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The influence of season and distance to a cancer centre on lung cancer treatment rates

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ABSTRACT

Background: Our tertiary Canadian academic cancer centre serves a population as far as 200 km away. We assessed whether driving time or winter season affected uptake of systemic treatment for non-small cell lung cancer (NSCLC) patients.

Materials and methods: With ethics approval, we performed a retrospective analysis of stage IIIB and IV NSCLC outpatients seen from 2009 to 2012. Patients were stratified by driving time from our cancer centre. Demographics, treatment and survival data were collected.

Results: In the overall cohort, 514 patients were included. The median age was 68, 56% were male and 71% had performance status 0–2. By drive time, 420 patients lived < 60 min and 94 patients ≥ 60 min from the cancer centre. There were no statistically significant differences in baseline demographics between patients in these two groups. For patients living closer vs further, driving time had no impact on receiving systemic therapy (55% vs 53% p = 0.72), or median overall survival (OS) (7.4 vs 8.0 months, p = 0.55). 133 patients were seen during winter months, 106 vs 27 residing < 60 vs ≥ 60 min away. Patients seen during winter months were as likely to receive systemic therapy as those seen during the rest of the year (56% vs 54%, p = 0.80) and had similar survival (8.4 vs 7.0 months, p = 0.69).

Conclusions: A long travel time to the cancer centre, even in winter months, did not adversely impact treatment rates for advanced NSCLC. These results suggest that centralization of medical oncology services does not limit uptake of available care options.

Microabstract

A long travel time to the cancer centre may create a barrier to access. In a retrospective analysis of 514 patients with stage IIIB and IV NSCLC, proximity to the cancer centre and winter season had no impact on the uptake of systemic therapy or overall survival. Centralization of medical oncology services does not limit uptake of available care options.

1. Introduction

Lung cancer poses a significant public health burden in Canada. It is estimated that there were 26,600 new lung cancer cases in Canada in 2015 accounting for almost 14% of new cancer cases. Lung cancer is the leading cause of cancer death. It is estimated that 20,900 people died of lung cancer in Canada in 2015 accounting for approximately 27% of cancer-related deaths [1].

Most patients with non-small cell lung cancer (NSCLC) present with advanced disease. It is known that systemic therapy can improve both survival and quality of life in patients with advanced NSCLC [2].

Different models of cancer care delivery may exist. Our institution, located in Ottawa, Ontario, is a centralized model of cancer care delivery. We serve a mixed urban and rural population of nearly 1.5 million in Eastern Ontario. The estimated incidence age-standardized rate for lung cancer in our Local Health Integration Network (Champlain LHIN) is estimated to be 74.2 in 2017 which is similar to the Ontario average [3]. We have two main cancer centres, The Ottawa Hospital Cancer Centre (TOHCC) and the Irving Greenberg Family Cancer Centre (IGFCC). These sites are located 16 km apart and are central to the geographic area they serve. All patients have their physician visits at one of these two sites. The number of physician visits is

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Table 1
Baseline demographics.

Demographic	All patients N = 514		Patients living < 60 min from cancer centre N = 420		Patients living ≥ 60 min from cancer centre N = 94		P-value
	N	%	N	%	N	%	
Age							0.14
< 70	297	58	249	59	48	51	
≥ 70	217	42	171	41	46	49	
Median (range)	68 (35–90)		67 (35–89)		69 (44–90)		0.23
Gender							0.42
Male	287	56	238	57	49	52	
Female	227	44	182	43	45	48	
PS							0.47
0–2	363	71	292	70	71	76	
3–4	111	22	95	23	16	17	
Unknown	40	8	33	8	7	7	
Smoking status							0.21
Current	219	43	282	43	38	40	
Ex-smoker	253	49	303	48	51	54	
Never smoked	36	7	33	8	3	3	
Unknown	6	1	4	1	2	2	
Pack-year history							0.99
Median (range)	40 (0–200)		40 (0–200)		40 (0–122)		
Weight loss							0.50
< 5%	224	44	179	43	45	48	
≥ 5%	252	49	211	50	41	44	
Unknown	38	7	30	7	8	9	
Constitutional symptoms	319	62	263	63	56	60	0.21
Baseline labs							
Hb < 100 g/L	27	5	24	6	3	3	0.72
LDH ≥ 250 U/L	51	10	40	10	11	12	0.78
Cr ≥ 120 μmol/L	38	7	31	7	7	7	0.83
WBC ≥ 11 × 10^9/L	180	35	148	35	32	34	0.97
Platelets ≥ 400 × 10^9/L	128	25	111	26	17	18	0.24

Data are presented as n (%) except where otherwise noted. Percentages as reported are rounded to the nearest whole number.
Abbreviations: min minutes, PS performance status, Hb Hebmoglobin, LDH lactate dehydrogenase, Cr Creatinine, WBC while blood cell.

at the discretion of the treating oncologist, although it would be considered standard at our institution to have a physician visit prior to each cycle of chemotherapy. In addition to TOHCC and the IGFCC, patients receiving intravenous systemic therapy can receive their therapy at one of several community hospitals located in Renfrew (73 km west of TOHCC), Pembroke (150 km west of TOHCC) Winchester (47 km south of TOHCC) and Hawkesbury (95 km east of TOHCC). Patients may travel as far as 200 km for physician visits and 129 km to access systemic treatment. There are no community oncologists practicing independently in the region, so patients are required to come to the cancer centre for treatment options.

The impact of distance to a cancer centre on the uptake of various available care options in several malignancies has shown conflicting results in previous studies [4–13]. The potential distance barrier may be of greater relevance in Ontario where seasonal weather can make travel difficult during the winter months due to extreme cold and snowstorms. It is unknown whether our institution's large geographic catchment area and our region's winter climate create barriers to accessing lung cancer treatment. With the goal of determining whether our centralized medical oncology service model provided equal access to systemic therapy, we assessed whether season or distance from the cancer centre affected the uptake of systemic therapy and overall survival (OS) in patients with advanced NSCLC at our institution.

2. Methods

With local research ethics board approval, we performed a retrospective single-centre chart review of all patients with advanced NSCLC at our institution who were seen by medical oncologists in initial consultation as outpatients between 2009 and 2012. Only patients with histologically-confirmed NSCLC were included in the analysis. Patients were included if they had stage IIIB (palliative intent) or stage IV NSCLC at the initial consult (or that stage established as the result of investigations initiated at the same time). Patients were excluded if their first consult with medical oncology occurred as an inpatient. Patients receiving curative therapy and those who had been treated with curative intent for NSCLC and then referred on relapse also were excluded. The full methods and outcomes from treatment have been previously described [14].

Baseline data on patient demographics, laboratory and clinical assessments, disease characteristics and treatment with systemic therapy and radiotherapy were recorded. Systemic therapy included platinum doublets, cytotoxic monotherapy and tyrosine kinase inhibitors. The Eastern Cooperative Oncology Group performance status (PS) [15], when not recorded directly in the clinical notes, was estimated from the clinical assessment at the time of the first medical oncology consultation. Distance and time from the nearest cancer centre was defined as the distance and time from the TOHCC or IGFCC, whichever was nearer. Patients were analyzed in subgroups with the following distance and time cut-offs from the nearest cancer centre: < 60 min vs ≥ 60 min, < 70 km vs ≥ 70 km, < 100 km vs ≥ 100 km and < median distance vs ≥ median distance. Driving time and distance were calculated using online mapping websites. Traffic was not taken into account. Winter season was defined as the time interval from December 21 to March 21.

This was a descriptive and exploratory analysis. The objectives were to describe the clinical characteristics of the advanced NSCLC population stratified by driving time and season and to determine whether driving time or season were associated with uptake of systemic therapy and OS. The primary end point was uptake of systemic therapy measured by treatment rates. The secondary endpoint was OS defined as the time from histologic diagnosis to death or last known follow-up. The