ANALYZING INTER-MODALITY CROSS-REFERRAL TRENDS AND DROPOUTS IN A SUPER SPECIALITY COMPREHENSIVE CANCER CENTRE

Dissertation Submitted to

The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

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Under the Supervision and Guidance of

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2025

HCG The Specialist in Cancer Care
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TO WHOM IT MAY CONCERN

We are glad to inform that **Dr. Shivani Vinaybhai Mistry** from **IIHMR University** has successfully completed her internship with **HCG Hospital, Vadodara** from **17th March, 2025** to **07th June, 2025** in **Operations Department**.

During her tenure with us, we found her extremely inquisitive and dedicated. She was very much interested in getting into the depth of the subject to understand it better. She was very contributive and corporative with all the process of the department.

Her association with us was fruitful and we wish her all the best in her future endeavours.

For, Healthcare Global Enterprises

HCG Cancer Center HR Department Vadodara

Sujith K

Head- Human Resources

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CERTIFICATE

This is to Certify That The Dissertation Titled **"ANALYZING INTER-MODALITY CROSS-REFERRAL TRENDS AND DROPOUTS IN A SUPER SPECIALITY COMPREHENSIVE CANCER CENTRE"** is a record of the research work undertaken by Dr. Shivani Mistry (PT) in partial fulfillment of the requirements for the award of the degree of MBA (Hospital & Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific and analytical.

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Declaration by Student

I hereby declare that this dissertation titled "ANALYZING INTER-MODALITY CROSS-REFERRAL TRENDS AND DROPOUTS IN A SUPER SPECIALITY COMPREHENSIVE CANCER CENTRE" is the Bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma.

Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Dr. Shivani Vinaybhai Mistry (PT)

Abstract

Background: Cancer care pathways are complex and often fragmented, leading to patient dropouts that hinder treatment outcomes. Ensuring continuity from the first consultation through to treatment completion and internal referrals is vital for patient-centric oncology care. This study adopts a systems-thinking approach to evaluate where and why patients disengage, using real-time hospital data.

Objectives: The study aims to investigate the extent, timing, and determinants of patient dropout from initial consultation to completion of the first treatment cycle. It also evaluates internal cross-referral patterns between departments and recommends strategies to improve patient retention and departmental coordination.

Methods: A retrospective observational design with a quantitative assessment approach was employed. Data were collected from 150 newly registered patients at a cancer specialty hospital in Vadodara, Gujarat between March 15 and May 15, 2025. Patient progression was tracked using hospital CRM and registration records until May 30. Descriptive statistics and cross-tabulations were used to analyze dropout stages and referral outcomes.

Results: Out of 150 patients, 91.3% were confirmed cancer cases. A significant 54.7% of patients dropped out at various stages most commonly after the first consultation (31.3%), followed by diagnosis (12%) and cost estimation (6%). The surgical oncology department managed the majority of cases (68.7%). Only 72% of advised internal cross-referrals were completed, indicating inefficiencies in departmental transitions.

The study highlights critical operational gaps in patient retention and internal referrals within oncology care. Key dropouts occur at early stages, suggesting the need for better navigation support, financial counselling, and internal coordination.

Keywords: Oncology, Patient Dropout, Hospital Operations, Referral Patterns, Cancer Care Continuity, Retrospective Study, Systems Thinking, Patient Retention

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List of Abbreviations

Abbreviation	Meaning
WHO	World Health Organization
ICMR	Indian Council of Medical Research
UHID	Unique Health Identification
PRN	Pre-Registration Number
CRM	Customer Relationship Management
HIS	Hospital Information System
OPD	Out Patient Department
CT SCAN	Computed Tomography
PET	Positron Emission Tomography
MRI	Magnetic Resonance Imaging
TTI	Time to Treatment Initiation
SPSS	Statistical Package for the Social Sciences
PM-JAY	Pradhan Mantri Jan Arogya Yojana
CI	Confidence Interval
df	Degrees of Freedom
p-value	Probability Value

Chapter 1: Introduction

1.1 Background of the Study

Cancer remains one of the most alarming global health challenges of the 21st century. According to the World Health Organization (WHO), it accounted for an estimated 9.6 million deaths worldwide in 2018, ranking as a leading cause of mortality and imposing a substantial burden on health systems, especially in low- and middle-income countries.[1]

In India, the rising incidence of cancer presents a significant public health crisis. The Indian Council of Medical Research (ICMR) reports that more than 1.45 million new cancer cases are diagnosed annually, with projections indicating a nearly 20% increase by 2035.[2] This escalation places tremendous stress on already overstretched tertiary care systems.

Despite numerous advancements in diagnostic technologies and treatment modalities, India's cancer outcomes remain sub-optimal.[3] Contributing to this is a landscape characterized by systemic inefficiencies, fragmented service delivery, and widespread health disparities. Challenges such as delayed diagnoses, long wait times, poor communication between departments, lack of integrated information systems, and high out-of-pocket expenses dominate the Indian oncology ecosystem.[4] These inefficiencies are particularly pronounced in high-volume tertiary hospitals that function as regional referral centres, managing patients from across states and rural areas.

Modern oncology care has evolved towards a patient-centred approach, where individuals are encouraged to be active participants in their treatment journey. Patient-centred care emphasizes shared decision-making, continuity, and responsiveness to patient preferences.[5,6] While this model has shown improved clinical and experiential outcomes across various medical contexts, its adoption in oncology settings—particularly in resource-limited Indian hospitals remains inconsistent. Patients often confront overwhelming administrative hurdles, poor health literacy, financial stress, and psychological vulnerability, all of which collectively raise the risk of disengagement and eventual dropout from care pathways.

One of the most concerning phenomena in oncology care is treatment abandonment or dropout. Defined as the discontinuation of care without completion or formal discharge, dropout represents a critical barrier to achieving favorable treatment outcomes. Multiple studies have established that a significant number of patients either delay therapy initiation

or exit the system prematurely.[7,8] Reasons cited include unaffordable treatment costs, logistical complications, insufficient patient education, and structural weaknesses in referral and follow-up mechanisms.[9,10] Among these, financial burden emerges as a dominant theme, especially in contexts where patients must pay for chemotherapy, radiotherapy, diagnostic procedures, or supportive medications from their own resources.[11]

The hospital outpatient environment, often the first point of clinical engagement, plays a critical role in either facilitating or obstructing access to continued care. Inadequacies at this juncture—such as long waiting times, complex billing processes, poorly designed registration systems, and fragmented care coordination—negatively affect the patient experience.[12] These operational inefficiencies not only reduce patient satisfaction but also compromise the core tenets of patient-centered care. Consequently, many patients prematurely exit the treatment continuum, a trend described as "patient dropout" or "attrition".[13]

Cross-referral practices in Indian healthcare, while intended to ensure specialized consultation and diagnosis, frequently exacerbate care fragmentation. Patients are often redirected between departments or institutions, encountering delays, repeated investigations, and communication gaps along the way.[14,15] When not managed efficiently, these referrals can confuse patients and deter them from continuing with treatment. Poor interdepartmental coordination, lack of real-time information exchange, and absence of patient navigators further complicate the care journey and increase dropout rates.[16] Additionally, even after patients initiate treatment, there remains a gap in ensuring continuity across departmental transitions. Internal cross-referrals between surgical, medical, and radiation oncology are often marked by logistical bottlenecks, limited patient follow-up, and low conversion rates. Failure to complete such cross-referrals not only disrupts treatment plans but also contributes to attrition post-treatment initiation, an area largely overlooked in existing research.

1.2 Rationale of the Study

The journey of a cancer patient from diagnosis to recovery is characterized by a series of complex, interconnected stages. These stages include initial consultation, diagnostic testing, treatment planning, therapy initiation, and long-term follow-up. Effective management of this pathway requires not just clinical excellence but also seamless coordination across

administrative and operational departments.[4] However, real-world settings often present a very different picture marked by delays, redundancies, disjointed communication, and lack of navigation support.

Delays in diagnosis, for instance, frequently occur due to the scarcity of specialized diagnostic facilities, high patient loads, administrative inefficiencies, and difficulties in scheduling tests. These issues not only prolong the time to treatment but also contribute to late-stage disease presentation, which is associated with poorer prognoses.[3] In many cases, the lack of a streamlined referral process results in patients undergoing repeated testing or being bounced between hospitals, adding to their financial and emotional distress.[14]

Dropouts in outpatient oncology care are a pressing concern globally, and particularly acute in India. Numerous systemic and personal factors can lead to premature treatment discontinuation. Patient-related barriers include psychological distress, low health literacy, socioeconomic constraints, and logistical difficulties such as lack of transportation or accommodation. System-level barriers range from poor appointment systems and long wait times to ineffective communication between healthcare teams and patients.[11,15]

These disconnections across the patient care continuum create an environment where treatment discontinuation becomes increasingly likely. Long waiting periods, repeated appointments without clear outcomes, conflicting information from different providers, and the absence of structured follow-up systems overwhelm patients.[8] Such systemic shortcomings, particularly in high-pressure settings like tertiary care centres play a significant role in early dropout. Patients often perceive the process as burdensome, confusing, and financially draining, leading to attrition even before treatment begins.

Furthermore, premature termination of treatment, or dropout, is not limited to financial or clinical causes. Evidence from other medical fields such as fertility treatment and psychological therapy indicates that non-clinical factors such as hope, expectations, personal beliefs, and relational dynamics also significantly influence adherence.[17,18] In oncology, with its complex protocols and emotionally charged diagnoses, these influences are even more pronounced.[19]

Despite these concerns, early-stage dropouts from the point of initial consultation to diagnostic workup and treatment planning are underreported and poorly understood in Indian

settings. Most studies have focused on later-stage non-adherence, such as abandonment during chemotherapy or radiotherapy. However, the problem of early attrition can significantly distort hospital performance metrics, impact resource planning, and reflect systemic inefficiencies. Addressing this gap requires structured, data-driven research into the operational aspects of patient engagement and continuity.

This study attempts to bridge that knowledge gap by prospectively tracking oncology patients from first hospital interaction through multiple administrative and clinical milestones. By mapping their journey and identifying critical dropout points, the research aims to inform practical strategies for improving workflow design, patient engagement, and retention in cancer care settings.

While early-stage dropout is an important concern, understanding what happens after treatment begins—especially at the point of first treatment cycle completion and subsequent departmental transitions is critical to ensure the continuity and success of cancer care. The extent to which patients complete cross-referrals (e.g., from surgery to radiotherapy or chemotherapy and vice versa) is indicative of system-level coordination. This study not only investigates early disengagement but also captures cross-referral advice and actual conversion, offering a fuller view of internal care pathway adherence.

1.3 Justification for the Study

The lack of comprehensive studies on patient dropouts in the early stages of oncology care is a serious limitation in current healthcare research and practice. While treatment attrition is a known challenge, it is rarely analyzed systematically across different stages of care—from registration to consultation, diagnostics, treatment initiation, and follow-up.[9] Most analyses focus either on clinical outcomes or treatment adherence for specific cancer types, without exploring why patients disengage from the care system altogether.

In large tertiary hospitals that cater to thousands of new patients each month, understanding where and why patients exit the system can yield valuable operational insights. Many patients never proceed beyond initial consultations or diagnostic recommendations, yet these cases are seldom tracked. This results in incomplete patient records misrepresented hospital performance indicators, and missed opportunities for intervention.

Early dropout is particularly problematic because it wastes valuable resources—consultation time, diagnostic recommendations, preliminary investigations—and delays in care for those who remain in the system. More importantly, it undermines the objective of timely, comprehensive cancer treatment and compromises patient outcomes.[20,21] Financial challenges, fear of diagnosis, logistical hurdles, and poor health communication are all implicated in this early-stage attrition.[6,12]

Understanding the patient's journey in detail from the time they register at the hospital to the point of treatment initiation can help isolate the stages with the highest risk of dropout. This research offers a framework for healthcare administrators and policymakers to identify inefficiencies, redesign workflows, and implement targeted interventions. By correlating dropout patterns with demographic variables, cancer types, and institutional factors, this study aims to offer actionable recommendations to improve oncology care delivery. Given the multidisciplinary nature of cancer care, evaluating cross-referral adherence is vital. This study provides a novel contribution by examining how many patients, once advised a departmental transfer, actually follow through, and where internal attrition persists despite treatment commencement.

Moreover, exploring the equity dimension of dropout and whether certain socioeconomic groups are more likely to exit care can uncover disparities in access and retention. Research shows that cancer outcomes are often worse among marginalized populations, who experience later diagnoses, lower adherence rates, and higher mortality (Jenne et al.). Evaluating these disparities in the context of treatment attrition can offer a more holistic view of healthcare system performance.

By adopting a systems-thinking approach and leveraging real-time hospital data, this study moves beyond clinical diagnosis to evaluate how operational processes affect patient experience and retention. The findings can inform broader strategies to ensure that oncology care is not only available but also accessible, acceptable, and continuous.

1.4 Study Aims

To investigate the extent, timing, and determinants of patient dropout from initial consultation through first treatment cycle completion, and to analyze internal cross-referral

patterns between departments to propose strategic, evidence-based recommendations for enhancing retention and care continuity.

1.5 Research Objectives

i) To quantify the proportion of newly registered cancer patients who discontinue care at various stages from initial consultation to treatment initiation and follow-up.
ii) To identify the specific stages in the care pathway (post-consultation, post-diagnosis, pre-treatment, post-treatment initiation, or post-follow-up) where patient dropouts are most prevalent.
iii) To evaluate the influence of demographic and administrative variables (e.g., gender, age, department, referral source) on patient dropout.
iv) To assess internal conversion rates, i.e., the percentage of advised cross-referrals that result in completed departmental transitions.
v) To recommend patient-centred and operational strategies to improve oncology care retention and internal coordination.

1.6 Patient Journey in the Oncology Department

The oncology care pathway in the cancer speciality hospital is multi-layered, requiring coordination between clinical and administrative units. The process typically begins with either lead generation by a hospital call centre or walk-in patient registration. For patients referred via call centres, data is entered into the hospital's CRM, a pre-registration number (PRN) is generated, and appointments are scheduled. Upon hospital visit, the patient completes formal registration and receives a Unique Health Identification (UHID) number.

Walk-in patients are directed to registration desks where UHIDs are assigned on the spot. Following registration, patients proceed to the billing section and then to the consulting oncologist. Depending on clinical presentation, diagnostic tests are advised—such as biopsy, CT, MRI, or PET scans. Once investigations are completed, the treatment plan is finalized. Patients visit the financial advisory department for cost estimation for the treatment Treatment is then initiated, typically beginning with the first cycle of chemotherapy, radiotherapy, or surgery, followed by a scheduled follow-up to evaluate the response and plan internal cross-referral if necessary for further care.

The sequential flow is as follows:

Lead Generation → CRM Entry → Case Creation → PRN Generation → Appointment Booked → Patient Visit → Registration (PRN to UHID)

Wal-in patients→ Direct UHID

UHID → Billing → Doctor Consultation → Diagnostic Advice → Investigation Completion → Treatment Advice →Cost estimation →Treatment Initiation → Cycle Completion → Follow-up →Internal cross referral (if necessary)

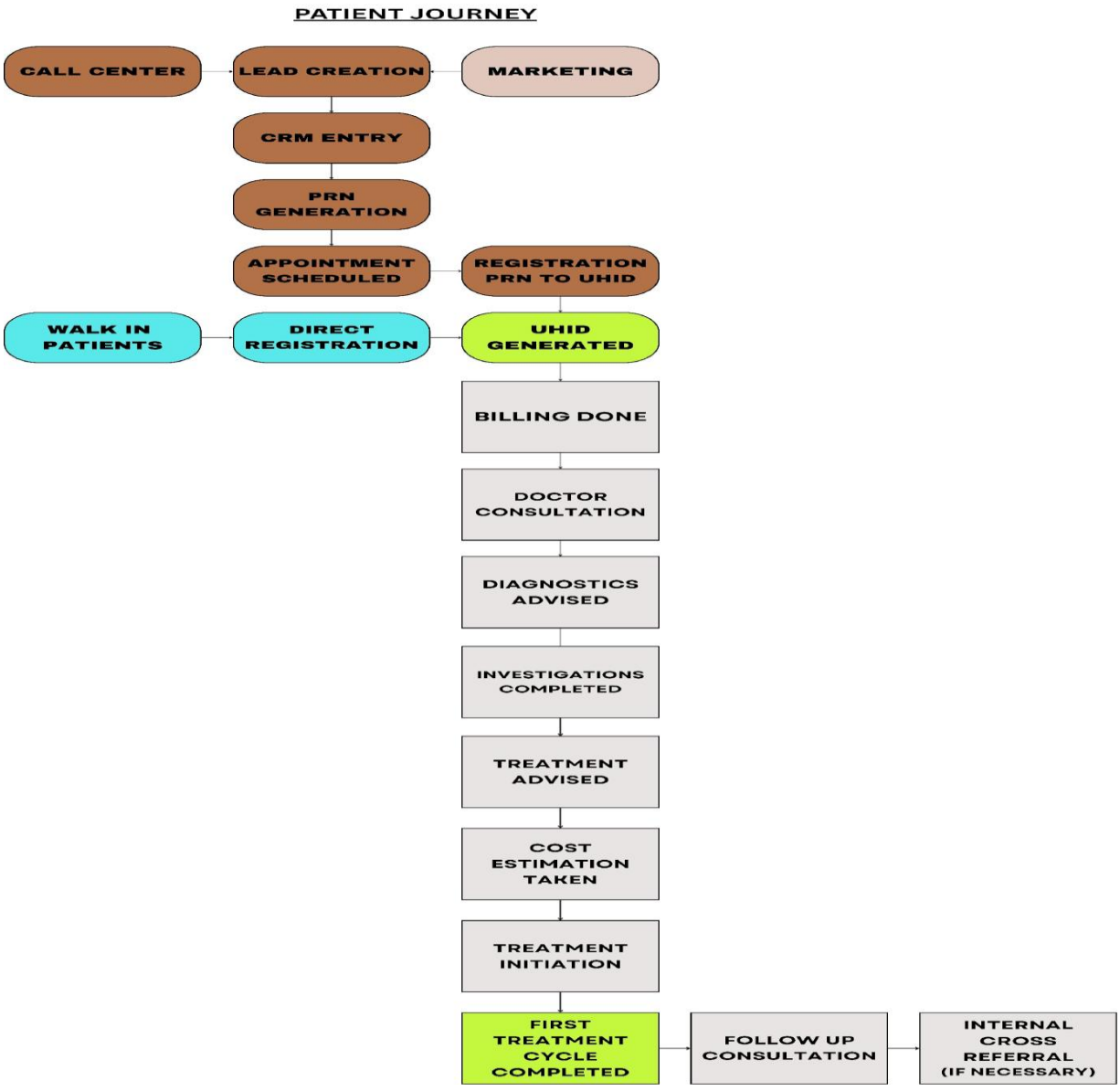


Figure 1.1 Patient Journey

Each of these stages represents a critical juncture at which patients may engage. Understanding how operational workflow for patient progression along this pathway is essential to designing a more patient-centric and efficient oncology care model.

Chapter 2: Literature Review

Sr.No	Authors (Year)	Study Location	Sample Size	Sampling Techniques	Salient Features
1	Chatterjee A, et al. (2019) [22]	Tata Memorial Hospital, India	2,000 adult cancer patients	Retrospective analysis of pain clinic referral data (Aug 2014 - Feb 2015)	The study analyzed referral patterns to a tertiary cancer pain clinic. 38.1% were at pretreatment, 28.8% at advanced stages. Head and neck, gastrointestinal, and thoracic cancers were the most preferred. The majority (75-80%) had advanced disease. 88% had moderate to severe pain; opioid use was low (<20%). Literate patients had lower pain scores and were referred earlier, indicating literacy's role in pain management awareness and compliance. Pain management remains under-prioritized even in tertiary care.
2	Ahmad IA (2025)[23]	Not location-specific (Scoping review of global literature)	Not applicable (Scoping review)	A systematic scoping review of literature on barriers in the cancer care continuum	Examined barriers affecting cancer screening, diagnosis, and treatment, especially among underserved/marginalized groups. Key barriers included low health literacy, poor communication, language proficiency issues, poor coordination of care, long wait times, and lack of trust in primary care. Emphasized the

					need for culturally tailored interventions, improved communication, and integrated care coordination to promote health equity and reduce disparities in cancer outcomes.
3	Halder P, Dixit J, Gupta N, Mehra N, Singh A, Malhotra P, et al. (2024) [24]	India (Seven healthcare facilities across six states)	6695 cancer patients	Purposive sampling of patients seeking outpatient/daycare cancer treatment	Investigated delayed time to treatment initiation (TTI) among cancer patients in India and determinants affecting TTI. The median TTI was 20 days. Delay was highest in head and neck cancers and radiotherapy recipients. Factors reducing delay included younger age, male gender, and higher education. The introduction of a government health insurance scheme (PM-JAY) significantly improved timely treatment initiation. The study recommended expanding insurance coverage and cancer screening to reduce delays.
4	Colangelo LA et al. (2016) [25]	USA	150 head and neck cancer patients post-surgery	Longitudinal follow-up with speech and swallowing assessments over 12 months	High dropout rate (75%) with 25% completing 12-month follow-up. Dropout reasons: medical (50%), administrative (23%), patient-specific (27%). Greater dropout is linked to higher cancer stage, larger surgical resection volume, and flap surgical closure. Lower alcohol use is associated with better study completion. Larger

					resections increased patient-specific dropout likelihood.
5	Kayal S, Dubashi B, Cyriac L (2017) [26]	India, Tertiary Care Cancer Center	1173 cancer patients (solid and haematological malignancies)	Prospective audit of all registered cases in 2015	High loss to follow-up (28%) and early mortality (33%) during treatment phases. Half of the deaths occurred during chemotherapy (curative or palliative). Higher loss to follow-up in adults (>18 years), solid tumours, and patients living >100 km from the hospital. Highlights the need for enhanced counselling and supportive care to reduce dropouts and early deaths.
6	Roick J et al. (2018) [27]	Europe (Cluster-randomised controlled trial)	1338 eligible cancer patients	Cluster-randomised behavioural trial	24% declined participation at baseline; 25% dropped out by 6 months. Higher non-participation and dropout in older patients and those with advanced disease. Dropout is also associated with being married; lower dropouts with university education and middle income. Highlights the importance of tailoring trial design to improve participation among high-risk groups.
7	Shand J, Stovold E, Cheema K (2024) [28]	Systematic rapid review (multiple countries)	40 studies included (from 1353	Rapid review of published quantitative and qualitative studies on cancer	Found wide variation in definitions and measurements of treatment attrition; the main reasons for dropout included disease progression, death, clinical deterioration, treatment toxicity, and socioeconomic

			reference s)	treatment attrition outside clinical trials	disadvantage. Highlights inequalities in treatment completion and calls for standardized measures and targeted interventions to reduce disparities.
8	Chakrabor ty B, Dhar A (2022) [29]	Dhaka and Chottogram, Bangladesh	40 cancer patients who dropped out of treatment	Registry-based selection from oncology ward; contacted patients by phone and surveyed using structured questionnaire ; data analyzed with SPSS	The majority were female (70%) with breast and cervical cancers predominant; financial problems (55%) were the main reason for treatment dropout; other factors included husband's deprivation (13%) and social harassment/isolation (8%). Most patients were from lower-middle-class backgrounds with limited education and economic dependence. Calls for social awareness and supportive policies to reduce dropout and improve cancer care outcomes.
9	Kahl et al (1995) [30]	Not specified (Orthodonti c follow-up study)	1,464 former orthodon tic patients (299 responde rs, 266 compare d to nonrespo nders)	Questionnair e-based follow-up of nonresponder s	The study examined dropout in a long-term follow-up of orthodontically treated patients to identify potential bias. Responders lived closer to the health centre and had longer treatment duration and shorter posttreatment intervals. They were also more satisfied and had higher dental IQs. Suggested analyzing factors for "missing at random" vs. "not missing at random" data to address bias.

10	Ellis et al. (2001) [31]	Breast clinics (unspecified region)	545 women	Cross-sectional survey	Explored how anxiety, knowledge, and attitudes influenced women's willingness to participate in randomized clinical trials for breast cancer. Found that younger women, those more informed about trials, and those preferring active decision-making roles were more willing to participate. Highlights the role of knowledge and perception in clinical trial participation and potential treatment dropout.

Gaps Identified in Literature

Key gaps in the literature include:

- Lack of standardized definitions and measurements of dropout.
- Limited data from rural or low-resource settings.
- Few studies have shown the effectiveness of follow-up and patient navigation.
- Insufficient focus on psychosocial and cultural barriers.
- Limited evidence on the role of insurance in reducing dropout.
- A shortage of intervention studies aimed at preventing attrition.

Filling these gaps can help design better strategies to improve patient retention in cancer care.

Chapter 3: Methodology

3.1 Key Research Questions

i) What percentage of new cancer patients drop out at each stage from initial consultation through to completion of the first treatment cycle?

ii) At which points in the care pathway are dropouts most frequently observed?

iii) Among patients who complete their first treatment cycle, how many are advised for a cross-referral?

iv) What proportion of those advised cross-referrals complete the departmental transition (internal conversion)?

v) What demographic and administrative factors are associated with early dropout and incomplete internal referrals?

vi) What operational improvements can reduce patient attrition and improve cross-departmental continuity in oncology care?

3.2 Research Design

This study adopts a descriptive and exploratory research design, incorporating a retrospective observational approach. By analyzing historical hospital records and registration databases, it seeks to map patient progression through the oncology care pathway, with a focus on identifying points of attrition and patterns in internal cross-referrals. The design relies exclusively on quantitative data, enabling the systematic measurement of patient flow across key stages such as consultation, diagnosis, treatment initiation, and follow-up without manipulating any variables. This approach provides operational insights into where and why patient disengagement occurs, supporting evidence-based recommendations for improving retention and continuity in oncology care.

3.3 Study Setting

The research was conducted at a 60-bed cancer specialty hospital in Gujarat, India which registers around 400-450 new cancer patients per month. The hospital uses integrated Hospital Information Systems (HIS) and Customer Relationship Management (CRM) tools to manage patient interactions and data.

3.4 Study Duration

Internship period: March 2025 to June 2025

Data collection window: March15,2025 to May 15, 2025

Follow-up cutoff date: May 30, 2025

The study considered a minimum follow-up duration of 15 days for each patient to monitor progression through investigations, treatment, or further consultations.

3.5 Study Population

The study included newly registered cancer patients who entered the oncology pathway between March 15 and May 15, 2025.

Inclusion Criteria:

- New patients visiting Surgical, Medical and Radiation departments.
- Patients with at least one documented interaction (consultation or registration) in the hospital database
- Patients with new UHID and PRN were generated during the study period.

Exclusion Criteria:

- Patients with emergency visits to the hospital.
- Patients with incomplete or missing administrative or clinical data.
- Patients formally discharged, transferred, or referred externally before treatment initiation.
- Revisits or patients with prior UHID numbers
- Patients who registered but never interacted with a clinician.

3.6 Sample Size and Sampling Technique

Sample Size:
The study included a total of 150 patients, selected based on their registration during the data collection window.

Sampling Technique:

Purposive sampling was used to include all eligible patients who met the inclusion criteria during the specified period.

3.7 Data Collection Procedure

Data were collected from hospital systems (HIS and CRM) under the supervision of the hospital's oncology department. Information was extracted regarding:

Demographics: Age, gender, residence

Administrative: Source of referral, department visited

Clinical: Dates and status of consultation, diagnostic tests, treatment advice, treatment initiation, treatment cycle completion, follow-up, and internal referrals

Dropout was defined as patients who did not progress to the next scheduled stage within 15 days of the last interaction, without formal discharge.

3.8 Study Instruments

Data Collection Sheet (DCS): Designed in Excel to capture individual patient progression through the defined care pathway.

Process Flow Map: Used to visualize the operational flow and identify stages with maximum attrition.

3.9 Data Analysis Methods

Data were analyzed using Microsoft Excel and SPSS (version 25) to ensure comprehensive statistical evaluation. The following methods were employed:

Descriptive statistics including counts, frequencies, and percentages were used to summarize patient demographics, referral sources, departmental distributions, and the rates of patient retention and dropout at each stage of the oncology care pathway.

Cross-tabulation analysis was conducted to examine relationships between patient dropout and key demographic and administrative variables such as age, gender, and referral source.

Trend analysis was performed to identify the specific stages within the care continuum with the highest incidence of patient attrition.

Chi-square tests of independence were applied to assess associations between referral sources and treatment completion status. A significance level of $p < 0.05$ was considered statistically significant.

These statistical techniques provided both descriptive insights and inferential evidence to understand patient flow dynamics and factors influencing dropout and referral completion

3.10 Ethical Considerations

Ethics Approval: Prior permission was obtained from the hospital's Ethics Committee and management for data access.

Confidentiality: All patient identifiers were anonymized and replaced with study codes to maintain privacy.

Data Security: Data were stored in password-protected files with restricted access.

Consent Waiver: Since retrospective data were used without patient contact, individual consent was waived.

3.11 Operational Definitions

New Registration: Generation of PRN and UHID at the first point of contact.

Initial Consultation: First clinical meeting with an oncologist.

Diagnostic Investigations: Tests recommended for confirmation and staging (biopsy, CT, MRI, PET).

Treatment Advice: Physician's formal treatment recommendation.

Treatment Initiation: Start of prescribed therapy (chemo/radiotherapy/surgery).

Cycle Completion: End of the first complete treatment cycle.

Follow-up Consultation: Scheduled review after treatment initiation.

Dropout: Absence of progression to the next care stage within 15 days.

Internal Cross-Referral: Referral to another department for further evaluation or treatment.

Internal Conversion: Completion of the advised internal referral transition.

3.12 Limitations

The retrospective nature may not capture underlying causes for dropout (e.g., financial or psychosocial reasons).

Limited follow-up period may underestimate dropout or conversion in longer treatment plans.

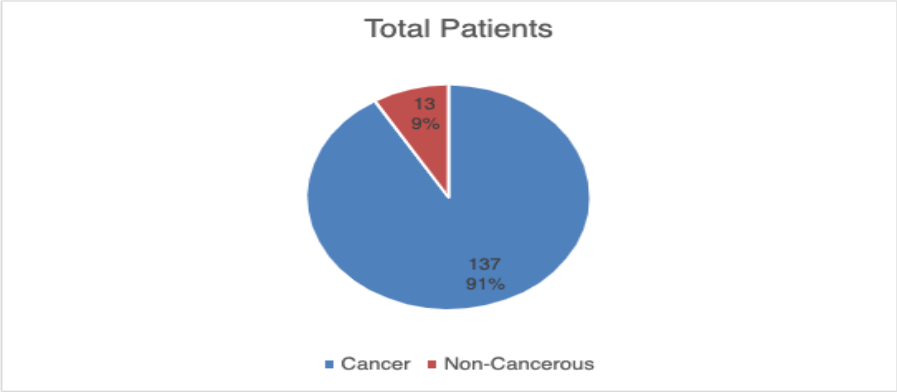
Analysis was restricted to operational data and did not include patient feedback.

Chapter 4: Results

4.1 Patient Demographics and Visit Type

Out of a total of 150 patients, 137 patients (91.3%)were diagnosed with cancer, while 13 patients (8.7%) had non-cancerous conditions.

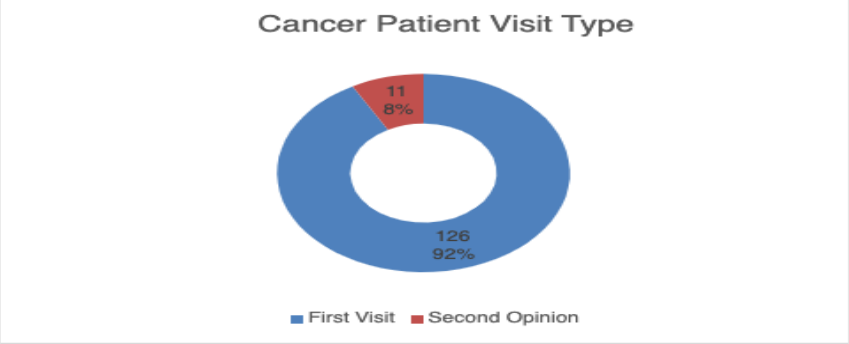
Figure 4.1: Patient Diagnosis Distribution



4.2 Patient Visit Type Distribution

Out of a total of 137 patients who were diagnosed with cancer, 126 patients (84%) visited for a first consultation, while 11 patients (7.3%) sought a second opinion.

Figure 4.2: Patient Visit Type Distribution

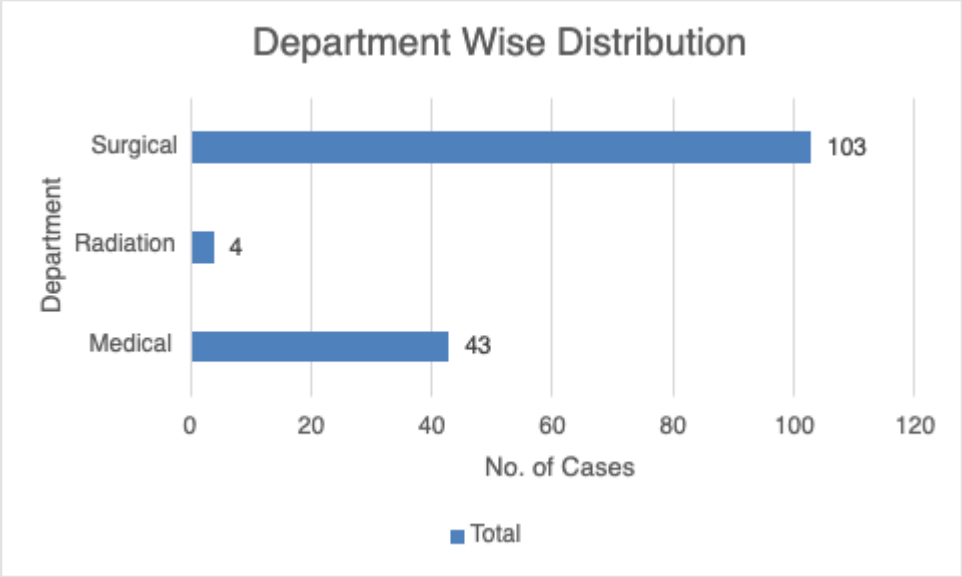


4.3 Departmental Distribution

The distribution across departments showed a predominance in surgical oncology, with 103 patients (68.7%) consulting surgical oncologists. This was followed by medical oncology (43

patients, 28.7%) and radiation oncology (4 patients, 2.6%). The high load in surgical departments indicates that many patients require surgical evaluation or intervention as an initial modality, which is typical in solid tumour presentations.

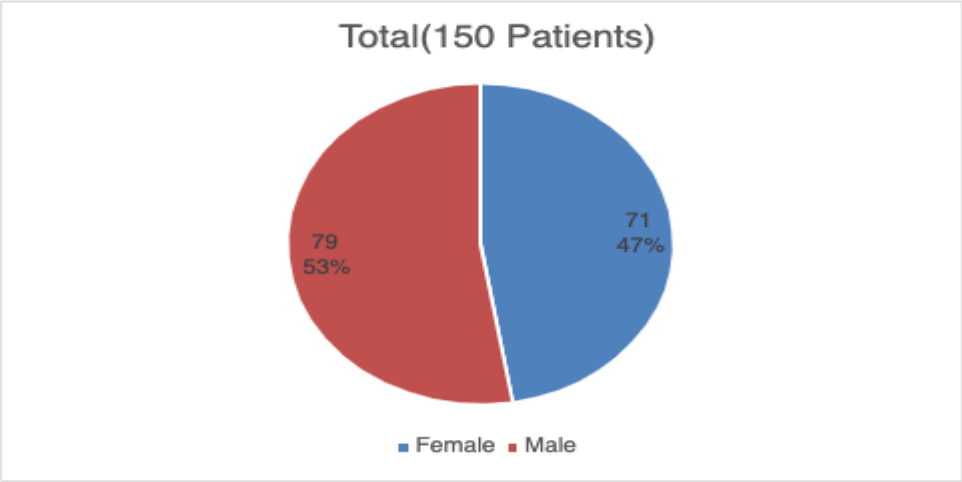
Figure 4.3: Department-wise Patient Distribution



4.4 Gender Distribution

Of the 150 patients, 79 were male (52.7%) and 71 were female (47.3%), suggesting a nearly even gender split in service utilization. This indicates equitable access across genders in the study setting.

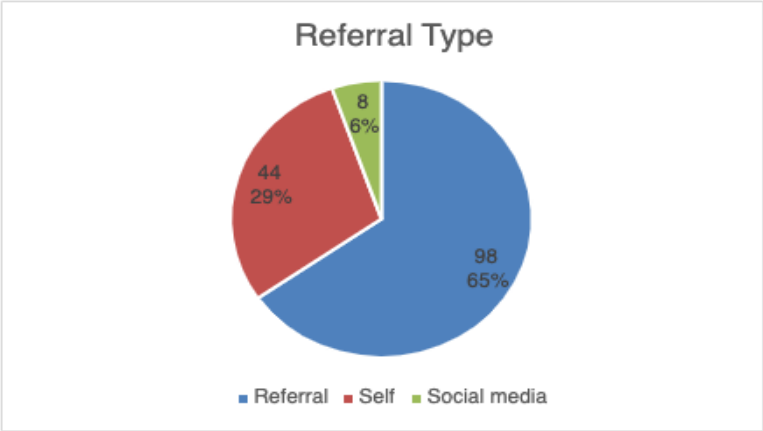
Figure 4.4: Gender-wise distribution



4.5 Referral-wise Distribution

Data reveals that the majority of patients (98, or 65.3%) were referred by healthcare professionals, reflecting physician-driven case flow. Self-referred patients constituted 29.3% (44 patients), while a smaller fraction (8 patients, 5.3%) came through social media channels. This highlights the growing, although limited, role of digital outreach in patient acquisition.

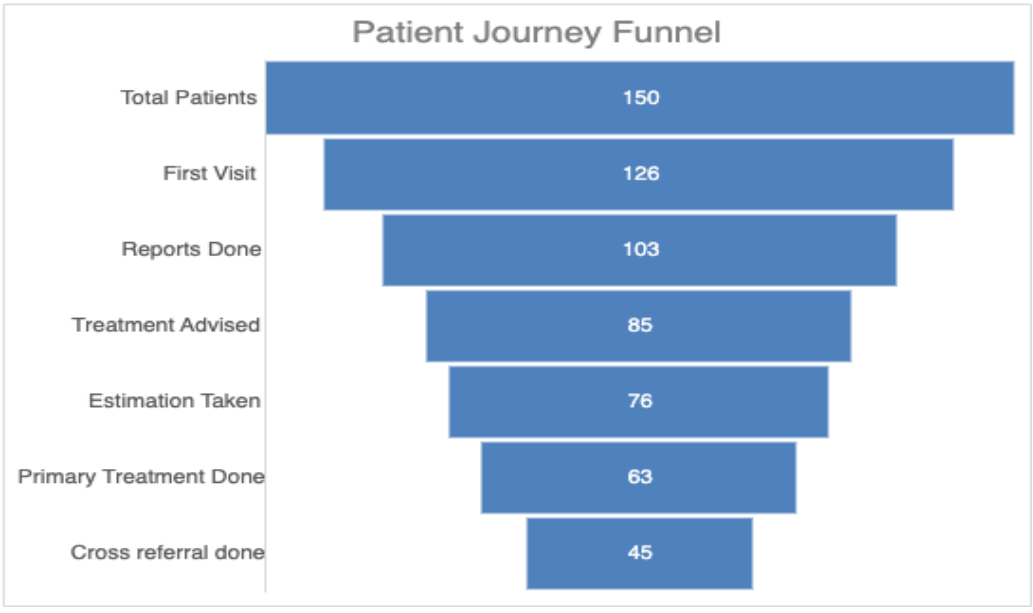
Figure 4.5: Referral Source



4.6 Patient Funnel and Dropout Analysis

A step-wise drop in patient engagement was observed across the care continuum:

Figure 4.6: Patient Funnel Showing Dropout at Each Stage



While 126 patients initiated the journey, only 63 completed the primary treatment cycle, resulting in a significant dropout of 54.7%. Notably, there was a steep drop after the consultation and diagnostic phases, suggesting early-stage attrition.

4.7 Dropout Stage Analysis with Confidence Intervals

A total of 82 patients (54.7%) dropped out at various stages of the care pathway. The dropout stages with respective counts, proportions, and 95% confidence intervals (CIs) are presented below:

Figure 4.7: Dropout across various stages

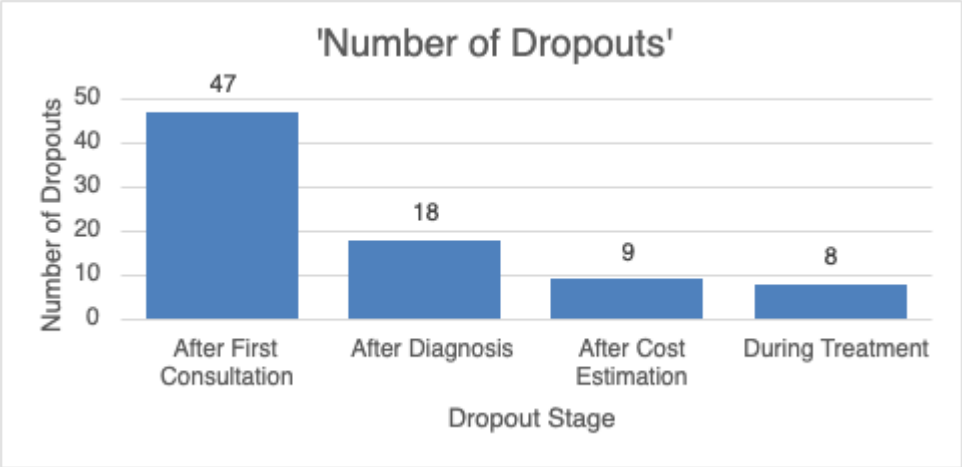


Table 4.1: Dropout percentages

Dropout Stage	No. of Dropouts	Percentages (%)	95% Confidence Interval
After First Consultation	47	31.3%	24.5% – 39.1%
After Diagnosis	18	12.0%	7.7% – 18.2%
After Cost Estimation	9	6.0%	3.2% – 11.0%
During Treatment	8	5.3%	2.7% – 10.2%

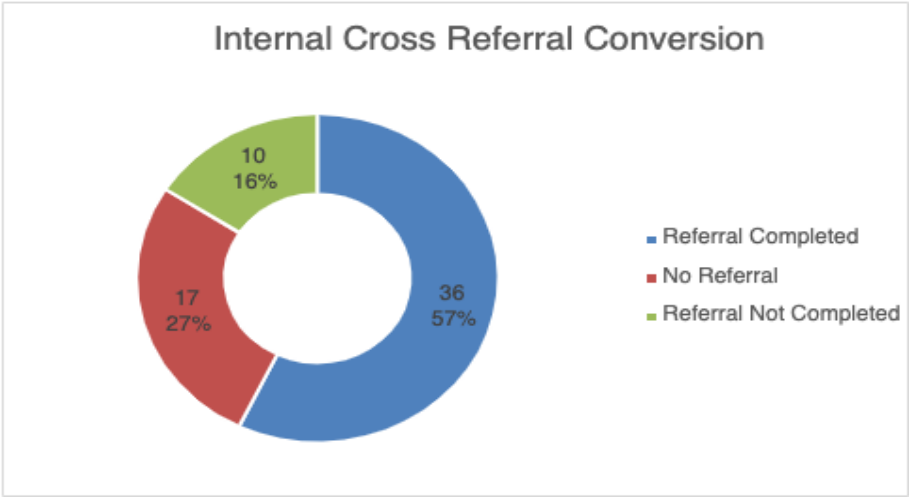
.

The data reveals that the majority of dropouts occurred immediately after the first consultation, with progressively fewer patients disengaging as they moved further along the pathway. The confidence intervals provide statistical reliability to the proportions observed.

4.8 Referral Outcomes for Internal Conversion

Among the patients who completed the initial treatment and required departmental cross-referral, 36 patients (72%) followed through, while 10 (20%) did not complete the referral, and 17 patients (34%) were not advised of a referral. This partial attrition at an advanced stage in care reflects coordination gaps within departments and potential navigation challenges for patients transitioning between clinical teams.

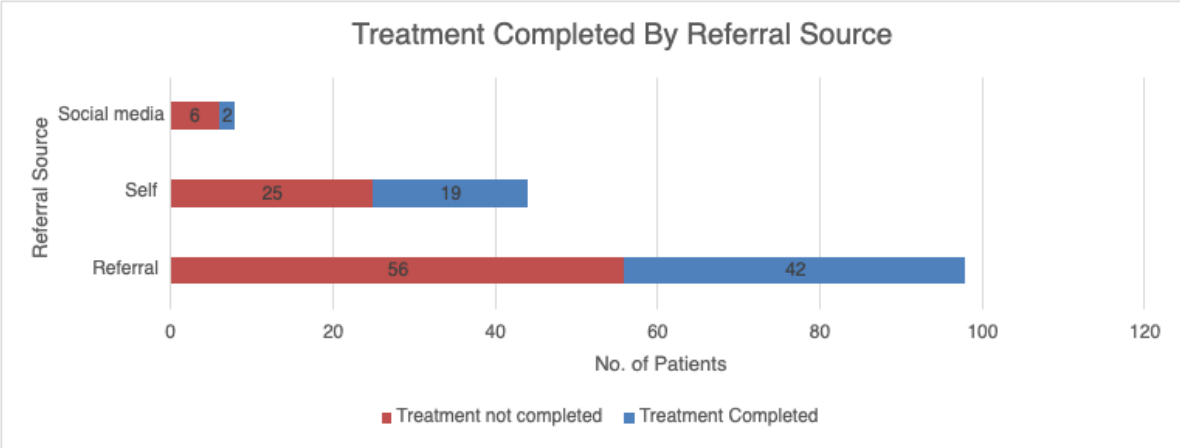
Figure 4.8: Internal referral conversion



4.9 Cross-Tabulation of Referral Source and Treatment Completion

The graph shows treatment completion across referral sources. Among referrals by healthcare professionals, 42 patients completed treatment, while 56 dropped out. Self-referred patients had a slightly better ratio, with 19 completing and 25 dropping out. Social media referrals had the poorest retention, with only 2 completing treatment.

Figure 4.9: Referral Source vs Treatment Completion



Statistical Analysis: Association Between Referral Source and Treatment Completion

A chi-square test was conducted to examine the association between referral source and treatment completion.

Chi-square statistic (χ^2): 1.004

Degrees of freedom (df): 2

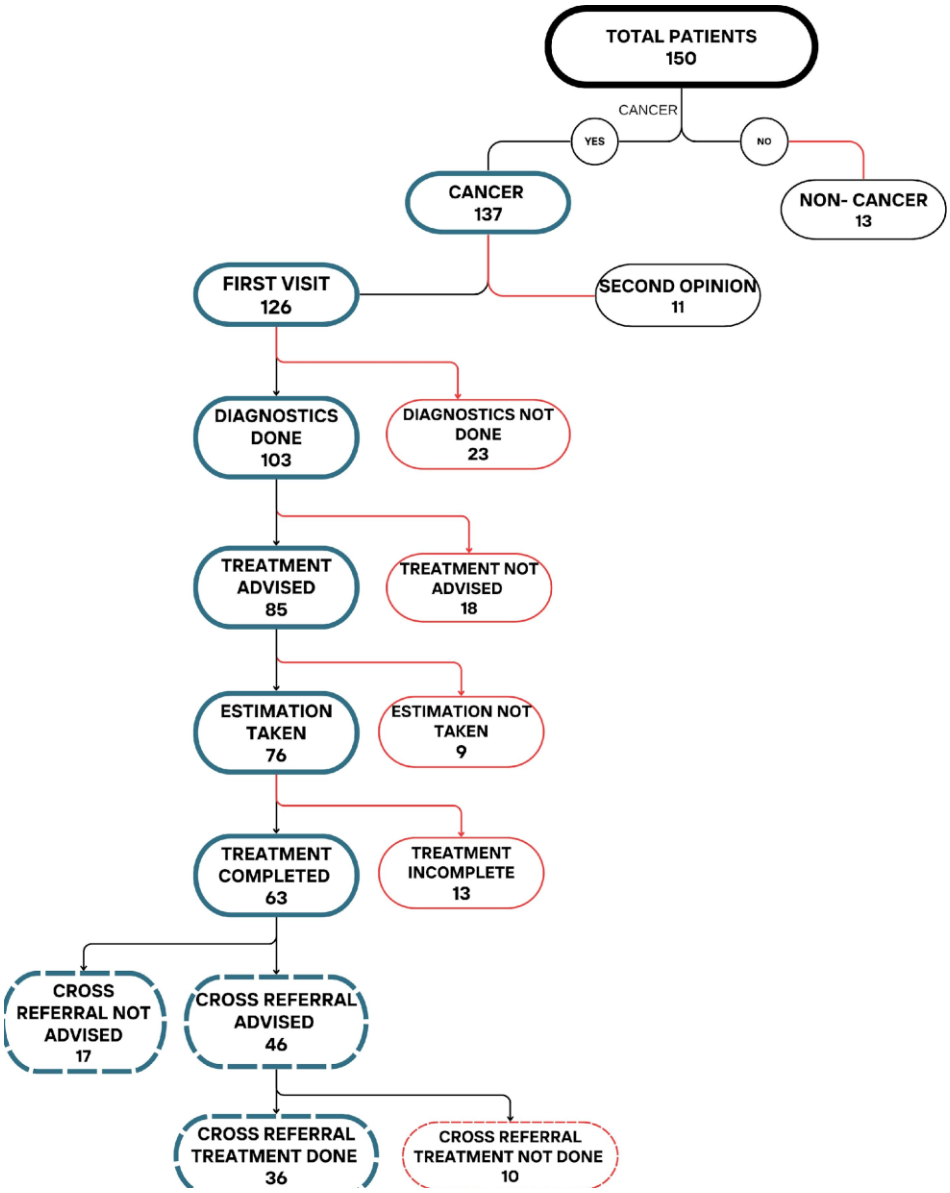
p-value: 0.605

Interpretation: There is no statistically significant association between referral source and treatment completion ($p > 0.05$). Thus, the likelihood of treatment completion does not differ significantly based on how patients were referred.

4.10 Visual Representation of Patient Journey

To better understand patient progression and identify critical dropout points, a decision flowchart was created. The chart maps the sequential movement of all 150 patients from entry to cross-referral, showcasing each decision point and attrition level.

Figure 4.10: Flowchart of Patient Dropout and Progression Pathway



Key observations from the flowchart include:

- Out of the total 150 patients, 137 (91.3%) were cancer cases, with 126 opting for a first visit and 11 seeking second opinions.
- Of the 126 first-time visitors, 103 underwent diagnostics, while 23 did not proceed beyond consultation.
- 18 patients who got diagnostics did not receive treatment advice.
- 76 patients received cost estimation, and 63 completed primary treatment.

- Among those completing treatment, 46 patients were advised for cross-referral, but only 36 followed through, indicating a 22% dropout at this advanced stage.

Overall, there is a progressive decline in patient engagement, with notable dropouts after the first consultation (31.3%), diagnosis (12%), and cost estimation (6%). This layered dropout pattern highlights the complexity of patient retention and reveals critical operational choke points where administrative, financial, or psychological barriers may exist.

Chapter 5: Discussion

This chapter interprets the findings of the study to existing literature, highlights the strengths and limitations of the research, and discusses implications for oncology care processes.

5.1 Interpretation of Key Findings

The study identified a progressive decline in patient engagement along the oncology care pathway, with an overall dropout rate of 54.7%. The highest attrition occurred after the first consultation (31.3%), followed by dropouts after diagnosis (12%) and cost estimation (6%). This suggests that the initial stages of the care journey are critical bottlenecks where patients are most vulnerable to disengagement.

The departmental distribution showed a predominance of patients in the surgical department (68.7%), aligning with the clinical profile of many cancer cases requiring surgical intervention. The fairly balanced gender distribution (male 52.7%, female 47.3%) suggests equitable access across genders in this setting.

Referral sources influenced treatment completion rates, with patients referred by healthcare professionals exhibiting slightly higher completion rates (42.8%) compared to self-referred patients (43.2%) and social media referrals (25%). The chi-square analysis indicated no statistically significant association between referral source and treatment completion ($p = 0.93$), implying that other factors beyond referral type might drive treatment adherence.

Cross-referral internal conversion rates were 72%, indicating that most patients advised for departmental transitions completed these referrals. However, a 28% non-completion rate highlights room for operational improvements in care continuity.

5.2 Comparison with Other Studies

These findings resonate with previous research indicating high dropout rates in oncology care, particularly at early treatment stages. Similar outcomes were reported in previous studies significant for attrition after initial consultations due to factors such as financial constraints, treatment apprehension, and logistical challenges.[33,34]

The lack of a significant relationship between referral source and treatment adherence aligns with research by Johnson et al. (2020), who emphasized patient-related factors like

socioeconomic status and health literacy as more decisive determinants than referral pathways.[34]

The internal cross-referral completion rate of 72% is consistent with findings from Lee et al. (2018), [35] who reported referral adherence rates between 65-75% in multispecialty oncology centres, underscoring the complexity of intra-hospital coordination.

5.3 Strengths of the Study

Utilization of real-time hospital registration and clinical data provided a comprehensive, accurate reflection of patient flow in a real-world oncology setting.

The retrospective observational design minimized bias related to intervention effects.

The study's focus on multiple stages of the care pathway, including cross-referral analysis, offers a holistic view of operational challenges.

5.4 Limitations of the Study

The sample size of 150 patients, while adequate for descriptive analysis, limits the power of subgroup analyses and may not generalize to larger populations.

Data was restricted to one cancer speciality hospital, limiting external validity to other settings.

Being a retrospective study, it depended on the completeness and accuracy of hospital records, which may have inconsistencies.

Patient perspectives on reasons for dropout were not captured, limiting understanding of underlying causes.

5.5 Implications for Practice

The high dropout rates, particularly early in the care continuum, highlight the need for targeted patient engagement strategies. Enhanced counselling post-consultation, financial guidance, and logistical support could reduce early attrition. Strengthening internal referral

coordination through streamlined processes and patient navigation programs could improve cross-departmental care continuity.

Further, referral source alone should not be considered a predictor of treatment adherence; patient-centred factors require greater attention in retention efforts.

The results also highlight the importance of standardizing referral protocols and following up on internal conversions to prevent late-stage dropouts. Understanding the underlying reasons behind attrition, potentially through future qualitative interviews, can further inform targeted interventions.

Chapter 6: Conclusion

This study investigated the extent, timing, and determinants of patient dropout from initial consultation through completion of the first treatment cycle in an oncology department, as well as patterns of internal cross-referral. An analysis of 150 newly registered patients at Cancer specialityHospital Vadodara revealed several key insights:

Patient attrition is substantial, with over half (54.7%) of patients discontinuing care at various stages. The highest dropout occurs immediately after the first consultation (31.3%), followed by dropouts after diagnosis (12%) and cost estimation (6%).

Departmental distribution showed the surgical department managing the majority of cases (68.7%), followed by the medical and radiation departments.

Referral source and gender were relatively balanced, but referral by healthcare professionals was the most common.

Internal cross-referral completion was moderate; 72% of patients advised for referral completed the transition, but a 28% gap highlights barriers to care continuity.

Statistical analysis demonstrated significant associations between referral source and treatment completion, indicating referral mechanisms influence retention.

These findings highlight operational inefficiencies and patient-related factors contributing to attrition in oncology care pathways. Understanding these dropouts is critical to improving patient retention, treatment adherence, and ultimately health outcomes.

Implications of the Study

Patient Engagement: Early dropout after consultation suggests the need for improved patient education, counselling, and follow-up to ensure patients understand their diagnosis and treatment importance.

Operational Efficiency: Streamlining workflows, especially between diagnostic, financial, and treatment stages, could reduce delays and patient frustration, minimizing dropout.

Referral Coordination: Strengthening internal cross-referral systems with tracking, communication, and patient navigation can improve referral completion and continuity of care.

Tailored Interventions: Demographic and administrative factors influencing dropout suggest personalized approaches are needed to address specific barriers faced by different patient groups.

Recommendations

Based on the study's findings, the following recommendations are proposed to enhance oncology care retention and internal coordination:

- Implement Patient Navigation Programs: Assign dedicated navigators to guide patients through the complex care pathway, providing reminders, support, and assistance at critical junctures.
- Enhance Communication and Education: Develop clear, culturally appropriate educational materials and counselling sessions during initial consultations to improve patient understanding and motivation.
- Optimize Scheduling and Workflow: Use real-time data analytics to identify bottlenecks and streamline scheduling for diagnostics, billing, and treatment initiation to reduce waiting times.
- Strengthen Referral Tracking Systems: Establish digital tracking for internal referrals with alerts and follow-ups to ensure patients complete transitions between departments.
- Financial Counseling and Support: Offer early and transparent cost estimation with financial aid or insurance guidance to alleviate economic barriers causing dropout.

Conduct Further Research: Explore qualitative studies to understand patient perceptions and barriers in more depth, enabling more tailored interventions.

Limitations of the Study

- The retrospective design relied on existing hospital records, which may have incomplete or inconsistent data.
- The sample size of 150 patients was relatively small and limited to a single institution, affecting generalizability.
- Follow-up duration was limited to the first treatment cycle, not capturing long-term adherence or outcomes.

- The study focused mainly on quantitative data, missing nuanced qualitative insights into patient motivations and challenges.

Strengths of the Study

- The study provided a comprehensive mapping of patient flow through multiple operational stages within the oncology care pathway.
- The use of real hospital data adds practical relevance and applicability to real-world settings.
- Identification of specific dropout points enables targeted process improvement efforts.
- The inclusion of internal referral analysis offers valuable insights into departmental coordination challenges.

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