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Patient Reported Symptoms and Quality of Life during Radiotherapy: Cross-Sectional Analytical Study in a Tertiary Care Setting

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ABSTRACT

Radiotherapy is integral to cancer care, yet its impact on patient-reported symptoms and health-related quality of life (HRQoL) remains understudied. **Objectives:** To assess the severity of patient-reported symptoms and HRQoL during active radiotherapy and examine associations between specific symptoms and QoL domains among adult cancer patients. **Methods:** This cross-sectional analytical study was conducted from July 2024 to June 2025 at Bahawal Victoria Hospital, Bahawalpur. A total of 85 adult patients undergoing external beam radiotherapy (without concurrent chemotherapy) completed validated PRO instruments, the EORTC QLQ-C30 and site-specific modules (e.g., QLQ-H&N35, QLQ-CR29), and the PRO-CTCAE at mid-treatment. Data were analyzed using SPSS Version 23.0; Spearman correlation and multiple linear regression identified symptom QoL relationships. **Results:** Mean global QoL score was 58.4 ± 18.3. Fatigue (64.7 ± 24.1), pain (57.3 ± 26.8), and insomnia (52.9 ± 28.4) were the most severe symptoms. PRO-CTCAE revealed 71.8% reported moderate to severe fatigue. Fatigue ($r = -0.52$), pain ($r = -0.48$), and appetite loss ($r = -0.41$) strongly correlated with lower QoL (all $p<0.001$). Regression confirmed fatigue ($\beta = -0.31$), pain ($\beta = -0.24$), and palliative intent ($\beta = -8.9$) as independent predictors of reduced global QoL (adjusted $R^2 = 0.486$). **Conclusions:** Fatigue, pain, and treatment intent significantly impair QoL during radiotherapy. Routine PRO integration and context-adapted supportive care are urgently needed to preserve patient well-being in resource-limited oncology services.

INTRODUCTION

Cancer is the leading cause of morbidity and mortality globally, with an estimated 20 million new cases in 2022 and a projected 77% increase in global cancer incidence by 2050, particularly higher in developing nations [1]. Radiotherapy (RT) is a cornerstone of cancer treatment, with approximately 50% of all cancer patients needing RT at some point during their care trajectory [2]. Despite its curative and palliative efficacy, RT is often associated with acute and late toxicities that can significantly impair patients' daily functioning and well-being [3]. In parallel with advances in radiation delivery techniques, there has been a paradigm shift toward patient-centered care, emphasizing health-related quality of life (HRQoL) and symptom burden as critical treatment outcomes [4]. Patient-reported outcomes (PROs) are now recognized as essential metrics for evaluating treatment tolerability, guiding supportive care interventions, and informing shared decision making [5]. Regulatory bodies, including the U.S. Food and Drug Administration (FDA) and the European Medicines Agency (EMA), increasingly endorse the integration of PROs into clinical trials and routine oncology practice [6]. However, significant knowledge

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gaps persist, especially in LMICs, where the majority of the cancer patients reside, but access to comprehensive supportive care and routine PRO collection remains limited [7]. Existing literature on RT related symptoms and HRQoL originates from high-income countries and often focuses on specific tumor sites (e.g., prostate, head and neck) or combines RT with systemic therapies, making it difficult to isolate the unique effects of radiotherapy alone [8]. Locally relevant evidence can help in the development of pragmatic, scalable interventions that prioritize patient experience without compromising oncologic outcomes [9-11]. The objective of the study was to assess the severity of patient-reported symptoms and health-related quality of life (HRQoL) among adult patients undergoing active radiotherapy and to examine the associations between specific symptom burdens and key HRQoL domains.

The cross-sectional data capturing real-time symptom experiences during active RT, particularly using standardized, validated PRO instruments like the EORTC QLQ-C30 or PRO-CTCAE, remain limited in diverse, resource-constrained settings. This gap is critical because symptom profiles and QoL impacts may differ substantially based on sociocultural factors, nutritional status, comorbidities, and healthcare infrastructure. Without context-specific evidence, supportive care strategies developed in high-resource environments may not be feasible or effective in LMIC, where patient volumes are high and multidisciplinary teams are often understaffed. Therefore, this study aimed to identify the spectrum and severity of patient-reported symptoms and their association with HRQoL among adults undergoing radiotherapy.

METHODS

This cross-sectional analytical study was conducted at the Department of Oncology, Bahawal Victoria Hospital, Bahawalpur, from July 2024 to June 2025. The study protocol was reviewed and approved by the Institutional Ethics Review Committee of Quaid-e-Azam Medical College (Ref: 2467/DME/QAMC Bahawalpur; dated 30th June 2024). All participants provided written informed consent. Confidentiality was maintained through anonymization, and participants were informed of their right to withdraw from the study at any time without affecting their clinical care. A sample size of 85 adult patients was calculated a priori using standard statistical formulas to provide adequate statistical power (80%) to detect a moderate correlation (r=0.30) between global health status (as measured by the EORTC QLQ-C30) and key symptom domains such as fatigue or pain. These parameters were based on effect sizes reported in similar radiotherapy populations [12, 13], assuming a significance level of $\alpha = 0.05$. Participants were selected using non-probability consecutive sampling. Eligible patients were adults (≥18 years) receiving external beam radiotherapy either with curative or palliative intent who were capable of providing informed consent. Patients were excluded if they had cognitive or psychiatric impairments that would preclude reliable self-reporting, were receiving concurrent chemotherapy (to isolate the effects of radiotherapy alone), or were undergoing re-irradiation. Data were collected using a structured questionnaire comprising two sections. The first section was socio-demographic variables, including age, gender, cancer type, and stage (per AJCC/UICC 8th edition), treatment intent, radiation site, total prescribed dose and fractionation schedule. The second section incorporated validated patient-reported outcome (PRO) instruments: the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC QLQ-C30) to assess global HRQoL and functional/symptom domains; the relevant EORTC site-specific module (e.g., QLQ-H&N35 for head and neck cancers or QLQ-CR29 for colorectal cancers). Eligible patients were approached during their radiotherapy course, typically around the midpoint of treatment, to determine real-time symptom experiences. After obtaining written informed consent, participants completed the PRO instruments either independently or with minimal assistance from the researcher. Statistical analyses were performed using SPSS version 23.0. Descriptive statistics summarized participant characteristics and PRO scores with quantitative variables reported as means ± standard deviations or medians with interquartile ranges depending on distribution normality. EORTC QLQ-C30 and module scores were linearly transformed to a 0–100 scale according to the EORTC scoring manual. Higher scores represent better functioning (for functional/global scales) and worse symptoms (for symptom scales). Associations between symptom severity scores (from PRO-CTCAE and QLQ-C30/QLQ-modules) and HRQoL domains were evaluated using the Spearman rank correlation coefficient due to non-normal distributions of PRO data. Multiple linear regression models were constructed to identify independent predictors of global health status, adjusting for potential confounders such as age, gender, treatment intent, radiation dose, and tumor site. Before regression modeling, assumptions of normality (Shapiro-Wilk test), multicollinearity (Variance Inflation Factor <5), and homoscedasticity were verified. Subgroup analyses were done to explore differences in symptom–QoL relationships by radiation field (e.g., head/neck vs. pelvis), treatment intent (curative vs. palliative), and key demographic factors. Statistical significance was defined as p-value<0.050.

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RESULTS

A total of 85 adult patients receiving external beam radiotherapy completed the full set of patient-reported outcome (PRO) measures at midcourse radiotherapy (median treatment day: 15; interquartile range: 12–18). The majority of participants were male (n=52, 61.2%), with a mean age of 54.3 ± 12.7 years. The most common primary tumor sites were head and neck (38.8%), followed by pelvic malignancies (27.1%) and thoracic cancers (18.8%). Approximately two-thirds (68.2%) received radiotherapy with curative intent, while the remainder underwent palliative treatment (Table 1).

Table 1: Socio-demographic and Clinical Characteristics of Participants (n=85)

Characteristics	n (%) or Mean ± SD
Age (years)	54.3 ± 12.7
Gender	
Male	52 (61.2%)
Female	33 (38.8%)
Cancer Type	
Head and Neck	33 (38.8%)
Pelvic (Cervix, Prostate, Rectum)	23 (27.1%)
Thoracic (Lung, Esophagus)	16 (18.8%)
Breast	8 (9.4%)
Other	5 (5.9%)
Disease Stage (AJCC/UICC 8th)	
Stage I–II	28 (32.9%)
Stage III–IV	57 (67.1%)
Treatment Intent	
Curative	58 (68.2%)
Palliative	27 (31.8%)
Other	
Median Radiation Dose (Gy)	50.4 ± 10.2
Median Fractions	25 (IQR: 20–28)

Mean global health status score of 58.4 ± 18.3 (on a 0–100 scale, where higher scores indicate better QoL). The lowest scores were observed in physical functioning (mean = 62.1 ± 20.5) and role functioning (mean = 59.8 ± 22.6). The most prominent complaints on the QLQ-C30 were fatigue (mean 64.7 ± 24.1), pain (mean 57.3 ± 26.8), and sleep disturbance (mean 52.9 ± 28.4) (Table 2).

Table 2: EORTC QLQ-C30 Global Health Status and Functional/Symptom Domain Scores (n=85)

Domain	Mean Score ± SD
Global Health Status/QoL	58.4 ± 18.3
Functioning Scales	
Physical Functioning	62.1 ± 20.5
Role Functioning	59.8 ± 22.6
Emotional Functioning	67.3 ± 21.1
Cognitive Functioning	71.5 ± 19.8
Social Functioning	64.2 ± 23.0
Symptom Scales	
Fatigue	64.7 ± 24.1
Pain	57.3 ± 26.8
Nausea/Vomiting	32.4 ± 25.6
Dyspnea	38.1 ± 27.3
Insomnia	52.9 ± 28.4
Appetite Loss	49.6 ± 29.1
Constipation	36.2 ± 26.7
Diarrhea	41.3 ± 28.0
Financial Difficulties	50.8 ± 30.5

Scores range from 0–100; higher scores = better functioning (for functional/global scales) or worse symptoms (for symptom scales)

PRO-CTCAE outcomes indicated that nearly three-quarters of participants (71.8%) experienced fatigue at a moderate or severe level, and 63.5% reported pain that negatively affected their ability to perform everyday activities. Distinct symptom patterns emerged by disease site. Individuals with head and neck malignancies (n=33) commonly reported pronounced swallowing impairment (QLQ-H&N35 mean 68.2 ± 23.4) and problematic thick saliva (mean 70.1 ± 25.0). In contrast, patients with pelvic cancers (n=23) most frequently experienced gastrointestinal symptoms, particularly diarrhea, as reflected by elevated scores on the QLQ-CR29 diarrhea scale (mean 61.5 ± 27.2) (Table 3).

Table 3: Frequency and Severity of Key Symptoms Using PRO-CTCAE (n=85)

Symptoms	Any Severity, (%)	Moderate/Severe, (%)	Interference with Daily Life ≥ Moderate, (%)
Fatigue	89.4%	71.8%	68.2%
Pain	82.4%	63.5%	61.2%
Skin reaction	76.5%	45.9%	32.9%
Nausea	48.2%	22.4%	18.8%
Insomnia	74.1%	56.5%	50.6%
Appetite loss	65.9%	49.4%	44.7%

Correlation analyses using Spearman's method demonstrated that higher symptom severity was consistently associated with poorer overall quality of life. Fatigue ($r = -0.52$, $p<0.001$), pain ($r = -0.48$, $p<0.001$), and reduced appetite ($r = -0.41$, $p<0.001$) showed inverse relationships with global health status. Additionally, nausea/vomiting and financial strain were significantly correlated with lower global QoL scores ($r = -0.34$ and $r = -0.36$, respectively; both $p<0.001$) (Table 4).

Table 4: Spearman's Correlation Coefficients between Top 5 Symptoms and Global Health Status (n=85)

Symptom (PRO Source)	Correlation (r)	p-value
Fatigue (QLQ-C30)	-0.52	<0.001
Pain (QLQ-C30)	-0.48	<0.001
Appetite Loss (QLQ-C30)	-0.41	<0.001

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Financial Difficulties (QLQ-C30)	−0.36	0.001
Nausea/Vomiting (QLQ-C30)	−0.34	0.002

In the multiple linear regression model (Table 5), fatigue (β = −0.31, p=0.003), pain (β = −0.24, p=0.012), and treatment intent (palliative vs. curative: β = −8.9, p=0.021) are independent predictors of lower global QoL (adjusted R^2 = 0.486, p<0.001). Age, gender, tumor site, and radiation dose were not statistically significant after adjustment. Subgroup analyses indicated that symptom QoL associations were stronger in the palliative group, where fatigue alone accounted for 39% of the variability in global QoL (r = −0.62, p<0.001). No significant differences were observed by gender.

Table 5: Multiple Linear Regression: Predictors of Global Health Status (EORTC QLQ-C30)

Predictors	Unstandardized β	SE	Standardized β	p-value
Fatigue	−0.24	0.08	−0.31	0.003
Pain	−0.20	0.08	−0.24	0.012
Treatment intent (Palliative)	−8.9	3.7	−0.22	0.021
Radiation Dose (Gy)	−0.05	0.04	−0.06	0.210
Tumor Site	1.2	2.1	0.05	0.564
Age	−0.08	0.09	−0.09	0.364
Sex (Male)	3.2	4.1	0.08	0.438
Model Summary				
– Adjusted R^2	—	—	0.486	<0.001

DISCUSSION

This cross-sectional study highlights a considerable symptom burden and reduced health-related quality of life among patients undergoing active radiotherapy in low-resource settings. Fatigue, pain, and insomnia were the most frequently reported symptoms, and overall QoL scores were markedly lower than population norms and reports from high-income countries [14, 15]. The mean global health score is consistent with findings from other developing countries but remains well below levels typically observed in Western populations. These differences likely reflect a combination of treatment-related toxicity, socio-economic challenges, limited supportive care, and delayed presentation, which are common in Pakistan within the oncology context [16]. The negative associations identified between fatigue, pain, and overall quality of life are consistent with findings from studies conducted in Pakistan; however, the magnitude of these relationships underscores their heightened clinical relevance in environments where symptom management resources are constrained [17]. Fatigue emerged as the predominant and most disabling symptom, a finding that was consistently demonstrated across both EORTC instruments and PRO-CTCAE assessments. Similar observations have been documented in multicenter investigations from India and Bangladesh, in which fatigue was repeatedly reported as the most burdensome symptom during radiotherapy and was often associated with underlying anemia and compromised nutritional status [18]. Furthermore, the financial strain observed in this study reflects socioeconomic challenges faced by cancer patients, where healthcare expenditures are predominantly paid out of pocket, and financial support is limited [19]. This economic burden showed a strong relationship with reduced quality of life, highlighting the importance of integrating financial counseling and supportive care into oncology treatment [20]. Variation in symptom patterns according to disease sites support patient reported outcome. Individuals with head and neck cancers commonly experienced mucosal and salivary complications, in line with established radiobiological effects of treatment, whereas patients with pelvic tumors reported marked gastrointestinal disturbances. These patterns are consistent with findings of a study conducted in a public sector hospital of Pakistan [21]. An important finding was the heightened influence of symptom burden among patients receiving palliative radiotherapy, with fatigue independently accounting for variation in quality-of-life scores. This indicates that patients with palliative care are particularly susceptible to symptom-related deterioration and may benefit from early incorporation of supportive and palliative care services [22, 23]. Given the resource constraints in this region, prioritizing symptom management for palliative patients could yield significant QoL improvements. Strengths of the study include the use of internationally recognized patient-reported outcome measures, including the EORTC QLQ-C30, relevant site-specific and PRO-CTCAE, allowing for comprehensive assessment of symptom burden. Exclusion of patients receiving concurrent chemotherapy enabled clearer evaluation of radiotherapy-related effects, while mid-treatment, real-time data collection reduced recall bias.

Several limitations should be considered. The cross-sectional design does not permit causal relationships. Although the sample size was sufficient to detect moderate correlations, it constrained more detailed subgroup analyses. In addition, a single institution setting may limit external validity. Based on these findings, recommendations are: incorporation of patient-reported outcome screening, particularly for fatigue and pain, into routine radiotherapy practice; and longitudinal studies to assess the effect of PRO-driven care on quality of life and treatment adherence among radiotherapy patients.

CONCLUSIONS

Adult patients undergoing active radiotherapy experience a substantial severity of patient-reported symptoms, particularly fatigue and pain, resulting in compromised health-related quality of life. Significant associations were

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identified between specific symptom burdens and key HRQoL domains, with fatigue, pain, and palliative treatment intent confirmed as independent predictors of reduced global health status. Routine integration of patient-reported outcome measures and supportive care interventions is essential to address these impairments and improve patient well-being during radiotherapy.

Authors' Contribution

Conceptualization: AL, MH
Methodology: AL, MH
Formal analysis: AL, MH, WH
Writing and Drafting: AL, MH, WH
Review and Editing: AL, MH, WH

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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REFERENCES

[1] Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A *et al.* Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA: A Cancer Journal for Clinicians. 2021 May; 71(3): 209-49. doi: 10.3322/caac.21660.

[2] Gospodarowicz M. Global Access to Radiotherapy—Work in Progress. Journal of Global Oncology. 2021 Jan; 7: GO-20. doi: 10.1200/GO.20.00 562.

[3] Abdel-Wahab M, Gondhowiardjo SS, Rosa AA, Lievens Y, El-Haj N, Polo Rubio JA *et al.* Global Radiotherapy: Current Status and Future Directions—White Paper. Journal of Clinical Oncology: Global Oncology. 2021 Jun; 7: 827-42. doi: 10.1200/GO.21.00029.

[4] Denis F, Yossi S, Septans AL, Charron A, Voog E, Dupuis O *et al.* Improving Survival in Patients Treated for A Lung Cancer Using Self-Evaluated Symptoms Reported Through a Web Application. American Journal of Clinical Oncology. 2017 Oct; 40(5): 464-9. doi: 10.1097/COC.0000000000000189.

[5] Cheung YT, Chan A, Charalambous A, Darling HS, Eng L, Grech L *et al.* The Use of Patient-Reported Outcomes in Routine Cancer Care: Preliminary Insights from a Multinational Scoping Survey of Oncology Practitioners. Supportive Care in Cancer. 2022 Feb; 30(2): 1427-39. doi: 10.1007/s00520-021-06545-7.

[6] Gnanasakthy A, Mordin M, Evans E, Doward L, DeMuro C. A Review of Patient-Reported Outcome Labeling in the United States (2011–2015). Value in Health. 2017 Mar; 20(3): 420-9. doi: 10.1016/j.jval.2016.10.006.

[7] Ige T, Lewis P, Shelley C, Pistenmaa D, Coleman CN, Aggarwal A *et al.* Understanding the Challenges of Delivering Radiotherapy in Low-and Middle-Income Countries in Africa. Journal of Cancer Policy. 2023 Mar; 35: 100372. doi: 10.1016/j.jcpo.2022.100372.

[8] Van den Bosch L, Van der Laan HP, van der Schaaf A, Oosting SF, Halmos GB, Witjes MJ *et al.* Patient-reported Toxicity and Quality-of-Life Profiles in Patients with Head and Neck Cancer Treated with Definitive Radiation Therapy or Chemoradiation. International Journal of Radiation Oncology* Biology* Physics. 2021 Oct; 111(2): 456-67. doi: 10.1016/j.ijrobp.2021.05.114.

[9] Basch E, Barbera L, Kerrigan CL, Velikova G. Implementation of Patient-Reported Outcomes in Routine Medical Care. American Society of Clinical Oncology Educational Book. 2018 May: 38: 122-134. doi: 10.1200/EDBK_200383.

[10] Van Zyl C, Mokkink LB, Derman W, Hanekom S, Heine M. Patient-Reported Outcome Measures in Key Sub-Saharan African Languages to Promote Diversity: A Scoping Review. Value in Health Regional Issues. 2023 Mar; 34: 86-99. doi: 10.1016/j.vhri.2022.11.001.

[11] Bamodu OA and Chung CC. Cancer Care Disparities: Overcoming Barriers to Cancer Control in Low-and Middle-Income Countries. Journal of Clinical Oncology: Global Oncology. 2024 Aug; 10: e2300439. doi: 10.1200/GO.23.00439.

[12] Davda J, Kibet H, Achieng E, Atundo L, Komen T. Assessing the Acceptability, Reliability, and Validity of the EORTC Quality of Life Questionnaire (QLQ-C30) in Kenyan Cancer Patients: A Cross-Sectional Study. Journal of Patient-Reported Outcomes. 2021 Jan; 5(1): 4. doi: 10.1186/s41687-020-00275-w.

[13] Dueck AC, Scher HI, Bennett AV, Mazza GL, Thanarajasingam G, Schwab G *et al.* Assessment of Adverse Events from the Patient Perspective in a Phase 3 Metastatic Castration-Resistant Prostate Cancer Clinical Trial. Journal of the American Medical Association Oncology. 2020 Feb; 6(2): e193332. doi: 10.1001/jamaoncol.2019.3332.

[14] Ngo NT, Nguyen HT, Nguyen PT, Vo TT, Phung TL, Pham AG *et al.* Health-Related Quality of Life in Breast Cancer Patients in Low- and Middle-Income Countries in Asia: A Systematic Review. Frontiers in Global Women's Health. 2023 Jun; 4: 1180383. doi: 10.3389/fgwh.2023.1180383.

[15] Bottomley A, Reijneveld JC, Koller M, Flechtner H, Tomaszewski KA, Greimel E *et al.* Current State of Quality of Life and Patient-Reported Outcomes

DOI: https://doi.org/10.54393/pjhs.v7i7.3885

Research. European Journal of Cancer. 2019 Nov; 121: 55-63. doi: 10.1016/j.ejca.2019.08.016.

[16] Afaya A, Ramazanu S, Bolarinwa OA, Yakong VN, Afaya RA, Aboagye RG *et al.* Health System Barriers Influencing Timely Breast Cancer Diagnosis and Treatment among Women in Low and Middle-Income Asian Countries: Evidence from a Mixed-Methods Systematic Review. BioMed Central Health Services Research. 2022 Dec; 22(1): 1601. doi: 10.1186/s12913-022-08927-x.

[17] Ayub F, Khan TM, Baig MR, Amin MU, Tahir H. Quality of Life and Wellbeing among Breast Cancer Patients in Lahore, Pakistan. Frontiers in Oncology. 2023 Jun; 13: 1105411. doi: 10.3389/fonc.2023.1105411.

[18] Silveira AP, Gonçalves J, Sequeira T, Ribeiro C, Lopes C, Monteiro E *et al.* Patient-Reported Outcomes in Head and Neck Cancer: Selecting Instruments for Quality-of-Life Integration in Clinical Protocols. Head and Neck Oncology. 2010 Oct; 2(1): 32. doi: 10.1186/1758-3284-2-32.

[19] Ahmad W, Iqbal SM, Jamil Q. Exploring Financial Toxicity and Its Impact on Health-Related Quality of Life of Cancer Patients. Supportive Care in Cancer. 2025 Apr; 33(4): 294. doi: 10.1007/s00520-025-09357-1.

[20] Udayakumar S, Solomon E, Isaranuwatchai W, Rodin DL, Ko YJ, Chan KK *et al.* Cancer Treatment-Related Financial Toxicity Experienced by Patients in Low- and Middle-Income Countries: A Scoping Review. Supportive Care in Cancer. 2022 Aug; 30(8): 6463-71. doi: 10.1007/s00520-022-06952-4.

[21] Hafiz A, Abbasi AN, Ali N, Khan KA, Qureshi BM. Frequency and Severity of Acute Toxicity of Pelvic Radiotherapy for Gynecological Cancer. Journal of the College of Physicians and Surgeons Pakistan. 2015; 25(11): 802.

[22] Gautam A, Gautam A, Johnson S, Rahman FA. Palliative Care and Pain Management in a Resource-Limited Setting. Kathmandu University Medical Journal. 2025 Jan; 22(88): 113-8.

[23] Malik M, Rizwan I, Hussain A. Health-Related Quality of Life Among Blood Cancer Patients in Pakistan: A Cross-Sectional Survey. INQUIRY: The Journal of Health Care Organization, Provision, and Financing. 2021 Jun; 58: 00469580211025211. doi: 10.1177/00469580211025211.