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## Introduction

- Lung cancer represents the most incident cancer worldwide and is the leading cause of cancer death in both more and less developed countries.<sup>1</sup>
- In Brazil, it was estimated that 27,330 new cases of lung cancer would occur in 2016<sup>1</sup>. However, few studies report treatment patterns regarding NSCLC in the country.
- Despite high burden of NSCLC, sparse data on resource use and treatment patterns of the disease in Brazilian private healthcare hamper decision-making process due to increased uncertainty in disease knowledge, treatment patterns and costs impact

## Objectives

- This real-world study describes the patterns of care and clinical profile of advanced NSCLC (aNSCLC), in addition to the use of resources during treatment and evaluate prognostic factors, in 6 of Brazilian private health care institutions.

## Methods

- Data from medical charts were retrospectively collected from six private institutions in Brazil, with Ethics Committees approval of all institutions involved.
- Key eligibility criteria included patients older than 18 years at the time of diagnosis (or recurrence), documented diagnosis of advanced (stages IIIB and IV) or recurrent NSCLC between January 2011 and July 2014 and having received at least two chemotherapy treatment lines. The follow-up period was determined until the end of inclusion period (03/03/17).
- Statistical analyses were performed using software R<sup>®</sup>.
- Data were summarized by measures of central tendency and dispersion and in absolute and relative frequencies. Survival analysis from aNSCLC diagnosis date was performed using Cox regression modelling.

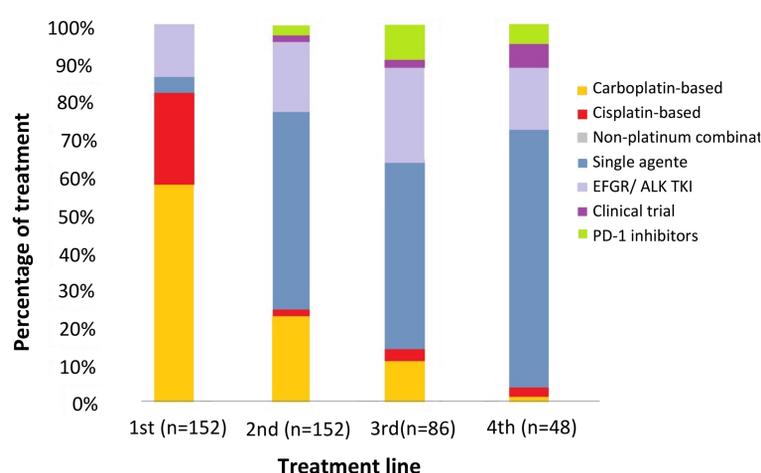
## Results

- Out of 430 charts of patients with NSCLC screened, 152 (non-squamous=121, squamous=26, unknown=5) were eligible. Patients' demographic and clinical characteristics are described in Table 1.
- As the objective of the study was to evaluate first- and second-line treatments, all patients had received two treatment lines, and 57.2% and 31.6% had received three and four treatment lines, respectively. Ten patients (6.6%) went through exclusive palliative care.
- Sixteen and 21 different regimens were used as first- and second-line treatments, respectively. Bevacizumab + carboplatin + paclitaxel (32 pts; 21.1%), carboplatin + pemetrexed (31 pts; 20.4%) and cisplatin + pemetrexed (26 pts; 17.1%) were the most frequent first-line regimens, while docetaxel (36 pts; 23.7%), pemetrexed (26 pts; 17.1%) and carboplatin + pemetrexed (20 pts; 13.2%) were the most common second-line regimens. The most commonly used treatments are described in Figure 1.
- PD-1 inhibitor therapy was used in four of the six research sites and in 20 patients of the study. Nivolumab was used in 19 of the patients using PD-1 inhibitors therapy. Among the reasons for therapy selection, expanded access to clinical trial drug was the most common (26.3%). Additionally, treatments were evaluated until the most recent data, and most of the patients were treated with Nivolumab after its approval in Brazil (May 2016).

**Table 1. Patients' demographic and clinical characteristics**

Characteristic	Patients (N = 152)
<b>Age at NSCLC diagnosis (years)</b>	
Mean (SD)	62.6 (12.5)
Median (range)	62 (25 - 91)
<b>Gender, n (%)</b>	
Male	85 (55.9)
<b>Ethnicity, n (%)</b>	
Caucasian	70 (46.1)
Black	6 (3.9)
Asian	4 (2.6)
Other	16 (10.5)
Unknown	56 (36.8)
<b>Family history of lung cancer, n (%)</b>	
No	101 (66.4)
Yes	23 (15.1)
Unknown	28 (18.4)
<b>Smoking history, n (%)</b>	
Nonsmoker	55 (36.2)
Smoker/ Former smoker	91 (59.8)
Unknown	6 (3.9)
<b>Alcohol consumption, n (%)</b>	
No	61 (40.1)
Social drinker	60 (39.5)
Alcoholic	7 (4.6)
Former alcoholic	2 (1.3)
Unknown	22 (14.5)
<b>Comorbidities, n (%)</b>	
Hypertension	64 (42.1)
Diabetes (Type 1 or 2)	26 (17.1)
Obesity	10 (6.6)
Emphysema	9 (5.9)
Bronchitis	6 (3.9)
Other	88 (57.9)
<b>Healthcare coverage, n (%)</b>	
Private healthcare plan	130 (85.5)
Out-of-Pocket	22 (14.5)

**Figure 1. Treatment patterns in aNSCLC, by line of therapy**



## Results (Cont.)

- During the duration of treatment, 52% of the patients were hospitalized, 25% had emergency room visits, 95.4% used supplemental medication (median number of medications 13 [1-85]), and 50% were submitted to supplemental procedures (median number of procedures 1 [1-16]). The frequency of resource use per treatment line is described in Table 3.
- Survival analysis with Cox regression modelling described gender as a prognostic factor in aNSCLC (Figure 2).

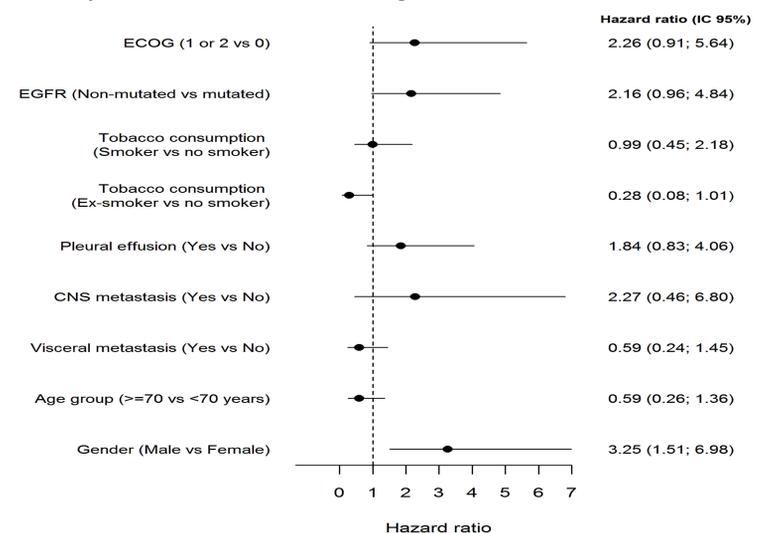
Characteristic	Patients (N = 152)	Characteristic	Patients (N = 152)
<b>Histology, n (%)</b>		<b>Metastasis sites<sup>b</sup>, n (% of metastatic patients)</b>	
Squamous cell carcinoma	26 (17.1)	Bone	39 (39.4)
Non-squamous cell carcinoma	121 (79.6)	Lungs	28 (28.3)
Unknown	5 (3.3)	Pleura	24 (24.2)
<b>Tumor location at diagnosis (ICD-10 code), n (%)</b>		Central Nervous System	14 (14.1)
Upper lobe, bronchus or lung (C34.1)	52 (34.2)	Lymph Nodes	13 (13.1)
Lower lobe, bronchus or lung (C34.3)	30 (19.7)	Liver	11 (11.1)
Middle lobe, bronchus or lung (C34.2)	12 (7.9)	Adrenal Glands	11(11.1)
Overlapping sites of bronchus and lung (C34.8)	8 (5.3)	Other	11 (11.1)
Unspecified part of bronchus or lung (C34)	50 (32.9)	<b>Recurrence, n (%)</b>	
<b>Sampling method<sup>c</sup>, n (%)</b>		No	139 (91.4)
Bronchoscopy	31 (20.4)	Yes	13 (8.6)
Needle biopsy	29 (19.1)	<b>Therapies previous to recurrence<sup>d</sup>, n (%)</b>	
Fine needle aspiration	28 (18.4)	Surgery	8 (61.5)
Video thoracic surgery	13 (8.6)	Radiotherapy	3 (23.1)
Pleuroscopy	13 (8.6)	Chemotherapy	6 (46.2)
Lymphnodes biopsy	6 (3.9)	Chemo-radiotherapy	3 (23.1)
Mediastinoscopy	6 (3.9)	<b>Pleural effusion at aNSCLC diagnosis, n (%)</b>	
Thoracocentesis	3 (2.0)	Yes	55 (36.2)
Unknown	28 (18.4)	No	97 (63.8)
<b>Diagnosis method, n (%)</b>		<b>Patients tested for biomarkers, n (%)<sup>b</sup></b>	
Immunohistochemistry (IHC)	79 (52)	EGFR <sup>c</sup>	116 (76.3)
Microscopy (Hematoxylin-Eosin)	44 (28.9)	ALK <sup>c</sup>	38 (25)
Unknown	29 (19.1)	KRAS <sup>d</sup>	9 (5.9)
<b>Image tests on aNSCL diagnosis<sup>e</sup>, n of exams (% of total exams)</b>		EGFR-positive, n (% of tested)	41 (35.3)
CT-Scan	172 (34.1)	ALK-positive, n (% of tested)	6 (15.8)
MRI	81 (16.1)	KRAS-positive, n (% of tested)	3 (33.3)
PET-CT	80 (15.9)	<b>Tumor stage at the primary diagnosis (AJCC 7th edition), n (%)</b>	
X-Ray	26 (5.2)	Stage IA	1 (0.7)
Bronchoscopy	20 (4.0)	Stage IIA	1 (0.7)
Other	125 (24.8)	Stage IIB	1 (0.7)
<b>ECOG performance status in first-line start, n (%)</b>		Stage IIIA	2 (1.3)
0	30 (19.7)	Stage IIIB	13 (8.6)
1	84 (55.3)	Stage IV	133 (87.5)
2	4 (2.6)	Unknown	1 (0.7)
Unknown	34 (22.4)		

AJCC, American Joint Committee on Cancer; ALK, anaplastic lymphoma kinase gene; ECOG, Eastern Cooperative Study Group; EGFR, epidermal growth factor receptor gene; KRAS, Kirsten rat sarcoma viral oncogene homolog.  
<sup>a</sup> Of the 149 patients with available information on this field, all were submitted to image testing. Some patients image test performed.  
<sup>b</sup> Double count is possible.  
<sup>c</sup> 3 patients needed re-sampling for biomarkers testing, of which 1 was submitted to re-sampling by needle biopsy and 2 by unknown methods.  
<sup>d</sup> 1 patient needed re-sampling for KRAS test. The re-sampling method was unknown.

**Table 3. Frequency of resource use per treatment line**

Resource	Treatment Line			
	1L (n=152)	2L (n=152)	3L (n=86)	4L (n=48)
Concomitant Medication	134 (88.2%)	133 (87.5%)	75 (87.2%)	30 (62.5%)
Support Procedures	36 (23.7%)	34 (22.4%)	19 (22.1%)	13 (27.1%)
Exams	147 (96.7%)	145 (95.4%)	81 (94.2%)	40 (83.3%)
Radiotherapy	54 (35.5%)	33 (21.7%)	22 (25.6%)	4 (8.3%)
Surgery	29 (19.1%)	7 (4.6%)	7 (8.1%)	1 (2.1%)
Hospitalization	37 (24.3%)	31 (20.4%)	21 (24.4%)	15 (31.3%)
Ambulatory Care	144 (94.7%)	138 (90.8%)	81 (94.2%)	42 (87.5%)
Emergency Care	12 (7.9%)	14 (9.2%)	5 (5.8%)	8 (16.7%)

**Figure 2. Cox analysis of survival after aNSCLC diagnosis**



## Limitations

- This study presents some limitations: retrospective studies often have incomplete data; treatment patterns represent only the practices of physicians who participated in the study; results do not allow conclusions for causal explanations due to cohort study design.

## Conclusions

- A high degree of heterogeneity in treatment patterns for NSCLC in these 6 of Brazilian private institutions indicates the lack of a clear effective standard of care for these patients in the pre-immunoncology era. The observed high resource use among aNSCLC patients suggests an important economic burden to the private healthcare system. Cost information on these resources would provide an important input into the decision-making process in private healthcare

## References

- Ministério Da Saúde, Instituto Nacional De Câncer José Alencar Gomes Da Silva (INCA). Incidência De Câncer No Brasil - Estimativa 2016. Ministério Da Saúde; 2016.