

# Patient Experience on Oncological Treatments Assessed through the LifeCare Mobile Application: A Cross-Sectional Pilot Study

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## Abstract

Patient-reported experience measures (PREMs) are essential for quality assessment in oncology care, often differing from clinician perceptions. Mobile health (mHealth) applications enable systematic capture of patient perspectives in routine practice. We assessed cancer patients' willingness to repeat oncological treatment and explored underlying reasons using the LifeCare mobile application in a cross-sectional pilot study of 16 users. Patients responded to: "Taking into account what has been explained to you about your disease and treatment, and your personal experience, would you undergo this treatment again?" (options: "No, never"; "Maybe"; "Yes, I would undergo this treatment again") with free-text justification. Natural language processing analyzed open responses. Median age was 56 years; 62.5% (10/16) female. Tumor distribution: breast 43.8% (n=7), colon 18.8% (n=3), lung 18.8% (n=3), others 18.8% (n=3). Overall, 62.5% (10/16) answered "Yes", 25.0% (4/16) "Maybe", 12.5% (2/16) "No, never". NLP identified six dominant themes for affirmative responses (disease control 40%, survival 20%), three for ambivalent responses, and three for negative responses (toxicity, disease progression). LifeCare enabled structured PREM capture revealing treatment acceptability determinants. Mobile health with NLP shows promise for scalable patient-centered oncology care.

### Keywords:

Patient experience; PREMs; mHealth; Oncology; Natural language processing

## Introduction

Oncology quality assessment has evolved from objective clinical endpoints toward patient-centered metrics.<sup>1,2</sup> Patient-reported experience measures (PREMs) capture lived treatment experience—symptoms, toxicity, functional impact, emotional burden—often diverging substantially from clinician assessments.<sup>3,4</sup> Systematic PREM collection supports shared decision-making, detects unmet needs, and enables care adaptation.<sup>5</sup>

Patient experience is dynamic, varying across disease trajectory and treatment lines.<sup>6</sup> Digital health solutions, including mobile health (mHealth) applications, integrate real-time PREM capture into routine workflows with minimal clinician burden.<sup>7</sup> LifeCare is a telemonitoring platform designed for patient-centered data collection, capable of capturing both structured and unstructured information in real-world oncology settings.<sup>8</sup>

This pilot study implemented LifeCare's global experience question: "Taking into account what has been explained to you about your disease and treatment, and your personal experience, would you undergo this treatment again?" We aimed to characterize patient responses and use natural language processing (NLP) to analyze free-text rationales, exploring determinants of treatment acceptance in a real-world population.<sup>9,10</sup>

## Methods

### Study design and setting

Cross-sectional observational pilot study analysing patient-reported data voluntarily provided through the LifeCare mobile application. LifeCare is an open-access digital health platform available to oncology patients, used independently of any specific research protocol or interventional study.

### Participants

Participants consisted of adult oncology patients who registered on the LifeCare mobile application and actively used it to report symptoms and/or treatment-related experiences. No formal recruitment was performed in the clinical setting; inclusion was based solely on voluntary app registration and use.

### Data collection

LifeCare is an open, patient-centred digital platform designed to support symptom monitoring and patient experience reporting in real-world clinical practice. For the purposes of this study, anonymised patient-reported data generated within the application were extracted and analysed.

The application collected:

- **Sociodemographic data:** age, sex
- **Clinical data:** primary tumour type

- **Key experience question:** "Taking into account what has been explained to you about your disease and treatment, and your personal experience, would you undergo this treatment again?" with three response options: "No, never", "Maybe", "Yes, I would undergo this treatment again".

- **Open-text field:** participants were invited to justify their response in their own words, generating narrative data for qualitative analysis.

All data were fully anonymised prior to analysis, ensuring compliance with ethical and data protection standards.

**Data analysis**

**Quantitative analysis:** Demographic and clinical variables were summarized using descriptive statistics (medians with ranges; frequencies with percentages).

**Qualitative analysis:** Open-ended responses were processed using natural language processing (NLP) techniques implemented in Python with spaCy library for European Portuguese:

1. Text preprocessing: lowercasing, accent normalization, stopword removal (Portuguese NLTK corpus)
2. Term frequency analysis to identify most common words and phrases
3. Semantic similarity clustering using word embeddings (fastText) to group thematically related responses
4. Manual thematic verification by trained analyst to confirm semantic groupings
5. Sentiment polarity assessment (positive/neutral/negative) for each response

Analysis tools optimized for European Portuguese ensured linguistic appropriateness.

**Results**

**Population characteristics**

Sixteen adult oncology patients were enrolled. Median age was 56 years (range: 22–69 years). The sample was 62.5% female (10/16). Tumor types included breast cancer (43.8%, n=7), colon cancer (18.8%, n=3), lung cancer (18.8%, n=3), and other malignancies (18.8%, n=3).

**Primary outcome: Treatment acceptability**

Treatment acceptability was assessed using a single-item patient-reported question asking whether the patient would choose to undergo the same treatment again, taking into account both the information provided and their personal experience.

Table I. Distribution of responses to "Taking into account what has been explained to you about your disease and treatment, and your personal experience, would you undergo this treatment again?"

Response	n	%
Yes, I would undergo this treatment again	10	62.5%
Maybe	4	25.0%
No, never	2	12.5%
<b>Total</b>	<b>16</b>	<b>100%</b>

Overall: 62.5% (10/16) answered "Yes, I would undergo this treatment again"; 25.0% (4/16) answered "Maybe"; 12.5% (2/16) answered "No, never".

**Secondary outcome: Qualitative themes**

Natural language processing of free-text justifications identified distinct thematic patterns associated with each response category (Table II).

Table II. Thematic categories and frequencies by response group

Response category	Thematic category	n	%
<b>Yes (n=10)</b>	Disease control/oncological efficacy	4	40
	Survival benefit	2	20
	Quality of life	1	10
	Positive experience/good tolerability	1	10
	Therapeutic acceptance/inevitability	1	10
	Medical team trust/confidence	1	10
<b>Maybe (n=4)</b>	Disease control/oncological efficacy	1	25
	Quality of life concerns	1	25
	Indecision/uncertainty about future	1	25
	<i>Missing explicit theme</i>	1	25
<b>No (n=2)</b>	Toxicity/negative side effect burden	1	50

As shown in table II, thematic analysis revealed distinct motivational patterns underlying patients' responses to the treatment acceptability question.

Among patients responding "Yes" (n = 10), the predominant driver was perceived oncological efficacy (4/10, 40%), followed by anticipated survival benefit (2/10, 20%). Additional themes—each reported by one patient (10%)—included quality of life considerations, positive treatment experience or good tolerability, perceived therapeutic inevitability, and trust in the medical team. Overall, affirmative responses were primarily grounded in expectations of clinical benefit, with experiential and relational factors playing a secondary role.

In the "Maybe" group (n = 4), responses were evenly distributed across four themes: disease control/oncological efficacy, quality of life concerns, uncertainty regarding the future, and absence of an explicit motivating theme (each 25%). This pattern reflects a state of clinical equipoise, in which perceived therapeutic benefit is counterbalanced by concerns regarding toxicity, life impact, and prognostic uncertainty.

Among patients responding "No" (n = 2), the dominant theme was treatment-related toxicity or side-effect burden.

## Discussion

This pilot study demonstrates the feasibility and utility of the LifeCare mobile application to systematically capture global patient experience with systemic oncological treatment in routine outpatient care.<sup>11</sup> The single, clearly worded question—"Would you undergo this treatment again?"—synthesized patients' holistic appraisal of benefit-burden-values trade-offs in a manner readily understood by both patients and clinicians.

Our finding that 62.5% of patients would repeat treatment aligns with literature describing high treatment acceptance when clinical benefit is perceived and toxicity is manageable.<sup>12</sup> Conversely, the 37.5% expressing hesitation or refusal underscores the centrality of side-effect burden and functional impact in retrospective treatment satisfaction, even when objective oncological responses were achieved.<sup>13</sup>

The thematic analysis via natural language processing (NLP) efficiently processed qualitative narratives without labor-intensive manual coding, offering a clear advantage in resource-limited or high-volume oncology settings.<sup>14,15</sup> Notably, "Maybe" responses revealed decisional ambivalence: patients acknowledged benefit but expressed uncertainty about repeating the experience, suggesting a subgroup potentially benefiting from enhanced supportive care or structured discussion of treatment alternatives.<sup>16</sup> This demonstrates the added value of combining digital PREMs with NLP to capture nuanced patient perspectives that traditional quantitative measures may overlook.

Integrating mHealth-enabled PREMs into routine practice offers a scalable approach to systematically include the patient voice in oncology decision-making, supporting shared decision-making and individualized treatment strategies. By capturing patient-reported experience in real time, this methodology addresses an often-overlooked dimension of care, emphasizing the necessity of studying patient experience alongside clinical outcomes.<sup>17,18</sup>

## Conclusion

The LifeCare mobile application, combined with NLP, enabled structured, scalable capture of cancer patients' global treatment experience. Our findings show that 62.5% of patients would repeat their oncological treatment, primarily motivated by perceived disease control, while 37.5% expressed ambivalence or refusal, driven predominantly by toxicity and disease progression concerns.

These results underscore that clinical efficacy alone may be insufficient to justify treatment repetition when quality of life is substantially compromised. Systematic integration of digital PREMs into routine oncology practice represents a pragmatic, patient-centered approach, facilitating shared decision-making and individualized treatment planning. The pilot study highlights the novel methodology's advantages—efficient, scalable, real-time capture of nuanced patient perspectives—while acknowledging limitations such as sample size, heterogeneity, and single-center design. Future research should expand longitudinally across tumor types and treatment modalities to deepen understanding of how patient experience evolves and informs optimal treatment strategies.

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