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Evaluating Patient Satisfaction with Oncology Pharmacy Services in Regional Referral Centers: A Mixed-Methods Approach

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Abstract

Purpose

This study analysed the impact of sociodemographic factors, clinical characteristics, and pharmaceutical service quality domains on cancer patient satisfaction using a mixed-methods approach.

Methods

A quantitative evaluation of 291 patients utilizing Chi-square and binary logistic regression was integrated with qualitative interviews from 10 participants analysed with NVivo12.

Results

Results revealed that sociodemographic and clinical factors, including caregiver count (> 3), occupation, education, age (> 60 years old), cancer diagnosis, metastatic status, therapy duration, and surgical history, significantly influenced patient satisfaction domains ($p < 0.05$). Simultaneously, four pharmaceutical service domains accounted for 31.2% of the variance in satisfaction ($R^2 = 0.312$, $p < 0.001$). Medication information and education quality emerged as the primary predictor (OR = 12.314, $p < 0.001$), followed by physical evidence and attributes (OR = 2.432, $p = 0.003$) and staff professionalism (OR = 2.095, $p = 0.011$). Conversely, post-pharmacy service quality showed no significant effect ($p = 0.083$). Qualitative findings confirmed that satisfaction is driven by clear dosing schedules, side effect counselling, therapeutic communication, and readable labelling. The insignificance of post-pharmacy services stemmed from an absence of formal post-discharge monitoring or tele-pharmacy, highlighting a critical unmet need.

Conclusion

comprehensive medication education is the key determinant of cancer patient satisfaction, and structured post-hospitalization monitoring is urgently required to optimize pharmaceutical care.

INTRODUCTION

Cancer remains one of the leading causes of morbidity and mortality worldwide. According to the 2020 Global Cancer Observatory (GLOBOCAN) data, Indonesia recorded 396,914 new cancer cases and 234,511 cancer-related deaths [1]. In 2023, Bali Province was ranked among the top seven provinces with the highest cancer prevalence in the country. This high prevalence demands that hospitals provide comprehensive and effective care [2]. Pharmacists occupy a strategic position within the healthcare system, playing a crucial role in bridging gaps in patient care [3]. Cancer care is highly complex and particularly vulnerable to medication errors, therefore, the presence of pharmacists in oncology units is critical for patient therapy. Their responsibilities span from early detection and preventive measures to the provision of systemic anti-cancer therapy (SACT). While existing literature heavily emphasizes process-oriented pharmacist activities, a critical gap remains in evaluating the actual outcomes of these services from the patient's perspective. Therefore, there is an urgent need to shift the research paradigm toward clinical and psychometric indicators that capture direct patient experiences [4]. In this regard, evaluating patient satisfaction serves as a pivotal psychometric indicator to assess the quality of pharmaceutical care. Superior oncology pharmacy services have been shown to positively impact patients' understanding of drug side effects and their management [5, 6].

Patient satisfaction with oncology pharmacy services is influenced by several factors. A study by Yuliandani et al. [7] indicated that factors affecting patient satisfaction include comfort and convenience, medication availability, communication between patients and clinical pharmacists, and follow-up care for chemotherapy patients. A potential challenge in oncology service units is the diversity of patient conditions, as cancer patients exhibit highly complex needs and expectations regarding their pharmacy services [8, 9]. Findings from an ambulatory oncology clinic demonstrated that patients view oncology pharmacy services as vital, particularly the availability of pharmacists for patient education. Patients in that study reported being highly satisfied with the

services received [10]. Conversely, other research revealed low patient satisfaction regarding interactions with oncology pharmacy staff. This highlights the need for oncology pharmacists to be more present during patient visits and to allocate sufficient counselling time to strengthen the therapeutic rapport. Given these conditions, evaluating oncology pharmacy services is imperative. This evaluation can be achieved by analysing patient satisfaction, which facilitates the formulation of targeted corrective actions to improve the quality of oncology pharmaceutical care. Measuring patient satisfaction also provides patients with an opportunity to receive healthcare services that better align with their needs and expectations [9].

METHODS

Study Design

An explanatory sequential mixed-methods design was employed. This study was conducted at two hospital in Bali, Indonesia. The first stage, the quantitative design was conducted to examine the patient's satisfaction. In the second stage, individual interviews were conducted. This qualitative data collection was aimed at investigating the patients' perspective and experience with oncology pharmacist service and also enhancing our understanding of the factors that contribute to the satisfaction. This explanatory mixed-methods study conformed to the Good Reporting of a Mixed-Methods Study (GRAMMS) guidelines (Supplementary material 1).

Participants

The quantitative study recruited a convenience sample of oncology patients from 2 hospitals. The lameshow formula for cross-sectional study was conducted to determine the minimum sample size (*Lwanga and Lemeshow, 1991*) [11]:

n = (Z x P x (1-P))/(d)

A minimum sample size of 97 respondents. The final analysed sample comprised 291 patients receiving oncology pharmacy services.

The inclusion criteria for participants were Indonesian nationals aged 18–65 years who visited the oncology pharmacist and had been diagnosed with cancer for at least 6 months. The exclusion criteria were patients who did not provide informed consent and failed to complete the questionnaire.

Study Instrument

Data were collected using a structured questionnaire designed to assess patient-centered oncology pharmacy services. The questionnaire items were adapted from established validated questionnaires such as Service Quality (ServQual) and Patient Satisfaction with Pharmacist Services Questionnaire Version 2.0 (PSPSQ 2.0). The questionnaire comprised four main sections: (1) informed consent, (2) socio-demographic characteristics, (3) clinical status, and (4) patient satisfaction. The patient satisfaction questionnaire comprised 24 items spanning four distinct domains and one overall. Participants rated each item using a 4-point Likert scale, ranging from 1 (strongly dissatisfied) to 4 (strongly satisfied). Before distribution to patients, the questionnaire also validated through expert review and comprised item-content validity index (I-CVI) score was 1.00 and a preliminary feasibility check with 30 patients to ensure clarity. The construct validity values ranged from 0.831–0.968 and reliability score using Cronbach's alpha was 0.969. Detailed properties are presented in supplementary material 2.

Following the quantitative assessment, a sequential qualitative phase was conducted. Purposive sampling was employed. To gain a comprehensive understanding, structured interviews were conducted to delve into specific factors affecting patient satisfaction. The audio recordings were subsequently transcribed and coded to identify key themes and subthemes.

Statistical Analysis

Quantitative Analysis

Data were analysed using SPSS version 30.0 (IBM Corp., Armonk, NY, USA). To assess the association between socio-demographic/clinical factors and satisfaction, patients' satisfaction scores were transformed into binary codes using a top-box scoring approach. The cut off score is a percentile value in each domain. The percentile in all domains are 4, then the binary code was classified into 1 is not too satisfied (with mean score < 4) and 2 is very satisfied (with mean score 4). The associations between these independent factors and the dichotomized satisfaction outcomes were analysed using Chi-square test.

For the domain-specific analysis, binary codes of each satisfaction domain and overall satisfaction were analysed using binary logistic regression. The analysis was conducted with omnibus tests of model coefficients to see the simultaneous effect, nagelkerke R square, accuracy of model, the partial effect, and odd ratio.

Qualitative Analysis

The interviews were carefully structured using structured questions, allowing for flexibility in exploring the participants' experiences while ensuring that key topics related to oncology patient satisfaction. The data in Indonesian language was analysed using an inductive thematic framework technique. The familiarization process started during the interview phase and this process was extended to transcribing the audio recordings of the interviews by revisiting and cross-referencing with the written transcripts. Then three authors were identifying key themes. Meaningful phrases in the textual transcripts were manually coded using software NVivo 12. Another team member confirmed the produced codes. After completion of the data coding, this study analysed the codes and pertinent patterns and organized them into themes.

This analysis was resolved by consensus among all the authors. In the end, quotations that exemplified the themes were selected with the consensus of the entire study team. The results from the quantitative and qualitative phases were integrated using the approach developed by Farmer et al. [12] This protocol involves sorting, convergence coding, convergence assessment, completeness assessment, researcher comparison, and feedback.

Ethics Statements

This study received ethics approval (reference No. 0105/EA/KEPK.RSBM.DISKES/2025) from Bali Mandara and reference No. 243/EA/KEPK-BUB-2026 from STIKES Bina Usada Bali.

RESULTS

Factors Associated with Patient Satisfaction Towards Oncology Pharmacy Services

Regarding Domain 1 (quality of information and medication education), the amount of caregiver showed a statistically significant association (p = 0.027), with a higher proportion of amount of caregiver > 3 reporting being very satisfied. Furthermore, occupation was significantly related too (p = 0.026) where patients categorized in other occupations (43.5%) expressed the highest rates of high satisfaction. In Domain 2, both educational level (p = 0.014) and age group (p = 0.038) demonstrated statistically significant association. Patients aged over 60 years old reported higher satisfaction levels regarding post-pharmacy services (73.2%). Among educational subgroups, junior high school graduates recorded the highest proportion of high satisfaction (81.6%). The detailed is showed in Table 1.

Several clinical parameters demonstrated strong statistical associations with specific quality domains as well as Overall Satisfaction (Domain 5). For Domain 1, significant differences were identified across primary cancer diagnoses (p = 0.032), metastatic status (p = 0.022), and history of surgical operation(p = 0.019). Patients with metastatic disease (28.2%) and those with a surgical history (25.4%) reported a higher proportion of high satisfaction. Regarding Domain 3 (Professionalism), surgical history was the sole clinical factor showing a statistically significant association (p=0.017), wherein patients who had undergone surgery expressed greater satisfaction (51.7%). Most notably, three clinical factors were significantly associated with Overall Satisfaction: metastatic status (p=0.009), length of therapy (p=0.001), and surgery history (p=0.019). Patients with metastatic

cancer (70.4%) and those who underwent surgical procedures (65.3%) exhibited higher overall satisfaction. Additionally, overall satisfaction increased with treatment duration, rising from 41.7% among patients receiving therapy for under 3 months to 69.7% in those treated for more than a year. As a detailed can be seen in table 2.

Table 1. Bivariate analysis of socio-demographic associated with quality domains and overall satisfaction in oncology pharmacy service (N = 291)

Variable	Domain									
	1 (Quality of Information and Medication Education)		2 (Quality of Post Pharmacy Services)		3 (Professionalism)		4 (Physical Product Evidence and Service Attributes)		5 (Overall Satisfaction)	
	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.
Gender										
Woman (n = 247)	42 (17%)	0.05	155 (62.8%)	0.911	108 (43.7%)	0.728	181 (73.3%)	0.698	137 (55.5%)	0.197
Man (n = 44)	13 (29.5%)		28 (63.6%)		18 (40.9%)		31 (70.5%)		29 (65.9%)	
Educational										
Unfinished (n = 2)	0 (0%)	0.263	1 (50%)	**0.014**	2 (100%)	0.377	2 (100%)	0.438	2 (100%)	0.067
Elementary school (n = 54)	15 (27.8%)		36 (66.7%)		26 (48.1%		44 (81.5%)		33 (61.1%)	
Junior school (n = 49)	7 (14.3%)		40 (81.6%)		18 (36.7%)		33 (67.3%)		23 (46.9%)	
Senior school (n = 108)	22 (20.4%)		57 (52.8%)		48 (44.4%)		78 (72.2%)		70 (64.8%)	
University (n = 78)	11 (14.1%)		49 (62.8%)		32 (41%)		55 (70.5%)		38 (48.7%)	
Age										
<= 60 years old (n = 220)	39 (17.7%)	0.368	131 (59.5%)	**0.038**	95 (43.2%)	0.943	161 (73.2%)	0.824	123 (55.9%)	0.491
> 60 years old (n = 71)	16 (22.5%)		52 (73.2%)		31 (43.7%)		51 (71.8%)		43 (60.6%)	
Marital status										
married (n = 249)	50 (20.1%)	0.307	159 (63.9%)	0.703	109 (43.8%)	0.543	185 (74.3%)	0.237	142 (57%)	0.994
single (n = 33)	3 (9.1%)		19 (57.6%)		12 (36.4%)		20 (60.6%)		19 (57.6%)	
divorce (n = 9)	2 (22.2%)		5 (55.6%)		5 (55.6%)		7 (77.8%)		5 (55.6%)	
Occupation										
unemployed (n = 56)	7 (12.5%)	**0.026**	36 (64.3%)	0.164	19 (33.9%)	0.135	35 (62.5%)	0.226	28 (50%)	0.137
civil servant (n = 14)	3 (21.4%)		7 (50%)		6 (42.9%)		11 (78.6%)		7 (50%)	
housewife (n = 116)	20 (17.2%)		78 (67.2%)		47 (40.5%)		89 (76.7%)		61 (52.6%)	
private sector (n = 53)	12 (22.6%)		30 (33.3%)		29 (54.7%)		37 (69.8%)		35 (66.0%)	

Variable	Domain									
	1 (Quality of Information and Medication Education)		2 (Quality of Post Pharmacy Services)		3 (Professionalism)		4 (Physical Product Evidence and Service Attributes)		5 (Overall Satisfaction)	
	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.
entrepreneur (n = 29)	3 (10.3%)		14 (48.3%)		11 (37.9%)		20 (69.0%)		17 (58.6%)	
others (n = 23)	10 (43.5%)		18 (78.3%)		14 (60.9%)		20 (87%)		18 (78.3%)	
Monthly income										
< IDR 1 million (n = 171)	28 (16.4%)	0.577	111 (64.9%)	0.293	69 (40.4%)	0.057	126 (73.7%)	0.214	89 (52.0%)	0.079
IDR 1 - < 3 million (n = 66)	12 (21.1%)		32 (56.1%)		22 (38.6%)		36 (63.2%)		33 (57.9%)	
IDR 3 - < 5 million (n = 48)	11 (22.9%)		28 (58.3%)		24 (50.0%)		39 (81.3%)		32 (66.7%)	
IDR >= 5 million (n = 15)	4 (26.7%)		12 (80%)		11 (73.3%)		11 (73.3%)		12 (80.0%)	
Caregiver										
No (n = 17)	1 (5.9%)	**0.027**	10 (58.8%)	0.738	8 (47.1%)	0.27	11 (64.7%)	0.596	10 (9.7%)	0.701
1 - 3 (n = 246)	44 (17.9%)		157 (63.8%)		102 (41.5%)		179 (72.8%)		138 (56.1%)	
> 3 (n = 28)	10 (35.7%)		16 (57.1%)		16 (57.1%)		22 (78.6%)		18 (64.3%)	
Assurance status										
No (n = 7)	2 (28.6%)	0.737	3 (42.9%)	0.535	4 (57.1%)	0.735	4 (57.1%)	0.399	4 (57.1%)	0.972
Private (n = 13)	3 (23.1%)		8 (61.5%)		6 (46.2%)		8 (61.5%)		7 (53.8%)	
Public (n = 271)	50 (18.5%)		172 (63.5%)		116 (42.8%)		200 (73.8%)		155 (57.2%)	

Values are presented as n (%)

Bold values indicate statistical significance (*p-value* < 0.05)

Abbreviation: Sig., significance

Table 2. Bivariate analysis of clinical associated with quality domains and overall satisfaction in oncology pharmacy service (N = 291)

Variable	Domain									
	1 (Quality of Information and Medication Education)		2 (Quality of Post Pharmacy Services)		3 (Professionalism)		4 (Physical Product Evidence and Service Attributes)		5 (Overall Satisfaction)	
	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.
Cancer diagnosis										
Breast (n = 215)	37 (17.2%)	0.032[a]	134 (62.3%)	0.389[a]	92 (42.8%)	0.646[a]	157 (73%)	0.987[a]	119 (55.3%)	0.342[a]
thyroid (n = 31)	2 (6.5%)		18 (19.5%)		15 (48.4%)		23 (74.2%)		15 (71.45%)	
nasopharynx (n = 21)	9 (42.9%)		14 (66.7%)		11 (52.4%)		16 (76.2%)		4 (40%)	
lung (n = 10)	2 (20%)		5 (50%)		3 (30%)		7 (70%)		3 (100%)	
sinus (n = 3)	2 (66.7%)		3 (100%)		2 (66.7%)		2 (66.7%)		2 (100%)	
lymphoma (n = 2)	1 (50%)		2 (100%)		1 (50%)		1 (50%)		1 (50%)	
melanoma (n = 2)	1 (50%)		2 (100%)		1 (50%)		1 (50%)		1 (50%)	
oral (n = 2)	0 (0%)		1 (50%)		0 (0%)		1 (50%)		1 (50%)	
prostate (n = 5)	1 (20%)		4 (80%)		1 (20%)		4 (80%)		3 (60%)	
Cancer stage										
1 (n = 57)	7 (12.3%)	0.207	34 (59.6%)	0.481	23 (40.4%)	0.401	36 (63.2%)	0.218	25 (43.9%)	0.115
2 (n = 107)	18 (16.8%)		71 (66.4%)		41 (38.3%)		83 (77.6%)		62 (57.9%)	
3 (n = 99)	25 (25.3%)		58 (58.6%)		49 (49.5%)		71 (71.7%)		60 (60.6%)	
4 (n = 28)	5 (17.9%)		20 (71.4%)		13 (46.4%)		22 (78.6%)		19 (67.9%)	
Metastasis										
Yes (n = 71)	20 (n = 28.2%)	**0.022**	47 (66.2%)	0.507	33 (46.5%)	0.534	57 (80.3%)	0.105	50 (70.4%)	**0.009**
No (n =221)	35 (n = 15.9%)		136 (61.8%)		93 (42.3%)		155 (70.5%)		116 (52.7%)	
Duration of therapy										
< 3 month (n = 103)	15 (14.6%)	0.482	61 (59.2%)	0.495	36 (35%)	0.184	72 (69.9%)	0.75	43 (41.7%)	**0.001**
3 - 6 month (n = 115)	26 (22.6%)		71 (61.7%)		55 (47.8%)		87 (75.7%)		76 (66.1%)	
7 - 12 month (n = 40)	7 (17.5%)		27 (67.5%)		18 (45.0%)		28 (70%)		24 (60%)	
> 1 year (n = 33)	7 (21.2%)		24 (72.7%)		17 (51.5%)		25 (75.8%)		23 (69.7%)	

Variable	Domain									
	1 (Quality of Information and Medication Education)		2 (Quality of Post Pharmacy Services)		3 (Professionalism)		4 (Physical Product Evidence and Service Attributes)		5 (Overall Satisfaction)	
	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.	Very-satisfied	Sig.
Operational history										
yes (n = 118)	30 (25.4%)	**0.019**	75 (63.6%)	0.844	61 (51.7%)	**0.017**	86 (72.9%)	0.993	77 (65.3%)	**0.019**
no (n = 173)	25 (14.5%)		108 (62.4%)		65 (37.6%)		126 (72.8%)		89 (51.4%)	
Family history										
yes (n = 39)	10 (25.6%)	0.248	26 (66.7%)	0.600	19 (48.7%)	0.463	32 (82.1%)	0.165	25 (64.1%)	0.339
no (n = 252)	45 (17.9%)		157 (62.3%)		107 (42.5%)		180 (71.4%)		141 (56%)	

Values are presented as n (%)

[a] Likelihood ratio test

Bold values indicate statistical significance (*p-value* < 0.05)

Abbreviation: Sig., significance

Quantitative Findings

Based on binary logistic analysis, the impact of the domain can be seen in Table 3. As simultaneous, the four domains reflect the significant effect on patients' satisfaction (p<0.05). The ability of the four domain variables to explain the variation in the satisfaction variable is 31.2%. The remaining 68.8% is explained by other factors outside the model. The strongest predictor was quality of information and medication education (p<0.05; OR:12.31,95%CI[2.798-54.201]). Professionalism and physical product evidence and service attributes also has a significant effect on patients' satisfaction (p<0.05). Professionalism was conducted OR:2.095,95%CI:1.182-3.713 and physical product evidence and service attributes was conducted OR:2.432,95%CI:1.356-4.360. Only quality of post pharmacy service was not associated with patient satisfaction (p>0.05).

Table 3. Binary Logistic Regression Analysis of Service Quality Domains Predicting Overall Patient Satisfaction

Domain	Beta	SE	Sig.	OR[95%CI]
Domain 1 (Quality of Information and Medication Education)	2.51	0.76	**<0.001**	12.314[2.798-54.201]
Domain 2 (Quality of Post Pharmacy Services)	0.48	0.28	0.083	1.613[0.940-2.767]
Domain 3 (Professionalism)	0.74	0.29	**0.011**	2.095[1.182-3.713]
Domain 4 (Physical Product Evidence and Service Attributes)	0.89	0.3	**0.003**	2.432[1.356-4.360]

Omnibus Tests of Model Coefficients p = <0.001

Nagelkerke R Square is 0.312

Bold values indicate statistical significance (*p-value* < 0.05)

Abbreviation: SE, standard error; Sig., significance; OR, odd ratio; CI, confidence interval

Qualitative Findings

In total 10 patients from the quantitative study completed individual interviews. Seven main domains with 22 sub-domains were identified. The detailed can be seen in supplementary 3. The most prominent theme is quality of information and medication education (10 files and 39 references0, highlighted administration timing (n=9), side effect counselling (n=7), and dispensing accuracy (n=9).

All participants addressed digital communication and tele pharmacy (10 files,15 references), emphasizing the current absence of formal post-discharge monitoring (n=8). Humanistic and tangible aspects were also critical, as captured under pharmacist professionalism and interpersonal skills (9 files, 25 references, driven by equitable care) and tangibles and physical evidence of service (9 files, 20 references, driven by label clarity and staff appearance). Finally, healthcare service coordination and logistics (8 files, 12 references) was primarily characterized by pharmacy waiting times (5 files), while patient experience and psychological well-being (3 files, 5 references) and medication complexity and comorbidities (1 file, 2 references) represented smaller, supplementary domains.

Narrative data integration

The mixed-methods integration (Table 4) revealed two key integration patterns: convergent and explanatory. A convergent pattern occurred when quantitative and qualitative data aligned, mutually reinforcing the same conclusion, as observed in quality in information and medication education, professionalism, and physical product evidence and service attributes. An explanatory pattern was applied when qualitative data clarified non-significant or unexpected quantitative results. Specifically, post-discharge pharmacy services exhibited an explanatory pattern: while quantitative analysis yielded non-significant results, qualitative findings revealed that this stemmed from a structural service gap.

Table 4. Joint Display Matrix Integrating Quantitative Statistical Findings and Qualitative Themes

Domain/Variable	Quantitative findings	Nvivo Metrix (Qualitative quantification)	Mixed-Methods Integration
Quality of Information and Medication Education	Dominant predictor (p<0.001; OR = 12.314 [2.798-54.201]	Files 10/10 References: 39	**Full convergence:** quantitative data confirms medication education as the strongest predictor of patient satisfaction (OR=12.314). Qualitative data contextualizes this finding, demonstrating that hight satisfaction is primarily driven by clear dosing schedules (n=9) and comprehensive side effect counselling (n=7).
Quality of Post Pharmacy Services	Predictor doesn't have significant effect p = 0.083; OR = 1.613 [0.940-2.767]	Files : 10/10 References: 15	**Explaining the Service Gap (Explanatory):** The lack of statistical significance (p=0.083) in the quantitative model is explained by qualitative findings. Rather than reflecting a lack of importance, qualitative findings reveal an unmet need. 8/10 patients reported an absence of formal post-discharge monitoring, indicating that tele pharmacy represents a desired future service rather than an established predictor of current satisfaction.
Professionalism	Predictor has sig nificant effect p = 0.011; OR = 2.095 [1.182-3.713]	Files: 9/10 References: 25	**Convergence (confirmation):** professional conduct significantly increases the likelihood of patient satisfaction (OR=2.095). Qualitative data confirms this mechanism, highlighting non-discriminatory care (n=9) and therapeutic communication soft skills (n=7) as key experiential drivers.
Physical Product Evidence and Service Attributes	Predictor has significant effect p = 0.003; OR = 2.432 [1.356-4.360]	Files: 9/10 References: 20	**Convergence (confirmation):** Tangible service attributes significantly predict satisfaction (OR=2.432). Qualitative narrative support this, showing that clear medication labelling (n=8) and staff professional appearance (n=8) enhance patient confidence and safety perception.

DISCUSSION

Patient satisfaction serves as a key outcome measure for improving oncology pharmacy services. In this study, 57.04% of patients reported high satisfaction. As the pioneer study evaluating oncology pharmacy satisfaction in Indonesia, this baseline reflects favourable service quality. By comparison, previous Indonesian research was limited to chemotherapy settings [13].

Sociodemographic and clinical factors affected the patient satisfaction. Within domain medication information and education quality, employment status and the number of caregivers significantly impacted satisfaction. Specifically, patients with more than three caregivers reported higher satisfaction than those with fewer than three. This finding aligns with Dionne-Odom et al. [14] who demonstrated that the factors support increase patient satisfaction is caregivers which not only assist with daily physical care, but also help guide cancer treatment decision. Similarly, Cerruti et al. [15] reported that collaborative caregiver networks streamline appointment scheduling and medication management, while delegating side-effect monitoring and administrative tasks and insurance communications. In the psychology perspective, having multiple caregivers reduces patient stress, enhances treatment adherence, fosters trust in healthcare providers, and driving higher pharmacy service satisfaction [16].

Studies by Ayele et al. [17] demonstrated that occupation is associated with patient satisfaction level. Varied occupational backgrounds shape distinct expectations, preferences, and health literacy levels, directly influencing how patients evaluate healthcare services. The mechanism may explain lower satisfaction among entrepreneurs, whose demanding schedules often preclude extended clinical consultations. Study by Eklund et al. [18] highlighted that flexible work schedules significantly enhance positive patient perception of healthcare service.

In domain 2 (follow-up service), education level and age significantly impact patient satisfaction. Older patients express greater satisfaction, heavily prioritizing provider credibility, which optimizes clinical communication [19]. Detailed geriatric pharmacist interventions, including medication review and reconciliation, consistently improve medication safety [20]. In contrast, younger patients (<60 years) show lower satisfaction driven by higher expectations. Educational disparities shape health literacy and information processing, necessitating tailored patient education [21]. Patients with lower education levels report satisfaction more quickly, whereas highly educated patients critically evaluate pharmacy care, leading to reduced satisfaction when elevated expectations go unmet [22].

Clinical factors significantly affect patient satisfaction. Cancer diagnosis impacts domain 1 because it affected vital components, such as counselling targets drug administration and side effect management for enhancing treatment adherence [23]. Surprisingly, patients with metastatic disease reported higher satisfaction with oncology pharmacy services, counter to established literature reporting lower satisfaction in this cohort [24,25]. This disparity may stem from higher interaction frequency and duration, offering expanded opportunities for pharmacist counselling. Regular pharmacist-led education and follow-up improve comprehension and adherence to oral anticancer regimens [26].

Treatment duration directly affects overall patient satisfaction. While initial therapy phases present uncertainties regarding regimens, side effects, and procedures, repeated clinical interactions foster familiarity with care pathways and promote care continuity [27]. Prior surgical history correlates with satisfaction concerning drug information, professionalism, and overall care, reflecting greater cumulative healthcare exposure and familiarity with health communication. Key elements of patient-centered oncology care, specifically care coordination, clear communication, and provider responsiveness, are vital to positive patient outcomes [28,29].

Cancer patient satisfaction with care, enhances health-related quality of life (HRQoL) [30]. In this study, the primary predictor of patient satisfaction was the quality of information and medication education. Medication-related information is vital during cancer treatment and directly affects satisfaction [30,31]. Satisfaction with received information also positively correlates with treatment adherence [32]. Furthermore, satisfaction increases when information encompasses general context and therapeutic effects [33]. This is supported by Aspden et al. [34] during the development of the *Medicine Information Needs for Individuals Questionnaire (MINI-Q)*, where 92% of participants desired adverse-effect information. Conversely, inadequate side-effect communication, specifically regarding risk profiles and management, remains a prominent unmet information need in oncology [33]. In the present study, patients reported high satisfaction with information quality and education due to receiving clear dosing schedules and side-effect guidance.

Pharmacist professionalism, encompassing attitude, emotional support, effective communication, attentiveness, and patient trust, significantly influences cancer patient satisfaction. These findings align with Galiano et al. [35] who reported high patient satisfaction with medical staff empathy, communication, and professionalism, resulting in both procedural and emotional fulfilment. Furthermore, daily oncology practice requires bidirectional, empathetic, and non-judgemental communication to build strong therapeutic relationships [36]. Qualitatively, oncology pharmacy services in Bali achieved patient satisfaction primarily through empathy, attentiveness, non-discrimination, and therapeutic communication.

The physical evidence and tangibles domain significantly influences cancer patient satisfaction. Qualitative findings highlight pharmacy environment cleanliness, clear drug labelling, and staff hygiene as key drivers of satisfaction in this domain. Similarly, Nguyen and Nguyen [37] demonstrated that physical factors, including dispensing systems, waiting areas, and payment workflows, affect outpatient satisfaction with healthcare facilities. Furthermore, robust physical infrastructure, technology, and visual design enhance patient trust and satisfaction [38]. Clear medication labelling is particulary critical, showing a statistically significant association with increased satisfaction [38].

The quality of post-pharmacy services domain had no statistically significant impact on patient satisfaction. Qualitative data indicate that patients have not fully received post-discharge therapy monitoring. However, strong demand and high expectations for home-based self-care suggesting that formally establishing permanent home care services in Bali oncology settings would substantially improve patient satisfaction. Supporting this, Castro-Balado et al. [39] and Casscella et al. [40] demonstrated high satisfaction levels with tele pharmacy in cancer medication management. Beyond high satisfaction, key advantages of tele pharmacy for oncology patients include cost reduction and the ability to deliver personalized care models.

With participants recruited from only two hospitals in Bali, this study was limited to a relatively narrow geographical scope representing Bali. Future research should expand this scope to generalise the findings across Indonesia. In addition, this study employed a purely cross-sectional design without interventions. Future studies are also needed to implement these findings, such as adopting tele pharmacy or home-based therapy monitoring—to enhance patient satisfaction.

Declarations

NOTES

Conflict of interest

The authors have no conflict of interest associated with the material presented in this paper.

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Conceptualization: Suardiana IK, Yuliawati AN, Amalia A, Damanik FS. Data curation: Suardiana IK, Yuliawati AN, Amalia A, Damanik FS, Suhendar DA. Formal Analysis: Suardiana IK, Yuliawati AN, Amalia A. Funding acquisition: Suardiana IK, Yuliawati AN, Amalia A, Damanik FS, Sindiawati NK, Dewi NPNL. Methodology: Suardiana IK, Yuliawati AN, Damanik FS. Project Administration: Suardiana IK, Sindiawati NK, Dewi NPNL. Visualization: Suardiana IK, Suhendar DA, Putri NPG. Writing-original draft: Suardiana IK, Yuliawati AN, Amalia A, Damanik FS, Suhendar DA, Putri NPG. Writing-Review: Suardiana IK, Yuliawati AN, Amalia A.

Ethics Approval

This study received ethics approval (reference No. 0105/EA/KEPK.RSBM.DISKES/2025) from Bali Mandara and reference No. 243/EA/KEPK-BUB-2026 from STIKES Bina Usada Bali

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