the process of recovery from surgery to be a common source of PORT delays. In this sample, one participant demonstrated obvious evidence of a lack of healing contributing to their PORT delay.

Physician, ID#2: Surgery is a big deal, it’s a tough recovery, someone has to be in good enough condition to do radiation and often after surgery they'll be discharged to either acute rehab or to a skilled nursing facility. Acute rehab doesn’t like people to do radiation because it interferes with their ability to do acute rehab. The flip side of that is that the timing of radiation is critical—if you don’t start it within about five weeks you have worse outcomes, so you have this kind of tradeoff between their medical recovery and the timing of their completion of cancer therapy.

In addition, providers identified pre-radiation dental evaluation and management as a source of delay. Providers stressed the importance of engaging dental care early in treatment and planning. They described the difficulty of ensuring timeliness with healing from tooth extractions prior to PORT when this process began late. Historically, the treatment team advised patients after surgery they would need a dental evaluation before starting PORT, but providers agreed this was not early enough. No patients in our sample recounted a delay caused directly by the need for dental work. Among patient participants, there was evidence of financial challenges associated with a lack of dental insurance.

3.2 | Communication

Patients and providers emphasized the importance of communication. Providers noted that patients are overwhelmed at the time of diagnosis and do not take in all of the information introduced to them. Patients echoed feeling overwhelmed by the amount of information. Providers described a need for tools to deliver the diagnostic, prognostic, and treatment messages in a more patient-centered manner. They suggested this could allow patients to digest the information in a more measured and calm setting, instead of inundating them all at once in the initial office meeting.

Provider, ID#14: You know sometimes I feel that if we tell them too much, or show them too much they get scared.

Patient, ID#24: There’s a lot that I probably didn’t understand, because I didn’t know how to answer a lot of the questions when I was asked about this. I guess you don’t know the questions to ask. When someone tells you that you’ve got cancer, you’re in shock.

Providers reported informing patients about the length of treatment and recovery. However, patients felt poorly prepared for this process. They expressed disbelief regarding the lasting effects of treatment. Immediate postoperative experiences represented the most
significant gap in understanding for patients. They described shock and fear upon waking up from surgery with tubes or wound dressings. Most failed to understand the importance of beginning adjuvant radiation within 6 weeks and were unaware of any recommended timelines.

Some patients expressed an expectation that providers within the same system would be able to communicate effectively. The expectation for internal communication prompted some patients to seek PORT at the same center as their surgery. Providers were generally satisfied with the level of communication with other members of the healthcare team, both outside and inside the academic treatment center. One provider suggested a need for a more streamlined process for outside medical providers to refer patients into the academic treatment center. Providers also felt it was a good idea to have PORT in the same system in which one has surgery. However, they asserted that for patients living a significant distance from the main treatment facility, PORT at an unaffiliated treatment facility closer to home can reduce the risk of breaks in therapy.

### 3.3 Social support

Social support, when defined as having someone participate in appointments and available for functional support, was apparent in 21 (81%) of the 26 participants in our study. All five participants that lacked a social support system were male and experienced delays in PORT initiation. Even in this small sample, the proportion of patients with delays lacking social support approaches statistical significance ($P = .05$). Providers stressed the importance of strong social and emotional support for their patients. Each provider emphasized their encouragement of patients to have someone accompany them to treatment planning and surveillance appointments. Patients’ disclosed support was pivotal when the doctor’s conversations overwhelmed them. Their supporting partners helped to reiterate important information and comprehend the requirements of treatment and recovery. Patients were adamant that significant others provided motivation to continue treatment when they considered quitting.

Providers emphasized that this treatment is especially difficult for HNC caregivers, in addition to patients. Caring for patients with HNC may strain relationships. Strain can result from the patient’s trouble swallowing and lack of appetite coupled with the caregiver’s sense of responsibility to ensure the patient’s nutritional status. Other sources of strain included managing patient depression, attending to various tubes, secretions and wound care, and the burden of daily visits for PORT. Many patients told us that the treatment was more of a burden for their caregiver than themselves. As one Radiation Oncologist put it, “Oh God. It’ll test anyone’s marriage.”

Care team members reported offering emotional support to patients over the course of appointments and tests. They considered it part of their job to coach patients through the emotional trials of treatment. One provider spoke of her advocacy role when a patient felt insecure:

Provider 6: They always have the option of calling me if they need to. I had a patient call the other day that was in tears, “I can’t finish, I can’t do this,” you know and so we kind of talked through what was going on ... when I checked on him the next day, he was already feeling better.

Patients spoke of the need for support tools coupled with information about what they would endure during treatment. They stated the importance of support groups for mitigating the intense emotional trials of the treatment process:

Patient 4: They have all this crap here for breast cancer, and all of my cancer stuff very little. Just somebody to talk to. Like you’re going to experience sleeplessness, restlessness, and constipation. I didn’t know any of that. Everyone thinks there’s only breast cancer, but there isn’t.

A care-team member echoed this sentiment:

Provider 5: There probably needs to be ... a whole pre-op class for patients that’s required for them and their primary caregiver. This is about what you’re about to go through and this is what you can experience on the other side and what you need to get ready for.

### 4 DISCUSSION

Multiple studies have demonstrated reduced survival among patients experiencing delays in PORT initiation.$^{25-27}$ NCCN guidelines recommend that PORT initiation occur within 6 weeks after surgery.$^{1}$ Delays are multifactorial in origin and are difficult to predict, but timeliness remains a key distinguishing feature for high-quality care.$^{1}$ Our study aims to build an initial
framework for future efforts to predict and reduce delays in patients with HNC patients.

This prospective mixed-methods qualitative study utilized in-depth semi-structured interviews to examine factors contributing to delays from both patient and provider perspectives. This study was not explicitly powered to make quantitative comparisons regarding demographic and socioeconomic factors. Large samples provide suggestions of a multitude of often immutable factors that contribute to delays.4,28

The purpose of this study was to identify targets for intervention by examining the full experiences of patients and providers with respect to PORT. By conducting detailed interviews with patients and providers, we elicited themes that might not be clear from large database studies.

4.1 | Process

Providers consistently stated that complexity of the multidisciplinary treatment process was a major contributor to delays. Cooperation between various providers is essential and often must occur across practices, institutions, and geographic divides. There is a need for standardized protocols to assist those tasked with coordinating care to ensure timely, high-quality care. One participating surgeon discussed the need for a tool to map patients in the multimodality treatment process in real time. In theory, EMRs have the capacity for this function. The lack of EMR interoperability across systems hinders continuity of care and likely contributes to poorer outcomes.29 Currently, low-tech solutions rely on strong lines of communication between providers, their staff, and patients.

In this sample, we saw evidence of surgical complications contributing to a delay in one patient. Providers also noted experiences with wound healing problems causing PORT delays. Surgical complications and their relationship to delays would likely be more evident in a larger sample. Surgical complications can be even more challenging to manage in a timely fashion when the patient is in a long distance from the hospital or has limited social support. Medical comorbidities and compromised nutritional status increase the likelihood of surgical complications.30,31 Enhanced recovery after surgery protocols have been designed to improve the perioperative health of patients and may ultimately reduce PORT delays.32,33

Providers expressed concerns about the need for dental consultation as a cause for delay, although this was not echoed by the patients interviewed in this cohort. Pre-treatment dental decisions to perform extractions are informed by numerous factors, often including radiation field planning.34 This makes preoperative dental assessment challenging, as radiation fields are designed in part based on postoperative pathologic findings. Thus, timely postoperative evaluation and coordination of extractions is essential to minimizing delays. Alternatively, some centers use preoperative dental evaluations with extractions concurrent with tumor ablation, a more aggressive approach advocated for as a method to reduce delays.9 Understanding barriers to receipt of dental care, including financial challenges (ie, a lack of dental insurance), may also help to predict challenges to timely dental extraction.

4.2 | Communication

Patient and provider participants agreed on the challenging nature of addressing the knowledge gap in the patient-provider relationship. Patients routinely describe being overwhelmed, especially in the postoperative period. They are often unable to process information or formulate questions about treatment. Thus, although information regarding the crucial nature of timely PORT initiation may be delivered by providers, it may not be received. These circumstances necessitate a patient-centered approach to communication. These communication strategies have been shown to improve information recall and therapy adherence by patients.35,36 In addition, shared decision-making models promote patient autonomy and allow physicians and patients to reach a consensus about appropriate treatment plans.37,38 These models similarly have been shown to improve patient understanding and satisfaction.39,40 A flexible communication system that adjusts to patient education levels and is accessible beyond a single consult visit may help to mitigate information overload and reduce delays in PORT.

In this sample, provider-to-provider communication did not appear to contribute to delays. Relationships between head and neck surgeons and radiation oncologists are critical to ensuring timely and efficient care coordination. Providers outside the tertiary facility where our patients receive surgery expressed a comfort with the surgeons, which seems indicative of mutual respect. Patients expect a higher level of communication and coordination within the system, and in some cases, this even drove them to receive PORT in a less convenient location. They clearly recognize the critical relationship between communication and outcomes.

4.3 | Social support

Social support for patients with cancer includes the functional, socioemotional, and informational assistance
provided by those around the patient and their caregivers. Caregivers provide emotional and functional support and assist with patient communication, nutrition, and appearance. Caregiver mental and emotional well-being often suffers in parallel with patients, although strong social support may mitigate these effects. Despite the critical nature of this support, discussions of delays or breaks in treatment have not routinely included the role of social support. This again points to the limitations of previous work that examines only administrative data or retrospectively reviews medical records.

In this study, representations of social isolation were present in 25% of patients with delays. Notably, this social isolation was completely absent in the patients without treatment delays. The disabling and disfiguring nature of HNC may drive patients away from social interaction outside the home and make them particularly reliant on their closest friends and family. HNC treatment and recovery is grueling, and our sample (both delayed and nondelayed) specifically attributed persistence to their social supports. Caregivers provided functional support; they helped patients manage drains and other equipment and provided transportation to daily radiation treatments. Additionally, the transmission of information from the care team to the patient is crucial to timeliness. In many cases, the presence of someone else in the room seems to contribute to the amount of information received. Future studies should include specific interventions for those in caregiving roles.

4.4 | Clinical implications

Delays in postoperative radiotherapy (PORT) are known to negatively impact oncologic and survival outcomes for patients with HNC. Studies eliciting causes of delays in PORT are largely quantitative and focus on immutable drivers of these delays. Two notable studies have identified mutable causes of PORT initiation delay, including inadequate patient engagement, delayed dental evaluation, increased time from surgery to PORT referral, increased time from PORT referral to radiation oncology consultation, and increased time from PORT consultation to initiation of therapy. This study utilized qualitative analysis of semi-structured interviews with patients and healthcare providers to identify themes associated with delay in initiation of PORT. This effort is unique among HNC literature. In drawing attention to the ways in which process, communication, and social support may lead to PORT delay, we recommend targeting these as areas for future intervention. This knowledge supports the development of effective multilevel interventions to mitigate those factors and reduce treatment delays with the end goal of improving oncologic outcomes.

4.5 | Limitations

Qualitative research aims to reach conclusions from in-depth analyses of conversations. The recruitment of new participants stops after thematic saturation and therefore the sample size is inherently smaller than some quantitative studies. This sample of 40 participants is a relatively large number for a qualitative study and includes a diversity of experiences. This study is limited to a single academic tertiary care facility, which may limit generalizability of study findings. However, the perspectives of Radiation Oncologists from outside the primary study site were intentionally included to expand the measured experiences. In addition, the patient cohort included participants from both urban and rural environments and from multiple states.

The key informants in this study are a part of the systems we are aiming to assess, which may introduce bias. Interviewing providers at all levels of the care team verified and challenged isolated perspectives to limit this bias. Lastly, although the time between treatment and interviews was limited to 18 months, recall bias may limit the identification of true causes of delays.

5 | CONCLUSIONS

Delays in PORT initiation contribute to morbidity and mortality from HNC. Achieving reductions in PORT delays requires efficient care coordination, improved communication between all parties involved in cancer care, and the strengthening of social support systems for HNC patients. Patients and care team members reported multiple contributors to delays that emphasize the need for reductions in system-level inefficiencies coupled with patient-centered communication approaches.

Our study establishes a framework for larger studies to validate the influence of key factors on PORT initiation delays. Validating these factors may help to isolate their contribution to delays and subsequent outcomes. Reducing delays in PORT initiation will require a multilevel effort that intervenes at both the system and the patient level.

ACKNOWLEDGMENTS

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DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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**SUPPORTING INFORMATION**
Additional supporting information may be found online in the Supporting Information section at the end of this article.