Volume 4, Issue 6, 2026

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

UNVEILING THE IMPACT OF DIAGNOSTIC DELAYS IN SOLID ORGAN MALIGNANCIES: A 200-PATIENT RETROSPECTIVE STUDY

Dr. Muhammad Tariq[1], Dr. Rahimullah Khattak[*2], Dr. Qazi Muhammad Farooq[3], Dr. Bushra Malik[4], Dr. Muhammad Wasim Sattar[5], Dr. Maryam Bibi[6]

[1]*Assistant Professor, MBBS, FCPS, Department of Medical Oncology, Khyber Teaching Hospital, Peshawar, Pakistan*

[*2]*Assistant Professor, MBBS, FCPS, SCE, Department of Oncology, Hayatabad Medical Complex/Khyber Girls Medical College (KGMC), Peshawar, Pakistan*

[3]*Resident, Internal Medicine, MBBS, Department of Internal Medicine, Mercy Fitzgerald Hospital, Pennsylvania, USA*

[4]*Postgraduate Resident, MBBS, Department of Medical Oncology, Khyber Teaching Hospital, Peshawar, Pakistan*

[5]*Assistant Professor, Medical Oncology, FCPS (Medical Oncology), Department of Medical Oncology, Multan Medical and Dental College & Ibn-e-Siena Hospital, Multan, Pakistan*

[6]*Postgraduate Resident, MBBS, Department of Medical Oncology, Khyber Teaching Hospital, Peshawar, Pakistan*

[1]tariq16864@gmail.com, [*2]rahim_kohatian@live.com, [3]qazimuhammadfarooq.wahab@mercyhealth.org, [4]bushramalik988@gamil.com, [5]wsattar66@gmail.com, 6mbibikhan874@gmail.com

DOI: https://doi.org/10.5281/zenodo.21215165

Keywords

Diagnostic delay, solid organ malignancies, late presentation, cancer staging, tuberculosis misdiagnosis

Article History

Received: 24 April 2026
Accepted: 06 June 2026
Published: 21 June 2026

Corresponding Author: *
Dr. Rahimullah Khattak

Abstract

Background: *Diagnostic delay in cancer remains a major challenge, particularly in low-resource settings, leading to advanced-stage presentation and poor outcomes. This study aimed to evaluate the duration and patterns of diagnostic delays in solid organ malignancies and their impact on stage at diagnosis.*

Materials and Methods: *This retrospective study was conducted at Khyber Teaching Hospital, Peshawar, from March 2022 to August 2024. A total of 200 patients with solid organ malignancies were included. Data regarding time from symptom onset to diagnosis, stage at presentation, and treatment initiation were collected. Descriptive statistics were used to summarize data, while inferential analysis assessed associations between diagnostic delay and stage at diagnosis, with $p<0.05$ considered significant.*

Results: *The median age was 45 years, with 66.5% females. Mean time to diagnosis was longest in lung cancer (156 days), followed by upper GI (123 days), hepatocellular carcinoma (98 days), colorectal (93 days), and breast cancer (72 days). Advanced-stage disease was common, with 100% of lung cancer and 65% of breast cancer presenting at Stage IV. Misdiagnosis as tuberculosis occurred in 85% of lung cancer cases. Mean time to treatment initiation was 7 days.*

Conclusion: *Significant diagnostic delays contribute to late-stage cancer presentation. Improved awareness, early referral, and diagnostic access are essential to enhance outcomes.*

INTRODUCTION

Cancer is a significant universal health challenge and one of the top causes of mortality around the globe, and in low and middle-income nations, the burden is rising rapidly [1]. A high percentage of cancer death is not only due to the aggressiveness of the disease but also due to the

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

delay in the diagnosis and treatment of the disease. Early diagnosis is important in enhancing survival, decreasing the complexity of treatment, and improving the quality of life. Nevertheless, in most health care facilities, patients usually present in their late stages, and this constrains the success of the therapeutic interventions [2].

Diagnostic delay is a complex problem that can be generalized into patient-related and healthcare system-related delay [3]. Patient delay is a period between the development of the symptoms and the initial medical consultation, and it is usually determined by the factors like the absence of awareness, cultural beliefs, the fear of diagnosis, and financial limitations. Delay in healthcare system on the other hand involves the time interval between the initial consultation and the ultimate diagnosis that may be extended by misdiagnosis, poor referral systems and the unavailability of diagnostic facilities [4].

Malignancies of solid organs such as breast, lung, gastrointestinal and hepatocellular cancers are often associated with non-specific or unspecific symptoms, which complicates their early diagnosis [5]. Although breast cancer is relatively easy to detect at the early stages, it is normally manifested late in resource-limited settings, owing to social stigma and inadequate screening protocols. GI malignancies such as colorectal and upper GI cancers are either asymptomatic or have insidious symptoms until late stages. On the same note, hepatocellular carcinoma is frequently diagnosed at an advanced stage because the disease lacks an efficient surveillance system among the at-risk groups [6].

Lung cancer is a distinct diagnostic problem especially in the areas where other infectious diseases like tuberculosis are very common [7]. Clinical and radiological overlaps often lead to misdiagnosis and incorrect initiation of anti-tubercular therapy, which is a severe delay in the correct diagnosis. Not only such delays permit the development of the disease, but also decrease the chances of the treatment and deteriorate the general prognosis.

The consequences of the late diagnosis will be manifested in the large percentage of patients with an advanced disease stage [2]. Some of the effects of advanced-stage cancers are a reduced treatment, more reliance on palliative care, higher healthcare expenses, and low survival rates. Moreover, delays are the causes of psychological distress in patients and families, which increases the overall burden of disease. It is therefore important to determine the length and predictors of these delays in order to enhance the delivery of cancer care.

Besides clinical considerations, systemic problems such as poor healthcare facilities, poor access to specialized oncology services, and poor referral channels also contribute to the diagnostic delays [4]. In most tertiary care hospitals, patients frequently present themselves after being consulted in the peripheral hospitals, which underscore the deficiencies in early detection and prompt referral mechanisms. It is important to address these systemic barriers to minimize diagnostic intervals and enhance patient outcomes.

This means that amidst these difficulties, there is the need to analyze diagnostic timelines in various kinds of solid organ malignancies in a systematic way and how they are associated with stage of disease presentation. This evidence can be used to make specific interventions, such as awareness campaigns, efficient referral channels, and better access to diagnoses.

Objective:

To evaluate the duration and patterns of diagnostic delays in patients with solid organ malignancies and to assess their impact on stage at diagnosis.

METHODOLOGY

Study Design and Setting: This retrospective study was conducted at Khyber Teaching Hospital, a tertiary care center, to evaluate diagnostic delays in patients with solid organ malignancies.

Study Duration and Population: The study was carried out over a period of 2.5 years from March 2022 to August 2024. A total of 200 patients diagnosed with solid organ malignancies were included. Patients with a prior history of cancer and those with hematological malignancies were excluded.

Data Collection and Variables: Data were collected retrospectively from hospital medical records using a structured proforma. Variables included demographic characteristics (age and

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

gender), type of malignancy, time from symptom onset to first consultation, time from first consultation to histopathological diagnosis, overall time to diagnosis, stage at diagnosis, and treatment initiation interval. Cancer types analyzed included breast, hepatocellular carcinoma, colorectal, upper gastrointestinal, and lung cancers.

Outcome Measures: The primary outcome was the duration of diagnostic delay, defined as the time from symptom onset to histopathological confirmation. Secondary outcomes included stage at diagnosis and time from diagnosis to initiation of treatment.

Data Analysis: Data were entered and analyzed using SPSS version 25. Descriptive statistics were applied, with quantitative variables such as age and time intervals expressed as mean ± standard deviation or median where appropriate, while categorical variables such as gender, cancer type, and stage at diagnosis were presented as frequencies and percentages. Inferential statistics were applied to assess associations between diagnostic delays and stage at presentation across different cancer types. The chi-square test was used for comparison of categorical variables, while independent sample t-test or ANOVA was applied for continuous variables as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 200 patients with solid organ malignancies were analyzed. The median age of the cohort was 45 years, with a predominance of females (66.5%). Breast cancer constituted the largest proportion of cases, followed by lung cancer, while hepatocellular carcinoma, colorectal, and upper gastrointestinal cancers were equally represented. Detailed demographic and disease distribution is shown in **Table 1**.

The overall diagnostic interval varied considerably across malignancies. Lung cancer demonstrated the longest delay (mean 156 days), followed by upper gastrointestinal cancers (123 days), hepatocellular carcinoma (98 days), colorectal cancer (93 days), and breast cancer (72 days). Patient delay (symptom onset to first consultation) contributed significantly to the total delay, particularly in breast cancer. These findings are summarized in **Table 2**.

Advanced-stage presentation was observed in a substantial proportion of patients. All lung cancer patients presented at Stage IV, while 65% of breast cancer and 55% of colorectal cancer patients were diagnosed at Stage IV. In upper GI malignancies, only 35% were eligible for curative treatment. Hepatocellular carcinoma patients predominantly received supportive care (75%), reflecting late-stage disease. These outcome measures are detailed in **Table 3**.

A notable finding was the high rate of misdiagnosis in lung cancer patients, where 85% were initially treated as tuberculosis, significantly contributing to diagnostic delay. Despite delays in diagnosis, once confirmed, treatment initiation was relatively prompt, with a mean interval of 7 days.

The variation in diagnostic delay across cancer types is further illustrated in **Figure 1**, highlighting the disproportionately prolonged delay in lung and upper gastrointestinal malignancies compared to others.

Table 1: Demographic and Cancer Type Distribution (n=200)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	67	33.5
Female	133	66.5
Cancer Type		
Breast Cancer	100	50
Lung Cancer	40	20
Hepatocellular Carcinoma	20	10
Colorectal Cancer	20	10
Upper GI Cancer	20	10

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Table 2: Diagnostic Time Intervals Across Cancer Types

Cancer Type	Mean Time to Diagnosis (Days)	Range	Mean Time to First Consultation (Days)
Breast Cancer	72	24 days – 4 years	45
Hepatocellular Carcinoma	98	–	–
Colorectal Cancer	93	17 days – 2 years	–
Upper GI Cancer	123	33 – 177 days	–
Lung Cancer	156	43 days – 8 months	–

Table 3: Stage at Diagnosis and Treatment Outcomes

Cancer Type	Stage IV (%)	Special Findings	Treatment Pattern
Breast Cancer	65%	–	Mixed
Hepatocellular Carcinoma	–	–	25% systemic, 75% supportive
Colorectal Cancer	55%	–	Mixed
Upper GI Cancer	–	35% curative candidates	Limited curative
Lung Cancer	100%	85% misdiagnosed as TB	Palliative

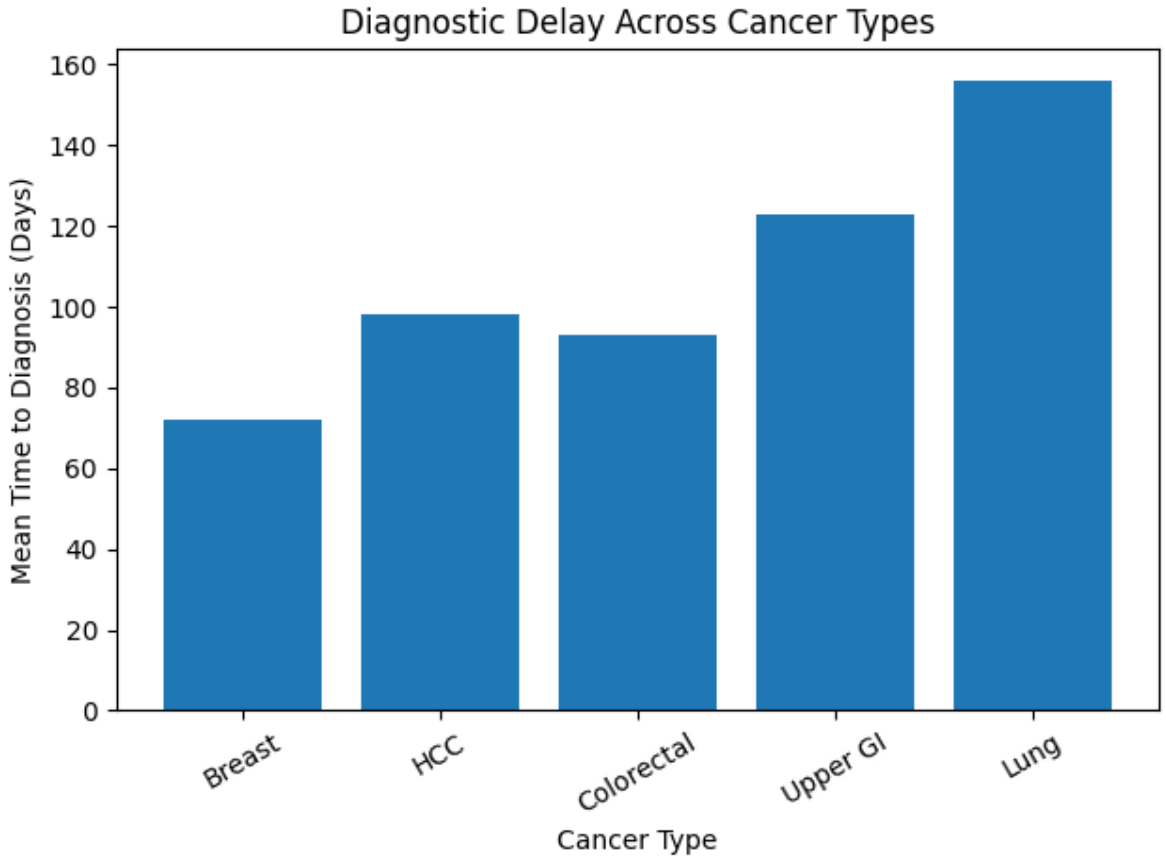

Figure 1: Diagnostic Delay Across Cancer Types

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

DISCUSSION

This study has identified that there is a high burden of diagnostic delay among patients with solid organ malignancies with a large number of them presenting at an advanced stage. The results indicate that the average time to diagnosis was more than two months with majority of the cancers and was more protracted in lung and upper gastrointestinal cancer. These delays were closely linked to late presentation, which restricted curative treatment choices and had a negative impact on prognosis. The same trends have been reported in the literature as long diagnostic times were associated with progressed disease and worse prognosis [9].

Although breast cancer was the most frequent malignancy in this group, its diagnostic times were relatively shorter than other malignancies; nevertheless, worryingly, 65% of the patients were at Stage IV. This implies that delays involving patients such as delayed health-seeking behavior and ignorance are key factors. Similar reports have also indicated high incidences of advanced stage breast cancer in resource-limited environments, which suggests the necessity of enhanced screening and education on awareness to the population [10,11].

Lung cancer had the longest diagnostic delay of 156 days with the mean and all patients were at Stage IV. Another interesting observation was that the misdiagnosis rate was high (85 percent). This is indicative of a long known problem in areas with high infectious disease burden where there is overlap in clinical and radiological appearance that results in improper treatment and late detection of cancer. Past researchers have had similar findings and misdiagnosis played a major role in the long-term diagnostic processes and poor clinical prognoses [12,13].

There were also significant delays with upper gastrointestinal and colorectal cancer which experienced mean diagnostic times of over three months. These tumors have common vague or non specific symptoms that can be ignored or even explained away by benign disease and hence late referral and investigation is made. The low percentage of patients who are eligible to curative treatment of upper GI (35) further emphasizes the effects of late diagnosis. It has been repeatedly shown in the past that late diagnosis of gastrointestinal cancers is linked to lower resectability and survival [14,15].

In this study, hepatocellular carcinoma patients were mainly subjected to supportive care and few of them were subjected to systemic treatment. This is an indication of late presentation and may be failure to monitor high-risk groups. Other research has also reported similar trends in which insufficient screening of people at risk led to late diagnosis and reduced treatment options [16]. It has been demonstrated that early detection with surveillance programs can make a difference and this presents a critical area of intervention.

Although there were extensive delays during diagnosis, the time interval between diagnosis and the start of treatment was also quite short, with an average of 7 days. It implies that after patients were put into the specialized care pathway, their management was very rapid and effective. Other studies have also recorded similar results and this implies that the first void is in identification and prompt referral as opposed to actual treatment being administered [17]. Thus, the intervention should be aimed mainly at decreasing pre-diagnostic delays.

Overall, the findings of this study align with existing literature, emphasizing that diagnostic delays are multifactorial and vary across cancer types. Addressing these delays requires a comprehensive approach, including public awareness campaigns, improved primary care training, streamlined referral systems, and enhanced access to diagnostic facilities. Early recognition of warning signs and reducing misdiagnosis, particularly in lung cancer, are critical steps toward improving cancer outcomes [18–20].

Limitations:

This study has several limitations. Being a retrospective study, it was dependent on the accuracy and completeness of medical records, which may introduce information bias. The study was conducted at a single tertiary care center, limiting the generalizability of findings. Additionally, certain variables such as socioeconomic status, educational background, and healthcare access were not fully explored, which may influence diagnostic delays. The relatively small sample size for some cancer subgroups may also affect the strength of comparative analysis.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

CONCLUSION

This study demonstrates that significant diagnostic delays exist across solid organ malignancies, with the longest delays observed in lung and upper gastrointestinal cancers, leading to a high proportion of advanced-stage presentations. Patient-related factors, misdiagnosis—particularly as tuberculosis in lung cancer—and systemic healthcare gaps contribute substantially to these delays. Although treatment initiation after diagnosis was timely, the late presentation limited curative options for many patients. These findings underscore the urgent need for improved awareness, early referral systems, and accessible diagnostic services to facilitate timely cancer detection and improve overall patient outcomes.

REFERENCES

Zouzoulas D, Karalis T, Sofianou I, Anthoulakis C, Tzika K, Zafrakas M, Timotheadou E, Grimbizis G, Tsolakidis D. The impact of treatment delay on endometrial and ovarian cancer patients: a systematic review. Cancers. 2025 Jun 21;17(13):2076.

Fernández JÁ, Gómez B, Díaz-Gómez D, López I, Lozano P, Muñoz P, Muñoz-Casares FC, Olivares-Ripoll V, Vasques H, Asencio-Pascual JM. Diagnostic Delay in Soft Tissue Sarcomas: A Review. Cancers. 2025 May 31;17(11):1861.

Hong K, Liu Y, Yin H, Huang K, Pu XL, Zhu ZX. Identifying factors contributing to delayed diagnosis of ovarian cancer: A comprehensive analysis. International journal of women's health. 2024 Dec 31:1463-73.

Malovrh MM, Adamic K. Unravelling the lung cancer diagnostic pathway: identifying gaps and opportunities for improvement. Radiology and oncology. 2024 Apr 14;58(2):268.

Rao A, Rich NE, Marrero JA, Yopp AC, Singal AG. Diagnostic and therapeutic delays in patients with hepatocellular carcinoma. Journal of the National Comprehensive Cancer Network. 2021 May 28;19(9):1063-71.

Telbany A, Farfour H, Gomez K, Soliman Y, Kachaamy TA. Candida Esophagitis in Patients with Solid Organ Cancers. Journal of Clinical Medicine. 2026 Feb 13;15(4):1474.

Mohammed AH, Blebil A, Dujaili J, Rasool-Hassan BA. The risk and impact of COVID-19 pandemic on immunosuppressed patients: cancer, HIV, and solid organ transplant recipients. AIDS reviews. 2020 Jul 1;22(3):151-7.

Najafi M, Majidpoor J, Toolee H, Mortezaee K. The current knowledge concerning solid cancer and therapy. Journal of biochemical and molecular toxicology. 2021 Nov;35(11):e22900.

Friman TK, Jäämaa-Holmberg S, Åberg F, Helanterä I, Halme M, Pentikäinen MO, Nordin A, Lemström KB, Jahnukainen T, Räty R, Salmela B. Cancer risk and mortality after solid organ transplantation: a population-based 30-year cohort study in Finland. International journal of cancer. 2022 Jun 1;150(11):1779-91.

Tangri N, Peach EJ, Franzén S, Barone S, Kushner PR. Patient management and clinical outcomes associated with a recorded diagnosis of stage 3 chronic kidney disease: the REVEAL-CKD study. Advances in Therapy. 2023 Jun;40(6):2869-85.

Gupta A, Peyrin-Biroulet L, Ananthakrishnan AN. Risk of cancer recurrence in patients with immune-mediated diseases with use of immunosuppressive therapies: an updated systematic review and meta-analysis. Clinical Gastroenterology and Hepatology. 2024 Mar 1;22(3):499-512.

El Jammal T, Pavic M, Gerfaud-Valentin M, Jamilloux Y, Sève P. Sarcoidosis and cancer: a complex relationship. Frontiers in medicine. 2020 Nov 24;7:594118.

Zafar S, Hafeez A, Shah H, Mutiullah I, Ali A, Khan K, Figueroa-González G, Reyes-Hernández OD, Quintas-Granados LI, Peña-Corona SI, Kiyekbayeva LN. Emerging biomarkers for early cancer detection and diagnosis: Challenges, innovations, and clinical perspectives. European Journal of Medical Research. 2025 Aug 18;30(1):760.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Kotsifaki A, Alevizopoulos N, Dimopoulou V, Armakolas A. Unveiling the immune microenvironment's role in breast cancer: a glimpse into promising frontiers. International journal of molecular sciences. 2023 Oct 18;24(20):15332.

Guberina N, Gäckler A, Grueneisen J, Wetter A, Witzke O, Herrmann K, Rischpler C, Fendler W, Umutlu L, Sawicki LM, Forsting M. Assessment of suspected malignancy or infection in immunocompromised patients after solid organ transplantation by [18F] FDG PET/CT and [18F] FDG PET/MRI. Nuclear Medicine and Molecular Imaging. 2020 Aug;54(4):183-91.

Lee K, Gani F, Canner JK, Johnston FM. Racial disparities in utilization of palliative care among patients admitted with advanced solid organ malignancies. American Journal of Hospice and Palliative Medicine®. 2021 Jun;38(6):539-46.

Ghufran MS, Soni P, Duddukuri GR. The global concern for cancer emergence and its prevention: a systematic unveiling of the present scenario. InBioprospecting of tropical medicinal plants 2023 Aug 31 (pp. 1429-1455). Cham: Springer Nature Switzerland.

Nguyen TV, Damiani G, Orenstein LA, Hamzavi I, Jemec GB. Hidradenitis suppurativa: an update on epidemiology, phenotypes, diagnosis, pathogenesis, comorbidities and quality of life. Journal of the European Academy of Dermatology and Venereology. 2021 Jan;35(1):50-61.

Kajiwara Saito M, Morishima T, Ma C, Koyama S, Miyashiro I. Diagnosis and treatment of digestive cancers during COVID-19 in Japan: A Cancer Registry-based Study on the Impact of COVID-19 on Cancer Care in Osaka (CanReCO). PLoS One. 2022 Sep 20;17(9):e0274918.

Zulpaite R, Miknevicius P, Leber B, Strupas K, Stiegler P, Schemmer P. Tryptophan metabolism via kynurenine pathway: role in solid organ transplantation. International Journal of Molecular Sciences. 2021 Feb 15;22(4):1921.