



The impact of the COVID-19 pandemic on lung cancer presentation at a high-volume tertiary referral centre in South Africa

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Background. The COVID-19 pandemic had a significant impact on health services globally. Cancer diagnosis and treatment was one of the services most frequently reported to be disrupted. Several international studies showed a marked reduction in the number of new lung cancer cases.

Objectives. To assess the impact of the COVID-19 pandemic on lung cancer diagnosis at a high-volume tertiary referral centre in South Africa.

Methods. A retrospective audit was conducted of all patients with primary lung cancer who were presented at the multidisciplinary oncology meeting at Tygerberg Hospital, Cape Town, from January 2018 to December 2021, and the incidence of lung cancer was compared between two cohorts: one prior to and one during the COVID-19 pandemic. We collected data on patient demographics, as well as performance status. A combined panel staged all patients.

Results. During the COVID-19 pandemic there was a relative reduction of 46% in the frequency of lung cancer, from a mean of 25.6 cases per month to 13.9. Patients referred during the COVID-19 pandemic had statistically better performance status (75.0% v. 25.0% with performance status 0 - 2; $p=0.01$) and were more likely to have adenocarcinoma (49.7% v. 41.1%; $p=0.02$) than those referred before the pandemic. The proportion of potentially curable lung cancer at presentation (i.e. stages I - IIIA) did not differ between the two cohorts.

Conclusion. The COVID-19 pandemic resulted in a substantial decrease in the number of new lung cancers diagnosed. Patients who were diagnosed with lung cancer during the pandemic had better performance status and were more likely to have adenocarcinoma. No impact on the proportion of potential curable disease was noted.

Keywords. COVID-19, lung cancer, staging.

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Study synopsis

What the study adds. Health services globally were substantially impacted by the COVID-19 pandemic. Cancer diagnosis and treatment was one of the services most frequently reported to be disrupted. This study highlights the significant impact of the COVID-19 pandemic on lung cancer presentation in a high-volume tertiary hospital in South Africa.

Implications of the findings. Lung cancer is known to have high mortality. The reduction in lung cancer presentation during the COVID-19 pandemic is likely to result in an increase in lung cancer-related morbidity and mortality over the next few years.

Lung cancer is the second most commonly diagnosed cancer worldwide, after breast cancer.^[1] According to the World Health Organization (WHO), lung cancer resulted in 1.8 million deaths in 2020. It is also the most common cause of cancer mortality in both males and females.^[1]

The COVID-19 pandemic caused by SARS-CoV-2 had a significant impact on general health services.^[2] In a pulse survey conducted by the WHO in 2020, disruptions of essential health services were reported by nearly all countries, especially lower-income countries.^[3] Cancer diagnosis and treatment was one of the services most frequently reported to be disrupted globally.^[3] Several international studies showed a marked reduction in the number of new cases of lung cancer. More patients were found to be symptomatic at presentation, and more patients were found to have advanced disease.^[4-7]

The objective of our study was to compare the incidence of lung cancer between two cohorts, one prior to the COVID-19 pandemic and one during the pandemic, at a high-volume tertiary referral centre in South Africa (SA). We also compared the performance status, lung cancer staging and potential cure rate of patients at presentation.

Methods

We retrospectively collected data on all patients with primary lung cancer who were presented at the multidisciplinary oncology meeting at Tygerberg Hospital during the period January 2018 - December 2021. Tygerberg Hospital is a 1 380-bed tertiary facility in Cape Town. It is one of two referral centres in the city and renders tertiary service to a population of ~3 million people.

We collected data on routine demographics such as age and gender, along with patients' performance status according to the Eastern Cooperative Oncology Group (ECOG). All patients had access to positron emission tomography-computed tomography, bronchoscopy with endobronchial ultrasound-guided transbronchial needle aspiration with rapid on-site evaluation, transthoracic imaging (ultrasound or computed tomography)-guided biopsy, and related diagnostic techniques that were performed at the discretion of the treating doctors as per standard operating procedures. A combined panel of at least a pulmonologist, a thoracic radiologist, a thoracic surgeon, a specialist oncologist and a pathologist staged all patients as per the 8th edition of the International Association for the Study of Lung Cancer TNM staging system.^[8] Stages IA - IIIA were considered potentially curable at presentation.

Of the 4-year period, 27 months (January 2018 - March 2020) were designated as prior to the COVID-19 pandemic and 21 months (April 2020 - December 2021) as during the pandemic. Of note is the fact that access to bronchoscopy and other relevant staging modalities, as well as pathology services, were deemed emergency services and not halted at our institution during the pandemic.

We calculated and compared both the absolute number of lung cancers diagnosed per time period and the staging of the lung cancers (stage IA - IIIA v. IIIB - IVB) as categorical data. Basic descriptive statistics such as means, proportions and standard deviations (SDs) were calculated. Categorical data were analysed using the χ^2 test and continuous data using *t*-testing, with *p*<0.05 considered to be significant.

Ethical approval was obtained from the Health Research Ethics Committee of Stellenbosch University (ref. no. S22/02/001_COVID-19), and we were granted a waiver of informed consent owing to the retrospective nature of the study.

Results

Over the 4-year period, a total of 982 patients were included in the study. Of these, 690 (70%) formed the pre-pandemic group (27 months), with a frequency of 25.6 per month. A total of 292 new lung cancer diagnoses were made during the pandemic (21 months), equating to a frequency of 13.9 per month, with a relative reduction of 46%.

The mean (SD) age of included participants was 59.6 (10.0) years, and 606 (61.7%) were male (Table 1). There was no significant difference in age and sex distribution between the pre-pandemic and pandemic groups, including the pandemic cohort with a larger proportion of people living with HIV.

Overall, adenocarcinoma was significantly more common during than before the pandemic (49.7% v. 41.1%; *p*=0.02). In the pre-pandemic group, 4.4% had potentially curable lung cancer at initial presentation (stages I - IIIA), compared with 3.4% during the pandemic (*p*=0.59). Of note is the fact that patients had significantly better performance status (0 - 2) during the pandemic (*p*=0.01).

Discussion

During the COVID-19 pandemic, we observed a relative reduction of 46% in the incidence of lung cancer. Patients who were referred during the pandemic had statistically significantly better ECOG performance

Table 1. Demographics, cell types, stage and performance status for all lung cancer patients before and during the COVID-19 pandemic

	All (N=982), n (%) [*]	Pre-pandemic (n=690), n (%) [*]	During the pandemic (n=292), n (%) [*]	<i>p</i> -value
Demographics				
Age (years), mean (SD)	59.6 (10.0)	59.9 (9.9)	59.1 (10.1)	0.23
Sex (male)	606 (61.7)	423 (61.3)	183 (62.7)	0.71
HIV infected	61 (6.2)	36 (5.5)	25 (8.6)	0.06
Cell type				
NSCLC				
Adenocarcinoma	429 (43.7)	284 (41.1)	145 (49.7)	0.02
Squamous cell carcinoma	263 (26.8)	189 (27.4)	74 (25.3)	0.53
Poorly or undifferentiated	164 (16.7)	122 (17.7)	42 (14.4)	0.22
SCLC	126 (12.8)	95 (13.8)	31 (10.6)	0.21
Stage				
I	8 (0.8)	8 (1.2)	0 (0.0)	0.59 [†]
II	6 (0.6)	2 (0.3)	4 (1.4)	
IIIA	26 (2.7)	20 (2.9)	6 (2.0)	
IIIB	71 (7.2)	53 (7.7)	18 (6.2)	
IIIC	118 (12.0)	89 (12.9)	29 (9.9)	
IVA	433 (44.1)	299 (43.3)	134 (45.9)	
IVB	320 (32.6)	219 (31.7)	101 (34.6)	
ECOG performance status				
0 - 2	679 (69.1)	460 (66.7)	219 (75.0)	0.01
3 - 4	303 (30.9)	230 (33.3)	73 (25.0)	

SD = standard deviation; NSCLC = non-small cell lung cancer; SCLC = small cell lung cancer; ECOG = Eastern Cooperative Oncology Group.

^{*}Except where otherwise indicated.

[†]Stages I - IIIA v. IIIB - IVB.

status (75.0% v. 25.0% with performance status 0 - 2; $p=0.01$) and were more likely to have adenocarcinoma (49.7% v. 41.1%; $p=0.02$). However, the potential cure rate at presentation did not differ between the two cohorts.

The reduction observed in new lung cancer diagnoses is very similar to the results reported by other investigators from our institution, who reported a 36.2% decline in the number of all new cancers diagnosed during the first wave of the COVID-19 pandemic.^[9] These authors noted an overall reduction in the cytopathological diagnosis of cancer of 61.1%. Substantial declines were seen for prostate (58.2%), oesophageal (44.1%), breast (32.9%), gastric (32.6%) and colorectal cancer (29.2%). The smallest decline was for cervical cancer (7%).^[9] A study from Spain also reported a 38% reduction in new lung cancer cases.^[4]

In a pulse survey conducted by the WHO in 2020,^[3] disruptions of essential health services were reported by nearly all countries, especially lower-income countries. The disruptions were caused by a combination of factors including lockdowns impeding access to healthcare, financial difficulties during lockdowns, cancellation of elective services, reductions in attendance of outpatient services, staff redeployment to provide COVID-19 relief, unavailability of services owing to closures of health facilities or health services, and supply-chain difficulties. Cancer diagnosis and treatment was one of the services most frequently reported to be disrupted globally.^[3] At our institution, pulmonology services were markedly de-escalated owing to the need to use staff and other hospital resources in the COVID-19 response. Patients did not come to hospital because they were afraid of contracting the disease. Outpatient services were also de-escalated. Furthermore, COVID-19 may have caused increased mortality in patients with lung cancer prior to presentation.

The rate of potentially curable cancer (stages I - IIIA) was similar in the two groups, with no statistically significant difference ($p=0.59$). This finding is in contrast to some international studies that showed a reduction in early-stage lung cancer during the COVID pandemic.^[6] The most likely explanation for this observation internationally is the suspension of lung cancer screening in the developed world during the start of the pandemic.^[7] SA did not have a lung cancer screening programme at the time, and patients historically present to our institution late in the disease course.

Our study showed that patients who presented during the COVID-19 pandemic had better performance status than those who presented pre-pandemic. The most plausible explanation for this finding is selection bias, as referring doctors were arguably more likely to refer patients who could benefit from oncology services. It contrasts with international data, where most countries found patients who presented during the pandemic to be more symptomatic.^[4]

Adenocarcinoma is well known to be the predominant tissue type in new lung cancer diagnoses, both globally and locally.^[10] However, the statistically significant increase in the proportion of adenocarcinoma during the pandemic was an unexpected finding. One possible explanation is that lung cancer in younger adults tends to be adenocarcinoma and to be stage IV at presentation, which may have contributed to a selection bias.^[11]

One of the strengths of our study is that it was performed in a high-volume tertiary referral centre with access to all relevant staging

and diagnostic modalities. Potential limitations may include major selection bias during the peaks of the pandemic, when patients with perceived advanced disease or with very poor performance status were considered for palliation without referral.

Conclusion

During the COVID-19 pandemic there was a relative reduction of 46% in the incidence of lung cancer observed in a high-volume tertiary referral centre, and patients who were referred and diagnosed with lung cancer had statistically better performance status and were more likely to have adenocarcinoma than those in the pre-pandemic period. No impact on the proportion of potentially curable disease was noted.

Declaration. The research for this study was done in partial fulfilment of the requirements for IF's MMed (Int Med) degree at Stellenbosch University.

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