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Patient-Reported Outcomes

Impact of Lung Cancer on Health-Related Quality of Life, Financial Toxicity, and Household Economics in Patients From the Public and the Private Healthcare Sector in Argentina

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ABSTRACT

Objectives: Non–small cell lung cancer (NSCLC) is Argentina's first cause of cancer death. Most patients have an advanced stage at diagnosis, with poor expected survival. This study aimed to characterize the health-related quality of life (HRQOL) and economic impact of patients treated in the private healthcare sector and compare it with that of the public sector.

Methods: We undertook an observational cross-sectional study that extended a previous study to a referral private center in Argentina. Outcomes included the EuroQol EQ-5D-3L (to assess HRQOL), Comprehensive Score for Financial Toxicity (financial toxicity instrument), Work Productivity and Activity Impairment – General Health (to assess productivity loss), and out-of-pocket expenses in adults diagnosed of NSCLC.

Results: We included 30 consecutive patients from a private healthcare center (July 2021 to March 2022), totaling 131 patients (n = 101 from previous public study). The whole sample had low quality of life and relevant economic impact. Patients in the private healthcare sector showed lower disease severity and higher educational level and household income. In addition, private healthcare system patients showed higher utility (0.77 vs 0.73; $P < .05$) and lower impairment of daily activities (41% vs 59%; $P = .01$). Private health system patients also showed lower financial toxicity as measured by the Comprehensive Score for Financial Toxicity score (23.9 vs 20.14; $P < .05$) but showed no differences when financial toxicity was assessed as a dichotomic variable.

Conclusions: Although patients with NSCLC treated in a private healthcare center in Argentina showed a relevant HRQOL and economic impact, this impact was smaller than the one observed in publicly funded hospitals.

Keywords: financial toxicity, health expenditures, health-related quality of life, non–small cell lung cancer.

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Introduction

Lung cancer (LC) is the most frequently diagnosed tumor and is the leading cause of cancer death worldwide. Non–small cell LC (NSCLC) accounts for approximately 80% to 85% of malignant lung tumors. Eighty-five percent of patients have an advanced stage at the time of diagnosis, with survival in this setting being 4 to 6 months without treatment. It also represents the first cause of cancer death in Argentina.[1-3]

The diagnosis of LC has a great impact on the individual, his or her family, and the social network that surrounds him or her, causing an important deterioration in the health related quality of life (HRQOL) related to health.[2-4] Likewise, many households are economically affected by the direct expenses generated during the diagnostic and therapeutic process or by loss of work productivity.[5] In turn, patients diagnosed of cancer who experience financial toxicity are more likely to have less adherence to treatment or follow-up, affecting the efficacy of the treatments established, with detriment to their survival and HRQOL.[6-8]

The health system of Argentina has 3 sectors: public, social security, and private. The public sector includes the national and provincial ministries and the network of public hospitals and primary healthcare units that provide care to the poor and uninsured population. The social security sector covers all workers of the formal economy and their families. Finally, the private sector includes all those private providers offering services to individuals, social security sector beneficiaries, and all those with private health insurance. This sector also includes private insurance agencies called Prepaid Medicine Enterprises, financed mostly through premiums paid by families or shared with employers.[9]

During 2019, a cross-sectional study was conducted in Argentina with the aim of characterizing the HRQOL and economic impact in patients diagnosed of NSCLC who are treated in public hospitals; however, this study only had the perspective of patients

Table 1. Characteristics of patients with non–small cell lung cancer included in the extension study to the private sector (N = 30) and those of the parent public healthcare system study (N = 101).

Variables	Public sector	Private sector
Sociodemographic and clinical characteristic	Value	Value
Age, years, mean (SD)	65.7 (8.9)	66.12 (8.54)
Sex	n (%)	n (%)
Male	56 (55.4)	10 (33.3)
Female	45 (44.6)	20 (66.7)
Medical center		
Instituto de Oncología Ángel H. Roffo	76 (75.2)	0 (0)
H.I.E.A y C. San Juan de Dios	25 (24.8)	0 (0)
Instituto Alexander Fleming	0 (0)	30 (100)
Residence		
City of Buenos Aires	17 (16.8)	15 (50)
Buenos Aires Province	74 (73.3)	12 (40)
Other	10 (9.9)	3 (10)
Marital status		
Single	9 (8.9)	0 (0)
Married	50 (49.5)	16 (53.3)
Domestic partner	13 (12.9)	0 (0)
Widowed	14 (13.9)	6 (20)
Divorced/separated	15 (14.8)	8 (26.6)
Education		
Incomplete primary school	14 (13.9)	0 (0)
Primary school completed	37 (36.6)	0 (0)
Incomplete secondary education	15 (14.8)	1 (3.3)
Secondary school completed	19 (18.8)	5 (16.7)
Tertiary/university	16 (15.8)	24 (80)
Medical insurance*		
PAMI (retirees insurance)	56 (55.4)	0 (0)
Social security	27 (26.7)	2 (6.7)
Private	3 (3)	28 (93.3)
Public	19 (18.8)	0 (0)
Household income (US$)		
≤122.95	5 (4.9)	0 (0)
>122.95 and ≤ 187.75	2 (1.9)	0 (0)
>187.75 and ≤ 518.41	8 (7.9)	0 (0)
>518.41 and ≤ 631.39	6 (5.9)	0 (0)
>631.39 and ≤ 746.04	13 (12.9)	0 (0)
>746.04 and ≤ 907.21	8 (7.9)	2 (6.7)
>907.21 and ≤ 1101.6	11 (10.9)	1 (3.3)
>1101.6 and ≤ 1329.24	16 (15.8)	1 (3.3)
>1329.24 and ≤ 1827.7	5 (4.9)	4 (13.3)
>1827.7	8 (7.9)	14 (46.7)
Not reported	19 (19.1)	8 (26.7)
Disease stage		
I	13 (12.9)	8 (26.7)
II	15 (14.8)	0 (0)
IIIa	15 (14.8)	1 (3.3)
IIIb	16 (15.8)	6 (20)
IV without brain metastasis	42 (32.2)	15 (50)
IV with brain metastasis	4 (9.5)	3 (20)
ECOG performance status		
0-I	34 (33.7)	29 (96.7)
II	55 (54.5)	0 (0)
III	12 (11.9)	0 (0)
IV	0 (0)	1 (3.3)

continued on next page

Note. Mean exchange rate US$1 = ARS 106. PAMI is an insurance for retirees and pensioners.
ECOG indicates Eastern Cooperative Oncology Group; PAMI, Programa de Atención Médica Integral (Comprehensive Medical Care Program).
*Some patients report more than one medical insurance.

served by the public health system and did not consider patients who are treated in the private healthcare sector.[10] Studies in other regions of the world have shown that the healthcare system or sector (private or public) is associated with differential financial toxicity, so the estimate for the public sector may not be representative for the country as a whole or for patients served by the private healthcare sector.[11]

Therefore, we conducted an extension study to complement the results of the previous study to the private healthcare sector in Argentina to describe the impact of NSCLC in this group of patients and to compare the results with those of the public healthcare sector.

Methods

A cross-sectional study extension was conducted with collection of clinical, demographic, socioeconomic, and out-of-pocket data at the individual and household levels in patients with NSCLC in a private healthcare institution in Argentina (Alexander Fleming Institute). Patients older than 18 years with a diagnosis of NSCLC at least 3 months before recruitment were included. The main variables were HRQOL, out-of-pocket expenses, productivity, financial toxicity, and catastrophic expenditure. These variables were assessed with a self-administered questionnaire, the EQ-5D-3L for HRQOL, Comprehensive Score for Financial Toxicity (COST) instrument for financial toxicity, and Work Productivity and Activity Impairment (WPAI) – General Health questionnaire for productivity impacts. EQ-5D-3L Argentina population–based preference-based values were used to value each patient-reported EQ-5D-3L state.[12-14]

The catastrophic expenditure related to the diagnosis of NSCLC was considered using 2 definitions, being deemed present if it met either of the following: if the declared direct health expenditure for care in the last month represented 10% or more of the total declared family income, or if the declared direct health

Table 2. Health Related Quality of life, productivity impact and financial toxicity in private and public healthcare sectors.

Population	Total	Private healthcare sector	Public healthcare sector	*P* value
Health Related Quality of life: EQ-5D VAS				
Overall population	70.2 (18.5)	73.57 (18.79)	69.2 (18.4)	*P* = .2378
Early stage	72.5 (16.9)	80 (12.3)	70.9 (17.6)	*P* = .063
Advanced stage	68.7 (19.4)	70.4 (20.9)	67.9 (18.9)	*P* = .5687
Health Related Quality of life: EQ-5D index				
Overall population	0.74 (0.24)	0.77 (0.3)	0.73 (0.22)	*P* = .049
Early stage	0.79 (0.22)	0.90 (0.09)	0.76 (0.23)	*P* < .001
Advanced stage	0.70 (0.25)	0.71 (0.34)	0.70 (0.22)	*P* = .88
Percentage of disability or impairment of daily activities due to the disease by WPAI questionnaire				
Overall population	54.9% (31.6)	41% (35.4)	59% (29.3)	*P* = .014
Early stage	49.2% (30.8)	27.8% (28.2)	53.7% (29.7)	*P* = .03
Advanced stage	58.6% (31.8)	46.7% (37.2)	62.9% (28.7)	*P* = .08
COST questionnaire value (financial toxicity)				
Overall population	21 (9.6)	23.9 (8)	20.14 (9.91)	*P* = .036
Early stage	24.3 (8.3)	25.8 (5.65)	23.97 (8.75)	*P* = .4431
Advanced stage	18.9 (9.9)	23.1 (8.83)	17.31 (9.84)	*P* = .016
Prevalence of financial toxicity by COST questionnaire				
Overall population	67.9% (89)	60% (18)	70.3% (71)	OR = 0.63 (95% CI 0.27-1.48)
Early stage	50% (26)	44.4% (4)	51.2 % (22)	OR = 0.76 (95% CI 0.18-3.24)
Advanced stage	79.7% (63)	66.6% (14)	84.5% (49)	OR = 0.37 (95% CI 0.12-1.16)

Note. Data are expressed as mean (standard deviation) or percentage (absolute number). Early stage (I-II-IIIa), advanced stage (IIIb-IV).
COST indicates Comprehensive Score for Financial Toxicity; OR, odds ratio; VAS, visual analog scale; WPAI, Work Productivity and Activity Impairment.

expenditure for the care of the person diagnosed of NSCLC in the last month was 40% or more of the total household affordability.[15]

Eligibility criteria and operational definitions of the variables are consistent with the inception study done in the public healthcare sector and funded by the National Cancer Institute in Argentina.

A balanced quota sampling was contemplated in relation to 2 subgroups of disease severity, aiming at recruiting half of the sample in stages I to III and the other half in stage IV.

The protocol was approved by the institution's internal ethics committee, and all patients signed a written informed consent.

We analyzed the patients included from the private sector, and in addition, we included patients from the previous study in the public healthcare sector. Due to the high inflation rates between the 2 study periods, the income and costs of patients in the public healthcare sector study were updated. For the update of the out-of-pocket costs, healthcare consumer price index was used to update the values from the month in which each patient was interviewed to February 2021.[16] To update the income, the value was modified according to the original income decile of the patients to the values of the deciles of the private healthcare sector study (as of February 2021), respecting the decile of each patient. For the conversion to dollars, we used the values of the National Bank of Argentina at the end of the recruitment phase (exchange rate US$1 = ARS 106, February 2022).[17]

Descriptive analysis and comparisons between groups were analyzed by Student's *t* test, one-way analysis of variance or

Figure 1. Frequency of response by domain in EQ-5D-3L in the study population at the private center (N = 30).

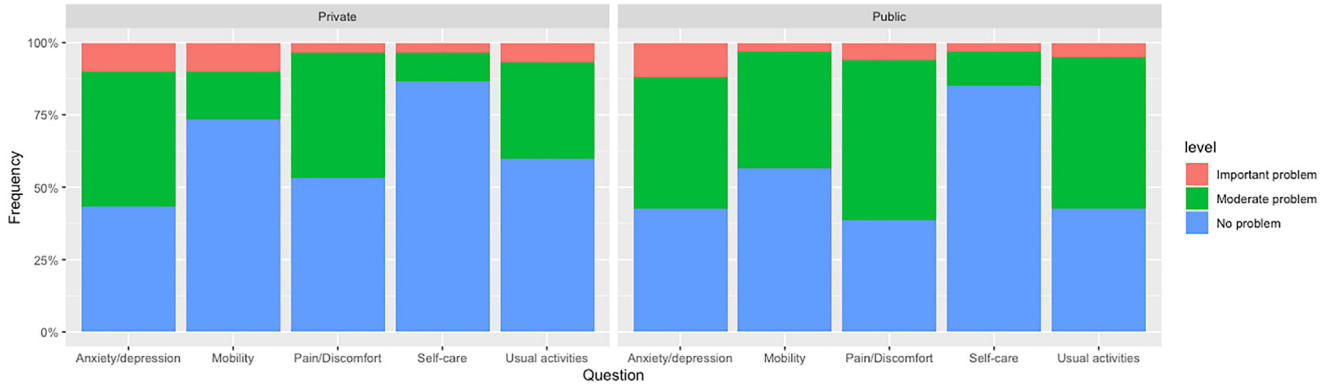
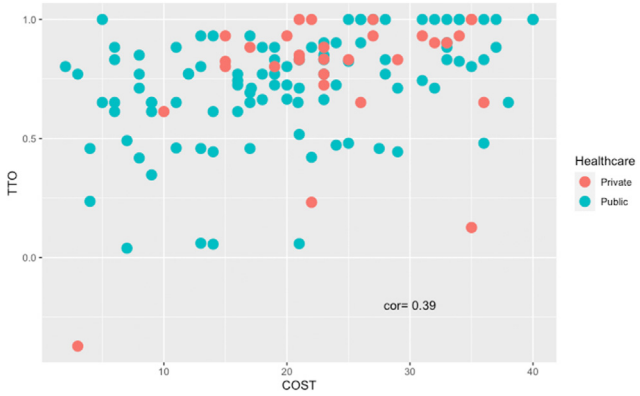


Figure 2. Correlation between TTO and COST by healthcare sector.



COST indicates Comprehensive Score for Financial Toxicity; TTO, time trade-off.

Kruskal-Wallis H test according to the distribution of the variables for continuous data, and chi-square or Fisher's exact test for categorical data, as appropriate. The R version 4.0.4 statistical program was used for data analysis. Results with an alpha level (p) of <0.05 were interpreted as statistically significant.[18]

Results

Thirty patients from the private sector were included in this study extension (66.7% women, average age of 66 years), from July 2021 to March 2022. Eighty percent of the patients had tertiary/university education, and 93% were covered by private insurance or prepaid insurance. Of the patients who responded, 63.6% were within the 10th percentile of family income (highest income), and >80% were between the 9th and 10th percentiles. Fifteen patients had stage IV cancer, of whom 3 had brain metastasis. Of the remaining patients included, the majority were stage I or IIIb. Twenty-nine of the 30 patients were found to be Eastern Cooperative Oncology Group grades 0 to 1, and only 1 patient was grade IV. The characteristics of the patients included in this extension in the private sector as well as those of the parent public healthcare system study are presented in Table 1.

The corresponding results of HRQOL, regular activities, and COST in the private and public health sectors are presented in Table 2. The private healthcare population showed a higher mean HRQOL index measured by the EQ-5D index than the public sector patients (mean 0.77 vs 0.73; $P < .05$). The most affected areas of HRQOL in all patients were anxiety/depression, pain/discomfort, and activities of daily living; however, none of the areas had a high percentage of large alterations (Fig. 1). Analyzing by disease stage, a similar effect was observed in patients with early-stage disease (mean 0.9 vs 0.76; $P < .001$) but not in patients with advanced-stage disease (mean 0.71 vs 0.70; $P = .88$). The same was seen in the disability or impairment of daily activities due to the disease assessed by Work Productivity and Activity Impairment - WPAI, where patients in the private healthcare sector showed less impairment than patients in the public sector (mean 41% vs 59%; $P = .01$), observing this difference both in early-stage patients (mean 27.8% vs 53.7%; $P = .01$) as well as in late-stage patients (mean 46.7% vs 62.9%; $P = .08$), although not reaching statistical significance in the latter. The COST showed higher scores (lower financial toxicity) in private healthcare sector patients (23.9 vs 20.14, respectively; $P = .04$); when assessing subgroups there was no statistical difference in early-stage patients (25.8 vs 23.97; $P = .4$), while there was statistical difference in late-stage patients (23.1 vs 17.31; $P = .02$). Though the mean odds ratio suggested less financial toxicity in private healthcare patients as compared to the public healthcare patients, no statistically significant differences was found (odds ratio 0.63; 95% CI 0.27-1.48). Results were similar both in early- and late-stage subgroups. The correlation between financial toxicity measured by COST and HRQOL (r 0.39; 95% CI 0.23-0.52) is presented in Figure 2.

The mean monthly out-of-pocket expenditure in the private sector was higher than in the public sector (US$292.29 vs US$125.42; $P = .04$); differences were also observed by severity category, although not reaching statistical significance (Table 3). The prevalence of catastrophic expenditure (using both health expenditure >10% of family income and health expenditure >40% of ability to pay) was assessed in 85 patients. Thirty-three patients (38.8%) had catastrophic expenditure >10% of family income and 19 (22.35%) had health expenditure >40% of ability to pay. Catastrophic expenditure could only be assessed in 15 patients in the private sector, where 7 patients had catastrophic expenditure with health expenditure >10% of family income and 4 with health expenditure >40% of ability to pay.

Discussion

This study extends our previous work—which assessed the HRQOL and economic impact of NSCLC in the public healthcare sector—to patients served in the private healthcare sector in Argentina. We describe and quantify the impact of this important health problem in the private healthcare sector in Argentina and compare it with that found in the public sector.

In both the parent and the present extension studies, an impact on HRQOL and economic domains was found. In the present study, a better HRQOL and activity and lower financial toxicity were observed in the private health sector patients than those served by the public sector. In addition, a moderate relationship between HRQOL and financial toxicity was observed in the overall sample, with catastrophic spending found in almost 4 of 10 patients in the overall sample. However, it is important to consider the low sample size and the possible respondent bias of the participants who chose to state their income and health costs.

Table 3. Monthly out-of-pocket expenditures in private and public healthcare sectors.

Population	Total		Private sector		Public sector		*P* value
	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	
Global	99	US$157.45 (250.58)	19	US$292.29 (314.44)	80	US$125.42 (223.5)	*P* = .04
Early stage	42	US$109.83 (208.05)	7	US$350.99 (412.23)	35	US$61.59 (88.55)	*P* = .11
Advanced stage	57	US$192.54 (274.3)	12	US$258.05 (256.18)	45	US$175.08 (279.05)	*P* = .34

Note. Mean exchange rate US$1 = ARS 106.

Our findings on HRQOL impact of NSCLC in Argentina were broadly similar to those of other studies conducted in other countries or regions of the world, following broadly similar methodologies. Doyle et al[19] found a utility value in patients with NSCLC slightly lower than that found in our study (0.67); however, all the patients had advanced disease (stable metastasis). In contrast, Grutters et al[20] showed a mean utility value of 0.74, a value similar to that found in the present work. They also found a decrease in HRQOL as the stage of the disease increases, with the exception of stage IV; however, they only included 2 patients in that stage.

Friedes et al[21] assessed financial toxicity through the COST in patients with predominantly stage III or IV LC in the United States with a 6-month follow-up, where both baseline (COST = 25) and 6-month (COST = 27) values were higher than those found in our study. This is a somewhat expected result as the United States is a country with high financial burden of healthcare expenses to patients and families compared with lower- and middle-income countries.[22]

Other studies have also shown a relationship between HRQOL and financial toxicity in patients with LC in general with similar estimates.[23,24] In addition, a systematic review analyzing the relationship between employment status and financial toxicity found increased financial toxicity in patients with limited access to health coverage.[25]

Chen et al[26] found higher values of catastrophic spending, defined as healthcare cost-to-income ratio >40% of annual household income in China, where 73.7% had catastrophic spending. It is important to note that only 16% of the patients had NSCLC, whereas almost 50% had adenocarcinoma, so costs may differ among different types of LC.

This study is an extension of a previous study conducted in the public healthcare sector. In the present extension, we added patients who were treated in the private healthcare system, which allows a more comprehensive understanding of the impact of this disease on the HRQOL, financial toxicity, and productivity of patients in the city of Buenos Aires, Argentina.[10]

Some limitations should be noted. First, this extension to the private healthcare sector was undertaken in a small sample from a single private institution specialized in oncology in the city of Buenos Aires. The sample in the private sector was approximately one-third of that of the public sector and from a single center. Although, given the exploratory nature of the study, the sample size in the private sector was considered sufficient for an initial description and comparison to the public sector population, it does not allow us to generate more conclusive conclusions regarding the variables of interest in this subgroup or extend it to the private healthcare sector population as a whole.

Second, the extension study to the private healthcare sector was done 2 years after the initial study, and although there were no important new drugs approved for NSCL in Argentina, treatment patterns could have somewhat changed.

Conclusions

This study highlights the relevance and impact of NSCLC on HRQOL, financial toxicity, labor productivity, and catastrophic health expenditure in patients treated in both the public and private sectors of the city and province of Buenos Aires in Argentina. It can serve as a relevant input to recognize and develop tools to improve wellbeing and reduce the financial burden on patients, care teams, and the health system. Further studies are still needed to extend our results to other jurisdictions that will contribute to a more comprehensive assessment of the health and economic impact of NSCLC in Argentina.

Author Disclosures

Links to the disclosure forms provided by the authors are available here.

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