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Barriers to timely lung cancer diagnosis and treatment in a Philippine tertiary hospital

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ABSTRACT

Objectives: Timeliness of care is crucial to optimize outcomes in lung cancer. In the Philippines, the causes of delays in lung cancer diagnosis and treatment have not yet been explored.

Material and Methods: We reviewed records of patients diagnosed with lung cancer in our institution between September 2017 and August 2019 after biopsy or resection of a pulmonary lesion. Time to specialist consultation, biopsy, cancer diagnosis, and treatment were measured and compared with standards set by the British Thoracic Society.

Results: Eighty patients were included in the analysis. The median time to pulmonology consult and biopsy was 5 and 18 days, respectively. Cancer diagnosis was made within 28 days for 48% of patients. Causes of delay include late pulmonology referral (21%), delayed biopsy (38%), need for repeat biopsy (24%), and performing outright resection (10%).

Out of 25 patients who received systemic treatment, only four were treated within 28 days of their cancer diagnosis. Curative resection was delayed beyond 56 days for two out of four patients.

Conclusion: Each step in the management of lung cancer is a potential cause for delay. This study revealed opportunities for improvement in multiple areas of care that can allow more patients to benefit from treatment.

Keywords: Lung cancer, Quality of care, Health services research

INTRODUCTION

Lung cancer is the leading cause of cancer-related mortality worldwide, as well as in the Philippines. Due to the aggressive nature of the disease, ensuring timely diagnosis and treatment is crucial.[1,2] Apart from improving access to healthcare, addressing in-hospital delays may also potentially improve patient outcomes.[3–5]

Several groups have made recommendations regarding maximum intervals between procedures related to diagnosis and treatment, including Cancer Care Ontario, the British Thoracic Society, and the United Kingdom National Health Service.[1,6–8] Despite these recommendations, significant delays occur in the diagnosis and treatment of patients with lung cancer worldwide.[9] In the Philippines, there is a paucity of data on the steps that delay management. We conducted this study to address this issue and guide us as we plan interventions to improve the quality of our care for these patients.

This study focused on patients diagnosed with primary lung cancer, and summarized the time intervals from the initial consult to confirmation of diagnosis and initiation of treatment.

MATERIAL AND METHODS

Study design

We conducted this study in a tertiary public hospital in Metro Manila that functions as a training and tertiary referral center. Approval from the Institutional Review Board was obtained with the approval code - 2019-439-01. This is a retrospective

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study involving consecutive patients diagnosed with primary lung cancer, who underwent biopsy or outright resection of a pulmonary lesion between September 2017 and August 2019, based on our hospital pathology registry.

For the majority of patients, the portals of entry are the General Medicine, General Surgery and Family Medicine clinics that receive walk-in consults and referrals from other institutions. Patients are then referred to the subspecialty clinics when deemed appropriate. From both electronic and paper records, we obtained dates of consultation with the various specialties and dates of diagnostic examinations and treatments.

We included adult patients with lung cancer of any clinical stage and any histologic type. We excluded cases if the lung cancer diagnosis was established prior to arriving at the study site, if pathologic evaluation reveals metastatic cancer from a different primary site, and cancers of occult primary.

Data analysis

Using the collected information, we determined the time to consultation with different specialties, the time to the performance of diagnostic procedures Computed Tomography (CT) scan, biopsy, immunohistochemistry, molecular testing), as well as the time to the claiming of results, the determination of clinical stage, treatment disposition, the initiation of systemic treatment, and performance of curative resection, whenever applicable.

Each time interval was analyzed as the median number of days ± interquartile range (IQR). Compliance rates for specific intervals were determined, with recommendations from the British Thoracic Society and National Health Service (NHS) Cancer Plan used as references when available. An exploratory analysis was performed to detect differences between subgroups using the z test for proportions, and the Kruskal–Wallis test for continuous variables. Subgroups analyzed were by the type of sampling (tissue versus cytology) and by whether or not on-site pathology evaluation was performed.

RESULTS

Study participants

A total of 91 patients with lung cancer were identified through the hospital pathology records [Table 1]. While pathology results and dates of first consult were available for all patients, data on intervals between specialist consultation and treatment initiation was only available for 87.9% (80 patients).

Time intervals between lung cancer care

Pertinent intervals between lung cancer care relating to consultation, diagnosis, and treatment are summarized in Table 2.

Table 1: Clinical and demographic profile of patients (n = 91).

Characteristic	n (%)
Age (years), mean	57.9
Male sex	49 (54)
Residence in Metro Manila	27 (30)
Smoking status	
Current smoker	19 (24)
Previous smoker	32 (40)
Non-smoker	29 (36)
Presentation	
Cough	38 (48)
Dyspnea	20 (25)
Pain	7 (9)
Incidental lung mass	5 (6)
Other	10 (13)
Stage	
I to II	5 (6)
IIIA	1 (1)
IIIB/C	0 (0)
IV	50 (63)
Unknown	24 (30)

n: number of patients

Intervals between specialist consultation (n = 80)

The pre-hospital period represents the longest time interval experienced by patients diagnosed with lung cancer, with a median of 125 days (IQR: 64 to 219 days). Upon entry into our institution, 58% (46 out of 80 patients) were first seen by General Medicine/Family Medicine, 21% (17 patients) by General Surgery, and the rest were first seen by other subspecialty services (Pulmonary Medicine, Medical Oncology, Neurosciences, and Orthopedics).

Among 80 patients with lung cancer, 64 (80%) were eventually seen by a pulmonologist, 54 (68%) by a medical oncologist, 24 (30%) by a thoracic surgeon, and 10 (13%) by a radiation oncologist, with a median time to consult of 5, 41, 10, and 78 days, respectively. Among those referred to a pulmonologist, 37% (24 out of 64 patients) were seen within the day of referral, and 61% (39 of 64 patients) were seen within seven days, as recommended by the British Thoracic Society.

Intervals between diagnosis

Among 13 patients with available data, the median time between first consult and CT scan was 36 days (IQR: 4–55 days). However, it could not be determined whether they were done within or outside the institution.

A total of 122 pathology reports were reviewed [Table 3]. Among 91 patients, 24 (26%) underwent a second biopsy procedure and four (4%) underwent a third biopsy procedure over the course of the diagnostic process. The median time interval between repeat biopsy procedures was 39 days (IQR: 20–57 days).

Table 2: Time intervals characterizing timeliness of lung cancer care and compliance to published guidelines (n = 80).

	No. of patients	Median	IQR	Min	Max	Recommended	Compliance
		Days					%
Intervals between specialist consultation							
Initial presentation to pulmonologist consultation	59	5	0 to 27	0	363	7[a]	61
Initial presentation to thoracic surgeon consultation	24	10	0 to 37	0	211	-	
Cancer diagnosis to medical oncologist consultation	39	20	10 to 56	2	342	-	
Intervals between diagnosis							
Initial presentation to chest CT scan	13	36	4 to 55	2	162	-	
Initial presentation to biopsy procedure	76	18	7 to 54	2	505	-	
Initial presentation to cancer diagnosis	77	28	14 to 66	4	506	28[b]	48
Cancer diagnosis to treatment disposition	40	44	15 to 84	0	383	-	
Cancer diagnosis to staging	54	10	0 to 39	0	342	-	
Cancer diagnosis to IHC confirmation	38	36	22 to 57	0	423	-	
IHC confirmation to molecular testing	12	29	20 to 46	6	1,104	-	
Release to claiming of pathology results	12	14	8 to 41	2	109	-	
Intervals between treatment							
Cancer diagnosis to initiation of systemic treatment	25	81	44 to 153	11	395	31[b]	16
Treatment disposition to initiation of systemic treatment	25	8	6 to 17	2	92	9[a]	68
Thoracic surgeon consultation to curative resection	4	60	56 to 63	16	184	56[a]	50

[a]British Thoracic Society recommendations, [b]National Health Service Cancer Plan.

Abbreviations: IQR: interquartile range, CT: computed tomography, IHC: immunohistochemistry, n: number of patients.

Table 3: Summary of diagnostic procedures performed (n = 122).

Procedure	n (%)
Bronchoscopy	59 (48.4)
Image-guided needle biopsy	40 (32.8)
Pleural biopsy	9 (7.4)
Open surgical resection	7 (5.7)
Mediastinoscopy	4 (3.3)
Cervical lymph node biopsy	3 (2.4)

n: number of patients

The median time to the release of histopathology results was five days (IQR: 3–7 days) from the biopsy procedure. A diagnosis of cancer was made within 28 days from the first consult for 48% (38 out of 80 patients). Among those in whom time to diagnosis was longer (42 patients), it was because of either a delay in referral to a pulmonologist (21%), delay in performance of the biopsy procedure (38%), delay due to the need for a repeat biopsy (24%), outright resection (10%), or a combination of factors (7%).

Information on disease stage was available for 56 patients. Among these patients, disease stage was determined by the medical oncologist in 55% (31 patients), by the pulmonologist in 21% (12 patients), by the thoracic surgeon in 13% (7 patients), and by other specialties for the rest. There was no noted discrepancy in staging between different treating physicians for any patient in the population. For some of these patients, the disease stage was established concurrently with the time of diagnosis of cancer. In the remaining 34 patients, disease stage was determined through a subsequent metastatic workup, which took a median of 30 days (IQR: 11–60 days).

Immunohistochemical evaluation was performed in 42% (38 out of 91 patients). Also, among 32 patients with metastatic lung adenocarcinoma, testing for epidermal growth factor receptor (EGFR) activating mutations and anaplastic lymphoma kinase (ALK) translocations was performed on 12 patients (38%) and 1 patient (3%), respectively [Table 2].

C. Intervals between treatment

Upon review of available medical records (n = 80), 25 patients (31%) were eventually able to initiate systemic cancer treatment. Among them were 17 patients (68%) in whom treatment was started within seven working days of deciding to treat as recommended by the British Thoracic Society. In contrast, the median time interval between demonstration of malignancy and initiation of systemic treatment was 81 days (IQR: 44–153 days). Only 16% (four of 25 patients) started treatment within a month of cancer diagnosis, and only 24% (six of 25 patients) started treatment within 62 days of subspecialty referral, as recommended.

Out of six patients with localized disease at presentation, four were able to undergo resection with curative intent. For these patients, preoperative mediastinal lymph node evaluation was based on imaging findings, and in one patient, mediastinal

lymph node sampling was performed at the time of surgery. The two remaining patients underwent preoperative staging by mediastinoscopy, however one developed distant metastasis soon after the procedure, and the other eventually refused any further treatment.

The median time to surgery was 60 days from the first consult with a thoracic surgeon. Two out of four patients were able to undergo resection within 56 days from first consult, as recommended by the British Thoracic Society.

D. Exploratory analyses

Of the 99 bronchoscopic and image-guided procedures performed, 48% (48 procedures) obtained cytological specimens, and the rest were tissue biopsies. Compared to tissue biopsies, cytological evaluations were more likely to be inadequate and require a re-biopsy (53% vs. 14%, $p < 0.0001$). The time to the first diagnostic procedure was shorter for those that were done by bronchoscopy (median 16 days, IQR: 11–35 days) compared to image-guided biopsy (median 38 days, IQR: 14–83 days) that was significant by the Wilcoxon rank-sum test ($p = 0.026$).

Rapid on-site pathologic evaluation was performed in 27 out of the 122 diagnostic procedures (22.1%). This was done by frozen section in 16 patients, and by adequacy evaluation in 11 patients. Among them, there were only three instances where a repeat biopsy was recommended (11%). On the other hand, patients who did not undergo on-site pathologic evaluation had a longer median time to cancer diagnosis (34 vs. 17 days, $p = 0.04$) and were more likely to require a re-biopsy (41% vs. 11%, $p = 0.01$). They were also less likely to eventually undergo systemic treatment (23% vs. 53%, $p = 0.02$), while a trend for a longer median time to treatment initiation did not reach statistical significance (145 vs. 83 days, $p = 0.14$).

Patients in whom lung cancer was diagnosed within 28 days from the initial consult had a numerically higher rate of ever starting systemic treatment compared to those in whom there was a delay in diagnosis (36% vs. 26%), however this did not reach statistical significance ($p = 0.3632$).

DISCUSSION

Pre-hospital interval

The pre-hospital period represents the longest time interval among the different intervals evaluated. This is likely to be a result of multiple factors, such as health-seeking behavior, financial capability, access to care, and the quality of medical care in the local community. This interval can only be shortened if these factors are addressed successfully, which would entail not only effective health-related programs, but socio-economic and behavioral interventions as well.

Intervals between specialist consultation

The time to consult with a pulmonologist was acceptable and within the recommended interval for the majority of patients. This is likely a result of maintaining a fast-track pathway in our institution for patients with a suspicious lung mass, allowing them to be seen within the day of referral. Reasons for late pulmonology consultations may include the unavailability of imaging studies, or alternatively, lack of awareness among referring physicians regarding this fast-track referral system. To demonstrate, the median time to a subspecialty consult was just two days for intradepartmental referrals from General Medicine, whereas it was 32 days and 50 days for interdepartmental referrals from Family Medicine and General Surgery, respectively.

Time to consult with a thoracic surgeon was comparable with data from other institutions.[9] In contrast, it took a median of 20 days to consult with a medical oncologist after the release of histopathology results. This could be explained in part by the delay in the claiming of pathology results that took a median of 14 days based on the available data. There is no alert system in our hospital that notifies patients and/or their treating physicians once pathology results are available. Moreover, this delay may also be reflective of the hesitation of physicians to refer patients before pathologic confirmation of cancer is obtained, even if the clinical picture is already highly suggestive of malignancy.

Intervals between lung cancer diagnosis

Imaging

Data regarding the interval between the first consult and CT imaging was available for only a limited number of patients. While many patients may already have imaging results available prior to consult, this information was not properly documented in the patient record in many instances. However, our data still reflects the long waiting time in our institution for this procedure, and it is common for patients to resort to other commercial diagnostic centers where they incur a significant out-of-pocket expense.

Biopsy procedure

Because image-guided procedures have a higher risk of post-procedure pneumothorax, patients in our institution are required to queue for hospital admission. On the other hand, bronchoscopy procedures can be performed on an outpatient basis, hence, they tend to be scheduled earlier in comparison. Notably, fewer core biopsies were done compared to fine needle aspiration. It should be noted however, that cytological specimens were more likely to require a second diagnostic procedure compared to tissue specimens. For this reason, and

because of the increasing utility of molecular markers to guide therapy for lung cancer, tissue biopsies should be favored over fine needle aspirates whenever feasible.

Pathologic evaluation

While the turn-around time for histopathologic results was relatively short in most cases, subsequent steps were delayed partly because results were not immediately retrieved. In cases where the sampled tissue was non-diagnostic or insufficient for further evaluation, this delay becomes even more significant. In our study, repeat biopsy was recommended in only three instances when onsite pathology evaluation was performed. In one case, the specimen was judged to be inadequate, but this was not followed by sampling of more tissue. In the other two cases, the specimen was deemed adequate but turned out to be insufficient for immunohistochemical evaluation.

These roadblocks contributed to delays in the diagnostic process for our patients, and explain why, for as many as 52.5% of patients, it took more than 28 days as recommended. This is also behind the reported time intervals from other institutions, wherein time to diagnosis ranged from 6 to 23 days from the first consult.[7,10]

Presently, there is no reflex testing protocol in our institution. Physicians can only order these tests once they have reviewed the initial histopathology result, which may be long after the date of release of the results.

Intervals between treatment initiation

In addition to the discussed intervals for diagnosis, time to treatment initiation is also affected by the timeliness of staging workup, promptness of follow-up, and access to medications. While the median time (1) between cancer diagnosis and staging, and (2) between deciding on treatment and treatment initiation were both relatively short, these intervals took more than a month for 31.5% and 20.0% of patients, respectively. The timeliness of staging is largely dependent on the accessibility of imaging tests, while the latter is dependent on the patient's financial capacity, insurance status, and access to assistance programs.

However, for many patients, the longest interval was between cancer diagnosis and treatment disposition. This is likely because many steps take place during this interval: (1) retrieval of the pathology result; (2) consultation with a medical oncologist; (3) processing and retrieval of immunohistochemistry and subsequent molecular testing; (4) re-biopsy when necessary; (5) conduct of metastatic work-up; and (6) follow-up in the oncology clinic.

Patients lost to follow-up

Our data also demonstrates the progressive decrease in the number of patients with each subsequent step in their care. Only 29 of 80 patients (36.3%) were able to undergo surgical and/or systemic treatment. Patients may progress and succumb to their illness while still undergoing evaluation, especially when there are delays in the different points of care. Some patients may also have already been in advanced disease or may have already depleted their finances before treatment could be initiated. While patients can be referred for financial assistance, this does not cover transportation and opportunity costs from the loss of livelihood of patients and their supporting family members. Also, the possibility of patients transferring to another institution could not be discounted, although the study setting is considered an end-referral center where majority of patients are not able to afford treatment elsewhere.

Strategies to improve timeliness of care

Various strategies can shorten the time between lung cancer diagnosis and treatment. Fast-track pathways can expedite biopsies for patients with suspicious lesions seen on chest radiography.[11–13] Repeat biopsies can be avoided through on-site pathologic evaluation, which can provide a preliminary diagnosis and ensure specimen adequacy.[14,15] Reflex testing protocols can avoid potential delays incurred from waiting for the request by the clinician.[16,17]

Early involvement of the lung cancer multidisciplinary team has been shown to improve diagnostic efficiency, particularly in challenging scenarios where the optimal diagnostic approach is unclear.[13,18] A multidisciplinary clinic can save the patient valuable time, energy, and resources associated with multiple hospital visits. Patient navigators have also been shown to improve the timeliness of cancer care and patient satisfaction.[19–21]

CONCLUSION

Each step involved in the diagnosis and treatment of lung cancer is a potential cause for delay, and an opportunity for improvement. While compliance rates to published recommendations were low, some of them can be addressed even in resource-limited settings. Close coordination between the different stakeholders can expedite the diagnostic process and help avoid the need for repeat biopsies. Similarly, active reporting of diagnostic results can potentially minimize delays in patient follow-up. The cost and benefit of other strategies such as employing patient navigators, performing reflex testing, and holding multidisciplinary clinics warrant further consideration as well.

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Ethical approval

The author(s) declare that they have taken the ethical approval from IRB (2019-439-01).

Declaration of patients consent

Patient's consent not required as there are no patients in this study.

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Conflicts of interest

The authors declare no conflict of interest. The conceptualization and conduct of the study, data analysis, and manuscript writing was performed by the authors free of any influence from the funding source.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Bozcuk H, Martin C. Does treatment delay affect survival in non-small cell lung cancer? A retrospective analysis from a single UK centre. Lung Cancer 2001;34:243–52.
2. Vidaver RM, Shershneva MB, Hetzel SJ, Holden TR, Campbell TC. Typical time to treatment of patients with lung cancer in a multisite, US-based study. J Oncol Pract 2016;12:e643–53.
3. Leiro-Fernández V, Mouronte-Roibás C, García-Rodríguez E, Botana-Rial M, Ramos-Hernández C, Torres-Durán M, *et al*. Predicting delays in lung cancer diagnosis and staging: Delays in LC diagnosis and staging. Thorac Cancer 2019;10:296–303.
4. Yorio JT, Xie Y, Yan J, Gerber DE. Lung cancer diagnostic and treatment intervals in the United States: A health care disparity? J Thorac Oncol 2009;4:1322–30.
5. Verma A, Lim AYH, Tai DYH, Goh SK, Kor AC, A. DBA, *et al*. Timeliness of diagnosing lung cancer: Number of procedures and time needed to establish diagnosis. Medicine 2015;94:e1216.
6. The Lung Cancer Working Party of the British Thoracic Society Standards of Care Committee. BTS recommendations to respiratory physicians for organising the care of patients with lung cancer. Thorax 1998;53(Supplement 1):S1–8.
7. Department of Health. The NHS cancer plan. Department of Health; 2000.
8. Reifel J. Lung Cancer. In: Quality of Care for Oncologic Conditions and HIV: A Review of the Literature and Quality Indicators. 2000; p. 133–172.
9. Olsson JK, Schultz EM, Gould MK. Timeliness of care in patients with lung cancer: A systematic review. Thorax 2009;64:749–56.
10. Frimpong GAA, Aboagye E, Amankwah P, Coleman NE, Abaidoo NK. Short-duration post CT-guided thoracic biopsy monitoring-clinical experience with 440 patients. J Med Radiat Sci 2019;66:91–5.
11. Fuller E, Fitzgerald K, Hiom S. Accelerate, coordinate, evaluate programme: A new approach to cancer diagnosis. Br J Gen Pract 2016;66:176–7.
12. Guldbrandt LM, Fenger-Grøn M, Rasmussen TR, Rasmussen F, Meldgaard P, Vedsted P. The effect of direct access to CT scan in early lung cancer detection: An unblinded, cluster-randomised trial. BMC Cancer 2015;15.
13. Rajasekaran AB. Effect of a multidisciplinary lung investigation day on a rapid access lung cancer service. Postgrad Med J 2006;82:414–6.
14. Anila K, Nayak N, Venugopal M, Jayasree K. Role of rapid on-site evaluation in CT-guided fine needle aspiration cytology of lung nodules. J Cytol 2018;0:0.
15. Wang H, Wei N, Tang Y, Wang Y, Luo G, Ren T, *et al*. The utility of rapid on-site evaluation during bronchoscopic biopsy: A 2-year respiratory endoscopy central experience. BioMed Res Int 2019;2019:1–7.
16. Cheema PK, Menjak IB, Winterton-Perks Z, Raphael S, Cheng SY, Verma S, *et al*. Impact of reflex *EGFR*/*ALK* testing on time to treatment of patients with advanced nonsquamous non–small-cell lung cancer. J Oncol Pract 2017;13:e130–8.
17. Houang M, Toon CW, Clarkson A, Sioson L, Watson N, Farzin M, *et al*. Reflex ALK immunohistochemistry is feasible and highly specific for ALK gene rearrangements in lung cancer. Pathology 2014;46:383–8.
18. Freeman RK, Ascioti AJ, Dake M, Mahidhara RS. The effects of a multidisciplinary care conference on the quality and cost of care for lung cancer patients. Ann Thorac Surg 2015;100:1834–8.
19. Ali-Faisal SF, Colella TJF, Medina-Jaudes N, Benz Scott L. The effectiveness of patient navigation to improve healthcare utilization outcomes: A meta-analysis of randomized controlled trials. Patient Educ Couns 2017;100:436–48.
20. Battaglia TA, Bak SM, Heeren T, Chen CA, Kalish R, Tringale S, *et al*. Boston patient navigation research program: The impact of navigation on time to diagnostic resolution after abnormal cancer screening. Cancer Epidemiol Biomarkers & Prev 2012;21:1645–54.
21. Freund KM, Battaglia TA, Calhoun E, Darnell JS, Dudley DJ, Fiscella K, *et al*. Impact of patient navigation on timely cancer care: The patient navigation research program. JNCI: J Natl Cancer Inst 2014;106.

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