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(RESEARCH ARTICLE)

ANALYSIS OF RADIOTHERAPY WAITING TIME FOR NASOPHARYNGEAL CANCER AT DR. SOETOMO HOSPITAL FROM 2022 – 2023

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ABSTRACT

This study aims to analyze the radiotherapy waiting time for nasopharyngeal cancer (NPC) patients at Dr. Soetomo Hospital from 2022 to 2023, and to identify both external and internal factors contributing to prolonged delays in treatment initiation. A quantitative, descriptive-analytical design was employed, utilizing a retrospective review of medical records from 76 NPC patients treated at Dr. Soetomo Hospital within the specified period. Patients were selected through purposive sampling based on a confirmed diagnosis of NPC and initiation of therapy between 2022 and 2023. Data were collected across multiple stages of the treatment process, including the intervals from diagnosis to chemotherapy, CT scan, simulator, initial radiation planning, and commencement of final radiotherapy. These data were analyzed using descriptive statistical methods. The findings revealed substantial delays in initiating radiotherapy. A significant majority of patients (84.2%) experienced a total radiotherapy waiting time exceeding six months, with an average wait time of 289 days (approximately 10 months). The longest documented waiting period was 485 days (approximately 16 months). The most prolonged delay occurred during the interval from diagnosis to chemotherapy, averaging 211 days, with 76.3% of patients waiting more than six months at this stage alone. Further analysis identified several contributing factors. External factors included limited radiotherapy facility capacity and extended queues for CT simulation. Internal factors comprised a shortage of specialized healthcare personnel and patient-related challenges, such as fear of procedures, economic limitations, and adverse effects following chemotherapy. Together, these factors significantly impacted the timely initiation of radiotherapy among NPC patients.

Keywords: Nasopharyngeal Carcinoma; Radiotherapy; Waiting Time; Dr. Soetomo Hospital

1 INTRODUCTION

Nasopharyngeal carcinoma (NPC) is a prevalent and endemic cancer in Indonesia, consistently presenting with high incidence rates across the archipelago (1). Despite its significant burden, there is a pervasive lack of public and even some healthcare professionals' awareness regarding NPC. This often stems from a disproportionate focus on other

cancer types, such as breast or cervical cancer, which receive more prominent national health campaigns and public attention (2). This imbalance in awareness critically contributes to delayed diagnosis and treatment initiation for NPC patients, directly impacting their prognosis and quality of life. Therefore, a focused investigation into crucial aspects, such as radiotherapy waiting times, is imperative to identify bottlenecks and ultimately improve patient outcomes in this high-burden disease setting. Nasopharyngeal cancer is a malignant disease within the head and neck region. It ranks as Indonesia's 4th most common malignancy, particularly prevalent in Java and Sumatra. Radiotherapy is the primary treatment for nasopharyngeal cancer. Given the high prevalence of this disease in Indonesia, hospital queues can become extensive, leading to prolonged waiting times for this therapy (3).

Currently, the waiting time for radiotherapy can range from 4-6 months, and in some cases, up to a year, according to various articles. As of 2013, there were only 29 radiotherapy facilities in Indonesia, and their development has not shown significant progress (Departemen Farmakologi dan Farmasi Klinik, Fakultas Farmasi, Universitas Padjadjaran, Sumedang, Indonesia et al., 2017). Therefore, it is essential to analyze further the reasons behind the long waiting times for radiotherapy. Nasopharyngeal cancer is recognized as a common health issue globally, especially in Indonesia, and its progression can be rapid, necessitating swift treatment to prevent fatalities (4). This urgency underscores the need for timely intervention.

According to existing literature, the waiting time for nasopharyngeal cancer therapy in hospitals is influenced by factors such as high patient volume, limited human resources and medical equipment, and the complexity of diagnostic processes (5). Research by Hermiati also indicates that the lack of administrative staff and a shortage of radiographers and other human resources contribute to extended waiting times (6). However, a thorough investigation reveals insufficient research detailing the specific factors leading to prolonged waiting times for radiotherapy. The reasons identified in existing studies are varied, highlighting the need for a more in-depth analysis to identify the precise factors causing these delays.

By understanding these factors, healthcare providers can implement strategies to reduce waiting times and improve the overall treatment experience for nasopharyngeal cancer patients in Indonesia.

2 MATERIAL AND METHODS

2.1 Research Method

This study will utilize a quantitative research design with a descriptive-analytical approach to analyze the waiting times for nasopharyngeal cancer therapy at Dr. Soetomo Hospital from 2022 to 2023. This research design was chosen to identify, describe, and analyze the duration patients wait to receive therapy after diagnosis, as well as the factors influencing these delays. Quantitative data will enable the researcher to measure and compare waiting times objectively and provide a clear picture of the effectiveness of time management in healthcare services.

Data collection will be performed through a retrospective method by reviewing the medical records of nasopharyngeal cancer patients treated at Dr. Soetomo Hospital during the study period. The data to be collected will include the date of diagnosis and the start date of therapy (e.g., radiotherapy). Data analysis will employ descriptive statistics to illustrate the distribution of waiting times and inferential statistics to identify relationships between factors and waiting times.

2.2 Population and Sample

2.2.1 Population

The population in this study includes all patients diagnosed with nasopharyngeal carcinoma at Dr. Soetomo Hospital Surabaya during 2022 to 2023. According to Creswell, a research population is a group of individuals who share similar characteristics and are the focus of the study (7). This population constitutes the entire set of individuals who have one or more common traits defined by the researcher as relevant subjects for the study. In the context of this research, the population is patients diagnosed with nasopharyngeal carcinoma at Dr. Soetomo Hospital Surabaya during the specified time period. They share the common characteristic of having nasopharyngeal carcinoma and receiving treatment at the same hospital.

2.2.2 Sample

The study uses purposive sampling to examine therapy wait times for nasopharyngeal cancer patients at Dr. Soetomo Hospital between 2022 and 2023. Inclusion criteria specify patients with a confirmed diagnosis of nasopharyngeal cancer, undergoing therapy such as radiotherapy or chemotherapy during the study period. Exclusion criteria involve patients with incomplete data, such as undetermined diagnoses or missing therapy information. By selecting participants based on these specific criteria, the study ensures the sample accurately represents the target population,

enhancing the validity of the results and providing insights into improving wait time management and healthcare efficiency for these patients.

2.3 Data Processing

2.3.1 Data Collection

Data collection is the first step in researching waiting times for nasopharyngeal cancer therapy at Dr. Soetomo Hospital. It involves identifying data sources such as patient medical records, hospital information systems, and scheduling data for radiotherapy. Data can be collected manually through forms or automatically through electronic system extraction. The collected data includes patient demographics (age, gender), diagnosis date, therapy initiation date, type of therapy, and other relevant variables, all of which are essential for analysing therapy wait times.

2.3.2 Data Validation

Data validation is the process of ensuring the accuracy, completeness, and consistency of collected data, which is essential for reliable analysis. It involves checking the completeness of the data to ensure no omissions, verifying consistency with established standards and formats (such as uniform date formats and reasonable value ranges), and cross-referencing the data with valid sources, like medical records, to confirm its accuracy.

2.3.3 Data Analysis

Data analysis involves interpreting the collected data to answer the research question on waiting times for nasopharyngeal cancer radiotherapy. The process begins with describing the data, followed by identifying patterns or trends, such as changes in waiting times from 2022 to 2023. Statistical tests are then conducted to test research hypotheses. Data visualisations, such as line graphs, histograms, and box charts, are created to aid in interpreting the findings and identifying patterns or anomalies. Finally, the results are interpreted to draw conclusions and make recommendations for improving therapy service efficiency.

2.3.4 Ethical Clearance

This research adheres to ethical guidelines for studies involving human participants. Anonymity is ensured by using coded identifiers rather than patient identities from medical records. Confidentiality is maintained, with survey data used exclusively for research purposes and only with permission from the Research Ethics Committee of the Faculty of Medicine, Universitas Airlangga. Ethical clearance, which confirms that the research has met all ethical standards and is deemed feasible, is obtained prior to conducting the study. This is required for any research involving human subjects, including non-biomedical studies, social research, and those involving medical records or biological samples.

3 RESULTS AND DISCUSSION

3.1 Data Collection on Nasopharyngeal Cancer Patients Undergoing Radiotherapy

The data collection on nasopharyngeal cancer patients undergoing radiotherapy at RSUD Dr Soetomo reveals various patient characteristics essential for understanding broader epidemiological and clinical trends associated with this disease. Based on the analysis, the majority of patients (59%) were within the 41–60 age group, indicating that this demographic is most affected by nasopharyngeal cancer (NPC). This pattern aligns with epidemiological findings which state that NPC generally affects middle-aged adults (8). It also concurs with studies showing that NPC is more common in middle-aged populations, particularly in high-risk regions such as Southeast Asia (9).

Regarding gender, there was a higher proportion of male patients (66%) compared to female patients (34%). This gender disparity is a well-recognised characteristic of nasopharyngeal carcinoma, as the disease tends to affect men more frequently, particularly in regions with prominent environmental and genetic risk factors. This finding also reflects global patterns, where men have a higher risk of developing NPC due to factors such as lifestyle, genetic predisposition, and infection with the Epstein-Barr virus (EBV), which is known to play a role in NPC pathogenesis (10).

In terms of geographical distribution, a significant majority (84%) of patients came from outside Surabaya. This may reflect patterns of healthcare access in regional areas or the centralisation of cancer treatment services in urban centres. This observation is similar to other studies indicating that patients often need to travel to major cities to receive advanced treatments such as radiotherapy (8). Additionally, the use of the National Health Insurance (JKN) by all patients (100%) reflects Indonesia's national health insurance system designed to provide coverage for various medical conditions, including cancer treatment (11).

Table 1: Sample Characteristics

No.	Characteristics	n	%
1	Age		
	< 10 Years	0	0%
	10 - 20 Years	5	7%
	21 - 40 Years	15	20%
	41 - 60 Years	45	59%
	> 60 Years	11	14%
2	Gender		
	Female	26	34%
	Male	50	66%
3	Domicile		
	Surabaya	12	16%
	Outside Surabaya	64	84%
4	Coverage Class		
	Class I	14	18%
	Class II	12	16%
	Class III	50	66%
5	Payment		
	JKN	76	100%
	Self-funded	0	0%
6	Chemotherapy		
	Yes	74	97%
	No	2	3%

From a treatment perspective, nearly all patients (97%) also underwent chemotherapy, which is a standard approach in the management of nasopharyngeal cancer, particularly at advanced stages. This finding underscores the crucial role of chemotherapy in NPC management, especially when combined with radiotherapy. As discussed in the literature, concurrent chemoradiotherapy is recommended for advanced-stage NPC as it has been shown to improve patient survival rates and reduce the likelihood of recurrence (8), (12). Furthermore, the high rate of chemotherapy use in this group reflects global treatment paradigms, as various studies have demonstrated that the combination of chemotherapy and radiotherapy is an effective strategy in controlling NPC progression (13).

The sample characteristics, including age, gender, geographical location, and treatment regimen provide a comprehensive overview of the nasopharyngeal cancer patient profile at RSUD Dr Soetomo. These data can form the basis for future studies on treatment outcomes and the impact of demographic variables on patient prognosis. Moreover, the collection and analysis of such data are crucial for optimising treatment protocols, especially in regions with a high burden of NPC where access to advanced therapies such as radiotherapy remains limited (14). The integration of detailed patient profiles with treatment data also supports ongoing efforts to improve healthcare systems, ensuring that patients receive timely and effective interventions.

This data collection aligns with theoretical frameworks in cancer treatment, such as the precision medicine approach and patient-centred care. According to research, the effectiveness of radiotherapy for NPC can be enhanced through advanced technologies like Intensity-Modulated Radiotherapy (IMRT), which allows precise targeting of the tumour while minimising damage to surrounding healthy tissue (15). This approach highlights the importance of technological innovation in cancer care and the need for continuous improvement in treatment methods to optimise clinical

outcomes. The findings from this study offer valuable insights into the clinical management of nasopharyngeal cancer and enrich the existing body of knowledge regarding this complex malignancy.

3.2 Nasopharyngeal Cancer Patients Regarding the Prolonged Time Between Diagnosis and Radiotherapy

Table 2: Radiotherapy Waiting Time for Nasopharyngeal Cancer

Indicator	Count (Days)	Average
Total Number of Patients	76 patients	
Total of Patients with Radiotherapy Waiting Time > 6 Months	64 patients	
Total of Patients with Radiotherapy Waiting Time < 6 Months	11 patients	
Percentage of Patients with Radiotherapy Waiting Time > 6 Months	84,2%	
Percentage of Patients with Radiotherapy Waiting Time < 6 Months	14,5%	
Shortest Radiotherapy Waiting Time	55 days	289 days
Longest Radiotherapy Waiting Time	485 days	

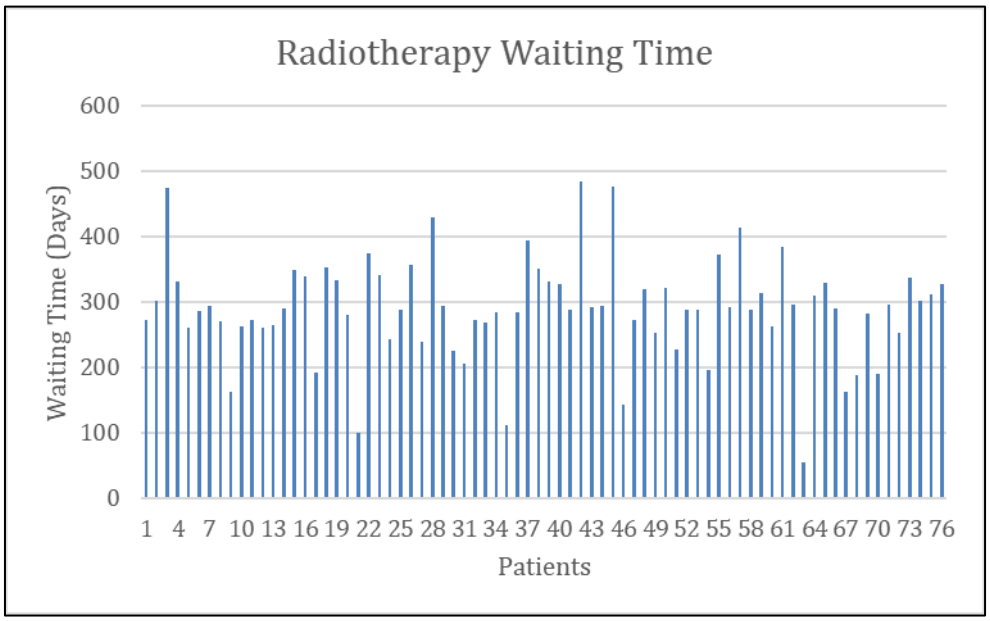

Figure 1: Radiotherapy Waiting Time for Nasopharyngeal Cancer

The prolonged waiting time between diagnosis and the administration of radiotherapy in nasopharyngeal cancer (NPC) patients represents a significant challenge in the treatment process at RSUD Dr Soetomo. Data reveal that the majority of patients (84.2%) experienced a waiting time of more than 6 months before receiving radiotherapy, with the longest waiting time reaching 16 months. This delay is a serious concern as nasopharyngeal cancer is an aggressive malignancy that can progress rapidly, making early intervention crucial. Extended waiting times between diagnosis and treatment are correlated with an increased risk of cancer progression, which impacts patient prognosis and treatment outcomes (11).

Research on nasopharyngeal carcinoma indicates that the effectiveness of radiotherapy can be significantly reduced when treatment is delayed, as during this period, the tumour may grow or metastasise (8). This underscores the importance of timely intervention in managing this disease. Studies on waiting times in healthcare services have shown that prolonged delays in initiating cancer treatments, including radiotherapy, can lead to reduced survival rates due to accelerated disease progression and the potential spread of cancer to other organs (16).

Table 3: Radiotherapy Implementation

Indicator	Count (Days)	Average
Total of Patients	76 patients	
Total of Patients with Radiotherapy Implementation > 6 Months	0 patients	
Total of Patients with Radiotherapy Implementation < 6 Months	76 patients	
Percentage of Patients with Radiotherapy Implementation > 6 Months	0,0%	
Percentage of Patients with Radiotherapy Implementation < 6 Months	100,0%	
Shortest Radiotherapy Implementation Time	4 days	61 days
Longest Radiotherapy Implementation Time	149 days	

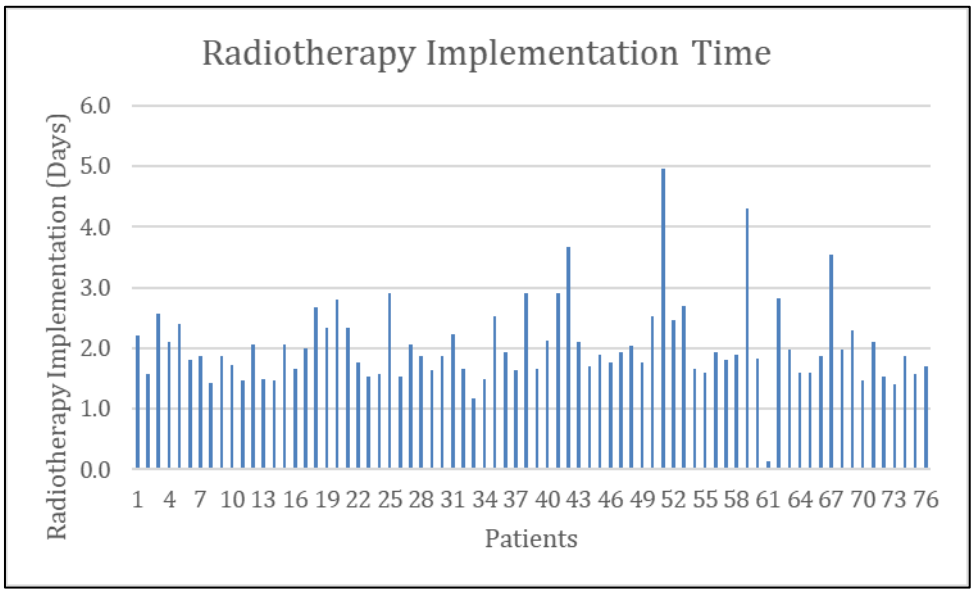

Figure 2: Radiotherapy Implementation

The outcomes of radiotherapy implementation for NPC patients at RSUD Dr Soetomo, showing that all patients (100%) received radiotherapy within less than 6 months with an average treatment time of 61 days (range 4–149 days), reflect the effectiveness of the procedures applied in managing this cancer. Pătcaș (8) and Tricia et al. (12) state that the success of radiotherapy treatment heavily relies on a well-prepared planning phase. The pre-treatment simulation process, which aims to determine body positioning and precise radiation dosage, is crucial in minimising errors and side effects. This demonstrates that RSUD Dr Soetomo has effectively implemented these preparatory procedures, supporting the efficiency of therapy delivery. Advanced technology such as Intensity-Modulated Radiotherapy (IMRT) (15) enables more precise delivery of radiation doses, protecting healthy tissue and minimising the risk of unwanted complications. Moreover, the implementation of daily sessions five days a week for 6–7 weeks, as outlined by Bellon et al., indicates that RSUD Dr Soetomo follows consistent and structured treatment protocols (17). However, these findings also highlight the need for a comprehensive evaluation of the entire cancer care pathway, including the screening, diagnosis, and initial referral stages, which may have experienced delays not reflected in the radiotherapy implementation data. Therefore, strengthening the overall healthcare system is a crucial step to ensure timely and successful treatment for nasopharyngeal cancer.

Table 4: Waiting Time of Diagnosis, Chemotherapy, CT scan, Simulator and for Radiation Nasopharyngeal Cancer

Indicator	Count (Days)	Average
Waiting Time from Diagnosis to Chemotherapy for Nasopharyngeal Cancer		
Total Number of Patients	76 patients	
Total of Patients with Waiting Time from Diagnosis to Chemotherapy > 6 Months	58 patients	
Total of Patients with Waiting Time from Diagnosis to Chemotherapy < 6 Months	18 patients	
Percentage of Patients with Waiting Time from Diagnosis to Chemotherapy > 6 Months	76,3%	
Percentage of Patients with Waiting Time from Diagnosis to Chemotherapy < 6 Months	23,7%	
Shortest Waiting Time from Diagnosis to Chemotherapy	0 days	211 days
Longest Waiting Time from Diagnosis to Chemotherapy	450 days	
Waiting Time from Chemotherapy to CT scan for Nasopharyngeal Cancer		
Total Number of Patients	76 patients	
Total of Patients with Waiting Time from Chemotherapy to CT scan > 6 Months	2 patients	
Total of Patients with Waiting Time from Chemotherapy to CT scan < 6 Months	74 patients	
Percentage of Patients with Waiting Time from Chemotherapy to CT scan > 6 Months	2,6%	
Percentage of Patients with Waiting Time from Chemotherapy to CT scan < 6 Months	97,4%	
Shortest Waiting Time from Chemotherapy to CT scan	0 days	59 days
Longest Waiting Time from Chemotherapy to CT scan	237 days	
Waiting Time from CT scan to Simulator for Nasopharyngeal Cancer		
Total Number of Patients	76 patients	
Total Of Patients with Waiting Time from CT scan to Simulator > 7 Days	48 patients	
Total of Patients with Waiting Time from CT scan to Simulator < 7 Days	28 patients	
Percentage of Patients with Waiting Time from CT scan to Simulator > 7 Days	63,2%	
Percentage of Patients with Waiting Time from CT scan to Simulator < 7 Days	36,8%	
Shortest Waiting Time from CT scan to Simulator	0 days	7 days
Longest Waiting Time from CT scan to Simulator	48 days	
Waiting Time from Simulator to Radiation for Nasopharyngeal Cancer		
Total Number of Patients	76 patients	
Total Of Patients with Waiting Time from Simulator to Radiation > 7 Days	12 patients	
Total of Patients with Waiting Time from Simulator to Radiation < 7 Days	64 patients	
Percentage of Patients with Waiting Time from Simulator to Radiation > 7 Days	15,8%	
Percentage of Patients with Waiting Time from Simulator to Radiation < 7 Days	84,2%	
Shortest Waiting Time from Simulator to Radiation	0 days	4 days
Longest Waiting Time from Simulator to Radiation	27 days	

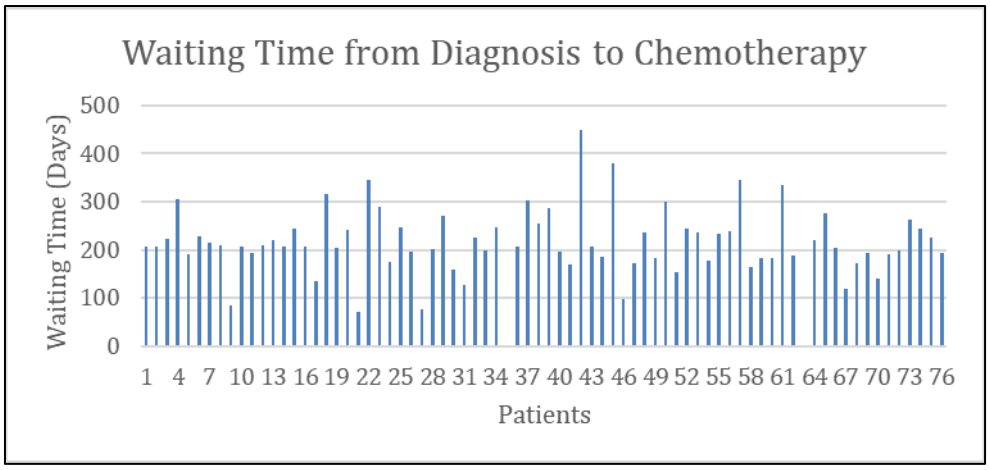

Figure 3: Waiting Time from Diagnosis to Chemotherapy for Nasopharyngeal Cancer

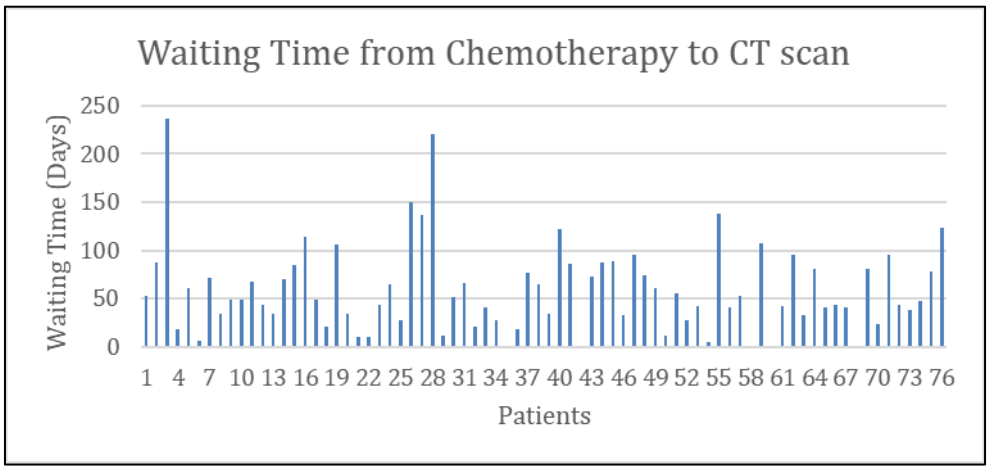

Figure 4: Waiting Time from Chemotherapy to CT scan for Nasopharyngeal Cancer

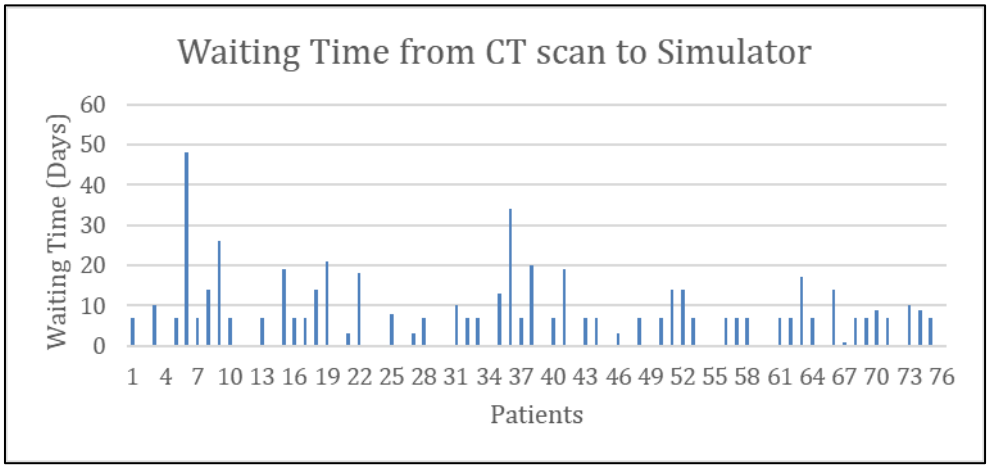

Figure 5: Waiting Time from CT scan to Simulator for Nasopharyngeal Cancer

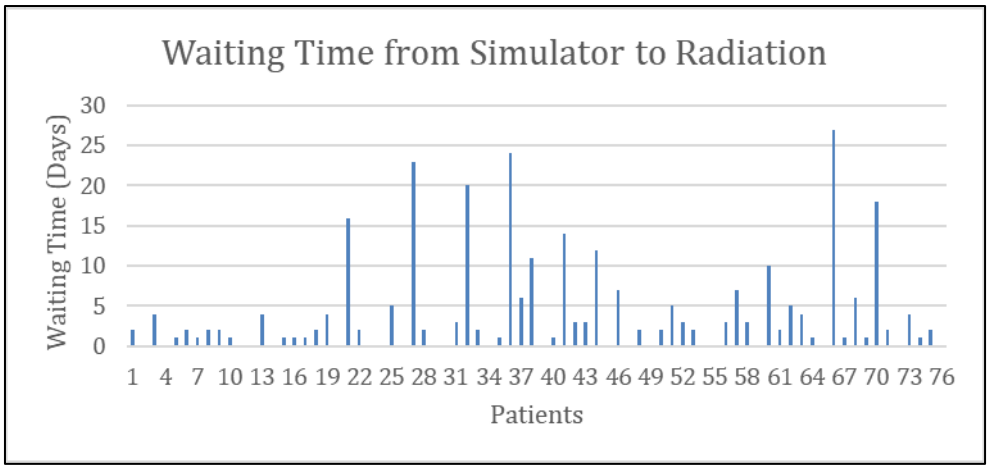

Figure 6: Waiting Time from Simulator to Radiation for Nasopharyngeal Cancer

The research also found that nasopharyngeal cancer patients registered at Dr. Soetomo Hospital experienced varying waiting times at each stage of treatment. The waiting time from diagnosis to chemotherapy showed that the majority of patients (76.3%) had to wait more than 6 months, with an average waiting time of around 7 months. After chemotherapy, most patients (97.4%) waited less than 6 months to undergo a CT scan, with an average waiting time of 2 months. The waiting time from CT scan to simulator showed that the majority of patients (63.2%) waited more than 7 days, with an average waiting time of about 1 week. From simulator to radiation, 84.2% of patients had a waiting time of less than 7 days, with an average waiting time of about 4 days. The final waiting time, from radiation to radiotherapy, showed that the majority of patients (98.7%) waited less than 30 days, with an average waiting time of only 2 days. Overall, the data indicate a significant variation in waiting times at each stage of treatment for nasopharyngeal cancer patients at this hospital.

On the other hand, it is essential to consider the side effects that may arise during and after the radiotherapy process. As noted by Khudary et al. (18) and Nagtegaal et al. (19), radiotherapy can trigger various reactions such as fatigue, digestive disturbances, skin changes, and other side effects that can affect patient comfort. The use of advanced technology, such as IMRT (20), can help reduce the risk of side effects by minimizing radiation exposure to healthy tissue. Additionally, integrating treatment with complementary therapies such as immunotherapy (8) and the use of adjuvant agents such as melatonin (21) may enhance tumour response to radiation and reduce the risk of side effects. Therefore, strengthening patient support programmes, regular monitoring, and the application of structured side effect management protocols are strategic steps that must be reinforced. Thus, not only is the effectiveness of radiotherapy implementation a priority, but also the sustainability of side effect management to improve patient quality of life and strengthen the prognosis for nasopharyngeal cancer at RSUD Dr Soetomo.

3.3 The External and Internal Factors That Cause Prolonged Waiting Times for Nasopharyngeal Cancer Patients

The analysis of external and internal factors contributing to the prolonged waiting times for nasopharyngeal cancer (NPC) patients at RSUD Dr Soetomo highlights multiple challenges affecting the effectiveness of treatment. Based on direct field observations, medical record documentation, and service schedules at RSUD Dr Soetomo, a number of external and internal factors were identified as contributing to the extended waiting times for radiotherapy in NPC patients.

From an external perspective, documentation indicates that the capacity of the radiotherapy facilities is very limited compared to the high demand from patients requiring treatment. Medical records show that 84.2% of patients waited more than 6 months before starting radiotherapy. The scheduling of the CT simulator, a crucial stage in treatment planning often experiences long queues, resulting in prolonged waiting times for patients. This is supported by observations of procedure schedules in the radiotherapy unit, which show an average waiting time of 289 days, far exceeding the ideal standard.

From internal service processes and administrative documents, internal challenges were also identified, such as a shortage of specialised medical personnel in radiotherapy and chemotherapy, which led to treatment delays. Some patients experienced side effects from chemotherapy, including anaemia and severe allergic reactions (anaphylactic shock) recorded in medical records, which caused radiotherapy to be postponed until the patient's condition stabilised. In addition, administrative processes such as verification of patient records and coordination between medical teams were often delayed and poorly integrated, leading to unnecessary gaps in therapy scheduling.

Overall, these observations and documentation demonstrate that limited facilities and human resources, coupled with suboptimal internal administrative and coordination processes, significantly contributed to the prolonged waiting times for radiotherapy among NPC patients at RSUD Dr Soetomo. Therefore, improvements in service capacity and process management are necessary to shorten waiting times and enhance the quality of care.

In addition to external and internal factors related to facilities and medical personnel, observations and documentation also revealed other internal factors influencing radiotherapy waiting times. Some patients experienced fear of the radiotherapy procedure and faced economic constraints that limited their ability to adhere to the therapy schedule consistently. As RSUD Dr Soetomo serves as a referral hospital receiving patients from outside Surabaya, these patients often had to manage their time and accommodation, which contributed to delays in therapy. The physical condition of patients deteriorating due to chemotherapy side effects, such as anaemia and severe allergic reactions (anaphylactic shock), was documented as a direct cause of treatment delays. These personal and geographical barriers exacerbated the already extended waiting times caused by institutional challenges, as evidenced by documentation showing scheduling difficulties for patients travelling from outside the region.

Therefore, based on the findings presented earlier, the hypothesis suggesting that external and internal factors influence the radiotherapy waiting time for nasopharyngeal cancer patients at RSUD Dr Soetomo is supported by the findings of this study.

3.3.1 External Factors

The first hypothesis concerning external factors—such as queues at the hospital, registration times, staff shift schedules, and healthcare workforce—was supported by the research findings, which indicated that the long waiting times (over 6 months) experienced by the majority of patients may have been caused by the limited availability of radiotherapy facilities and the high number of patients requiring treatment. In this study, most patients experienced extended waiting times before receiving therapy, reflecting the long queues for access to limited facilities. In addition, delays in CT simulator scheduling and delays in administrative procedures were also identified as external factors that hinder the smooth process of treatment.

3.3.2 Internal Factors

The second hypothesis regarding internal factors, such as patients' fear of radiotherapy, economic issues, busy schedules, and the fact that RSUD Dr Soetomo is a referral hospital serving patients from outside Surabaya was also supported by the research findings. Some patients who experienced side effects from chemotherapy, such as anaemia or allergic reactions (anaphylactic shock), demonstrated that patients' physical conditions could influence the continuation of treatment and lead to delays in the implementation of radiotherapy. Additionally, limited time availability both for patients who had to manage their own schedules and for those from outside the city who had to wait longer for therapy also contributed to the extended waiting times. This indicates that personal and geographical factors can exacerbate the situation, consistent with the research findings that identified scheduling difficulties for patients travelling from outside the city.

Thus, the proposed hypothesis regarding external and internal factors affecting the waiting time for radiotherapy at RSUD Dr Soetomo is supported by the research findings, which reveal limitations in facilities, administration, as well as personal and geographical factors that play a role in extending the waiting time for radiotherapy among nasopharyngeal cancer patients.

The waiting times identified in this study are influenced by various factors. One of the main issues is the limited capacity of radiotherapy services at the hospital. The fact that 84.2% of patients faced waiting times of more than 6 months highlights a significant gap between the high demand for cancer treatment and the availability of resources. This reflects broader issues within the healthcare system, where high patient numbers and limited access to specialised treatment often result in extended waiting times (11). This delay is particularly concerning in NPC treatment, as early intervention is crucial. Prolonged waiting times not only add physical and psychological burdens to patients but also disrupt the overall effectiveness of treatment plans, including chemotherapy, which is often administered as interim therapy while awaiting radiotherapy (8).

Based on the study results, the hypothesis that external and internal factors influence radiotherapy waiting times for NPC patients at RSUD Dr Soetomo is supported by relevant findings. External factors, such as long hospital queues, limited radiotherapy facilities, and delays in CT simulator scheduling and administrative procedures, were shown to cause most patients to wait over six months for therapy. Meanwhile, internal factors such as fear of the radiotherapy procedure, patients' physical conditions post-chemotherapy (e.g., anaemia or allergic reactions), economic challenges, and patients' busy schedules also contributed to the extended waiting times. This situation is exacerbated by the fact that RSUD Dr Soetomo is a referral hospital serving patients from outside Surabaya, making geographical challenges

and time constraints even more problematic for therapy scheduling. These findings demonstrate that a combination of personal, administrative, and systemic factors play a crucial role in prolonging radiotherapy waiting times.

The results of this study are consistent with findings by Pramitasari, which indicate that limited facilities and infrastructure, inadequate human resources, unclear regulations, and budget constraints are the primary factors contributing to lengthy waiting times for radiotherapy services (22). This situation shows that the standard waiting times for cancer treatments such as cervical, breast, and nasopharyngeal cancer have not been optimally achieved. To address this issue, better coordination between oncology professionals through a multidisciplinary team approach is needed to establish ideal and efficient service times. Support in the form of sufficient radiation equipment and competent medical personnel is also essential to shorten waiting times. A similar view is expressed by Amanah and Mustakim, who found that in the Radiology Unit of RS Syarif Hidayatullah, there were still human resource shortages, such as the absence of administrative staff and radiology nurses, as well as a lack of understanding of procedures and policies among staff (23). Although the facilities were relatively complete, aspects such as layout and technology were still inadequate, compounded by outdated hospital information management systems, resulting in radiology service waiting times that did not meet the standards set by the Ministry of Health.

In the context of the theoretical framework of waiting times in healthcare services, radiotherapy delays can be understood as a result of external and internal factors. Externally, the lack of radiotherapy facilities and the high number of patients are major contributors, consistent with the literature indicating that resource limitations directly impact treatment access (11). Internally, factors such as administrative delays and poor coordination between service units also exacerbate waiting times. These internal issues, including delays in CT simulator scheduling and other pre-treatment processes, have also been reported in other studies addressing delays in cancer treatment (16).

Furthermore, delays in initiating treatment can have serious implications for patient clinical outcomes. Research shows that early implementation of radiotherapy is essential to reduce the risk of metastasis and improve survival rates in NPC patients (12). This underscores the need for better waiting time management, not only through increased resource allocation but also through the adoption of advanced scheduling systems that can help prioritise high-risk patients and streamline treatment delivery (24).

Thus, the extended waiting times experienced by NPC patients at RSUD Dr Soetomo indicate a critical gap in the timely provision of cancer treatment. Addressing this issue is essential to improve treatment effectiveness and enhance patient survival outcomes. Effective solutions should focus on increasing radiotherapy service capacity, improving administrative processes, and strengthening interdepartmental coordination to reduce delays and provide faster and more efficient care.

4 CONCLUSION

Based on the findings of the study concerning nasopharyngeal cancer patients undergoing radiotherapy at RSUD Dr Soetomo during 2022–2023, it can be concluded that: 1) 1. Data from 76 nasopharyngeal cancer patients at RSUD Dr Soetomo (2022–2023) indicate that the majority were male, aged 41–60 years, residing outside Surabaya, and using the National Health Insurance (JKN) with chemotherapy as part of their treatment. 2) Most patients (84.2%) waited more than 6 months for radiotherapy, with an average waiting time of 289 days, while the implementation of radiotherapy took less than 6 months with an average duration of 66 days. This study identified several limitations, including non-compliance with international standard operating procedures (SOPs) in the radiotherapy process, particularly for patients with Stage 1 nasopharyngeal cancer, who were delayed in receiving radiotherapy due to long waiting times, especially for those enrolled in the National Health Insurance (JKN). As a result, there was significant variation in waiting times, with an average of 289 days, reflecting inadequate radiotherapy service capacity. Recommendations include improving the treatment flow system, reassessing the hospital's SOPs to align with international standards, and increasing radiotherapy capacity to ensure more timely treatment and reduce waiting times.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare that they have no conflict of interest related to the publication of this manuscript. No financial or personal relationships with other individuals or organizations have inappropriately influenced this study.

Statement of ethical approval

This study was conducted following the ethical principles outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Ethics Committee of the Faculty of Medicine, Universitas Airlangga. All patient data were anonymized, and confidentiality was strictly maintained.

Statement of informed consent

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