AN ANALYSIS OF PATIENT CHARACTERISTICS ASSOCIATED WITH MYELOSUPPRESSION AMONG SMALL CELL LUNG CANCER PATIENTS TREATED IN US COMMUNITY CANCER CARE PRACTICES

Poster Code: EPH181

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BACKGROUND

- Small cell lung cancer (SCLC) accounts for about 14% of all lung cancer cases in the United States. It is classified by limited stage or extensive stage, and most patients are diagnosed at an advanced stage[1, 2]
- Chemotherapy remains a major component of treatment for both limited-stage and extensive-stage disease[3]
- Chemotherapy-induced myelosuppression (CIM), usually manifested as neutropenia, anemia and/or thrombocytopenia, is a common complication of chemotherapy[4]
- There is substantial clinical; humanistic and economic burden associated with CIM[5-8]
- Although there is published literature on predicting neutropenia risk based on patients' characteristics[9, 10] among patients with breast, colorectal, lung, lymphoid, or ovarian cancer, or predicting myelosuppression[11, 12] (neutropenia; anemia and/or thrombocytopenia) among non-small cell lung cancer patients, a paucity of studies examine the risk of myelosuppression among patients with SCLC

OBJECTIVE

- The objective of this study is to examine the association between patient characteristics and risk of CIM in SCLC using real-world data

METHODS

DATA SOURCE

- This retrospective observational study used the electronic medical records (EMR) data from the Providence St. Joseph Health (PSJH) and the Providence Cancer Reporting Registry, which included data from 40 oncology clinics associated with community hospitals across seven states in the United States[5]
- The study used data available between January 1, 2016, and December 31, 2019
- This study was approved by the PSJH institutional review board (IRB 2019000565)
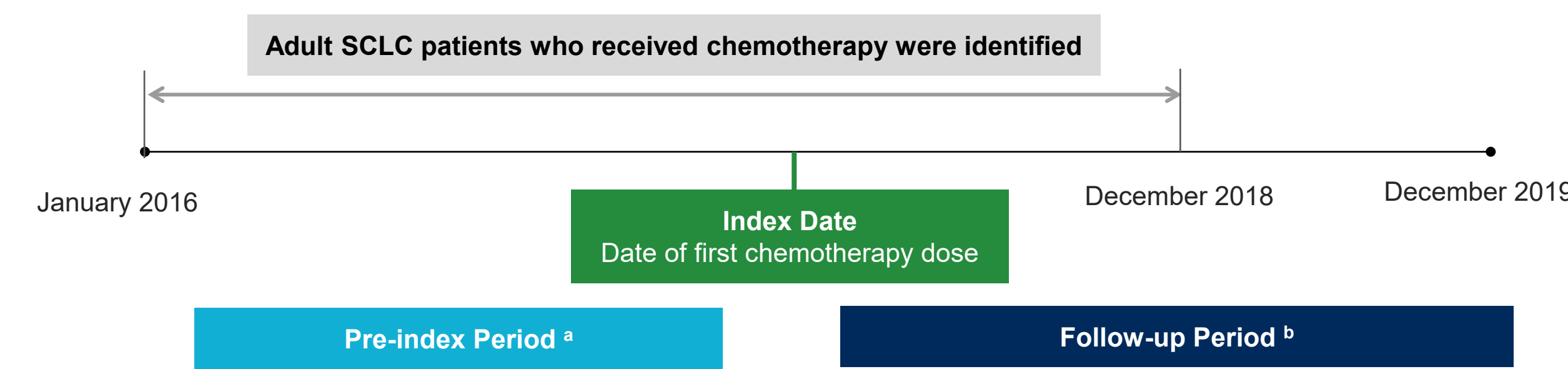
PATIENT POPULATION AND STUDY DESIGN

- Adult patients diagnosed with SCLC who received chemotherapy between 2016-2018 and had longitudinal laboratory data were included in this study
- The date of the first chemotherapy dose was considered the index date and patients were followed from index date for 12 months, or until the date of the last visit, date of death, or the end of the study period (December 2019), whichever occurred earliest (**Figure 1**). More details can be found in the Epstein study[5]

STUDY MEASURES & STATISTICAL ANALYSIS

- Grade ≥ 3 myelosuppressive events were defined based on the laboratory values according to the CTCAE v5.0:
    - Grade ≥ 3 anemia: hemoglobin <8.0 g/dL
    - Grade ≥ 3 neutropenia: absolute neutrophil count <1,000 mm³
    - Grade ≥ 3 thrombocytopenia: platelet count <50,000 mm³

Figure 1. Study design

Adult SCLC patients who received chemotherapy were identified

January 2016 — December 2018 — December 2019

Index Date
Date of first chemotherapy dose

Pre-index Period [a]   Follow-up Period [b]

Notes: [a] The pre-index period was the period from study start (January 2016) to index, or the 24-month period prior to index, whichever was shorter.
[b] Patients were followed for 12 months post-index date, or until death, loss to follow-up, or end of the study period (December 2019), whichever occurred sooner.
Abbreviations: CTCAE, common terminology criteria for adverse events; SCLC, small cell lung cancer

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- Percentages of patients with grade ≥3 myelosuppression and grade ≥3 lineage-specific cytopenia were analyzed by patient characteristics
- Multivariate logistic regressions were conducted to examine the association between patient characteristics (independent variable) and risk of experiencing at least one grade ≥3 myelosuppression (dependent variable) among the overall population and by age group
    - Myelosuppression was coded
        - as 1 if patients had any of the following after chemotherapy initiation: grade ≥3 neutropenia, grade ≥3 anemia, grade ≥3 thrombocytopenia;
        - as 0 if patients had none of the following after chemotherapy initiation: grade ≥3 neutropenia, grade ≥3 anemia, grade ≥3 thrombocytopenia
    - Patient characteristics included: age, gender, race, smoking status, stage, Eastern Cooperative Oncology Group (ECOG) performance status, radiation treatment, and receipt of second-line (2L) therapy
- In addition, multivariate logistic regressions were conducted to examine association between patient characteristics and risk of myelosuppression in each lineage (anemia, neutropenia, thrombocytopenia)
- The areas under the receiver operating characteristic (ROC) curve (AUCs) were reported for all the regression models
- Additional outcome (e.g., treatment patterns, healthcare resource utilization) were reported in the Epstein study[5]

RESULTS

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS

- The mean age of included SCLC patients was 66.5 years, with females accounting for 49.1% of patients (**Table 1**)
- 62.7% of SCLC patients were diagnosed at the extensive stage (IV), and 30.2% of patients received the 2L therapy (**Table 1**)
- Very few patients received prophylactic granulocyte-colony stimulating factor (G-CSF) before 1L therapy

MYELOSUPPRESSION BY PATIENT CHARACTERISTICS

- Grade ≥ 3 myelosuppression occurred in 60.9% of patients in the overall population (**Table 2**)
- More than half of the patients experienced grade ≥ 3 myelosuppression in all subgroups among the overall population, except one subgroup of patients (stage not documented, n=15) (**Table 2**)
- Proportion of grade ≥ 3 myelosuppression appeared to be numerically higher among younger patients (66.2% for age ≤59 years, 53.4% for age > 74 years) and patients with lower ECOG score (73.3% for ECOG 0/1, 61.4% for ECOG 2/3, 53.3% for patients with missing ECOG status) (**Table 2**)
    - This might be partially explained by the higher proportion of patients receiving 2L chemotherapy for younger patients and patients with lower ECOG score (**Figure 2A and 2B**)
- Patients who received 2L chemotherapy had numerically higher percentage of patients with grade ≥ 3 myelosuppression than patients who only received 1st line chemotherapy (71.6% vs. 56.4%) (**Table 2**)

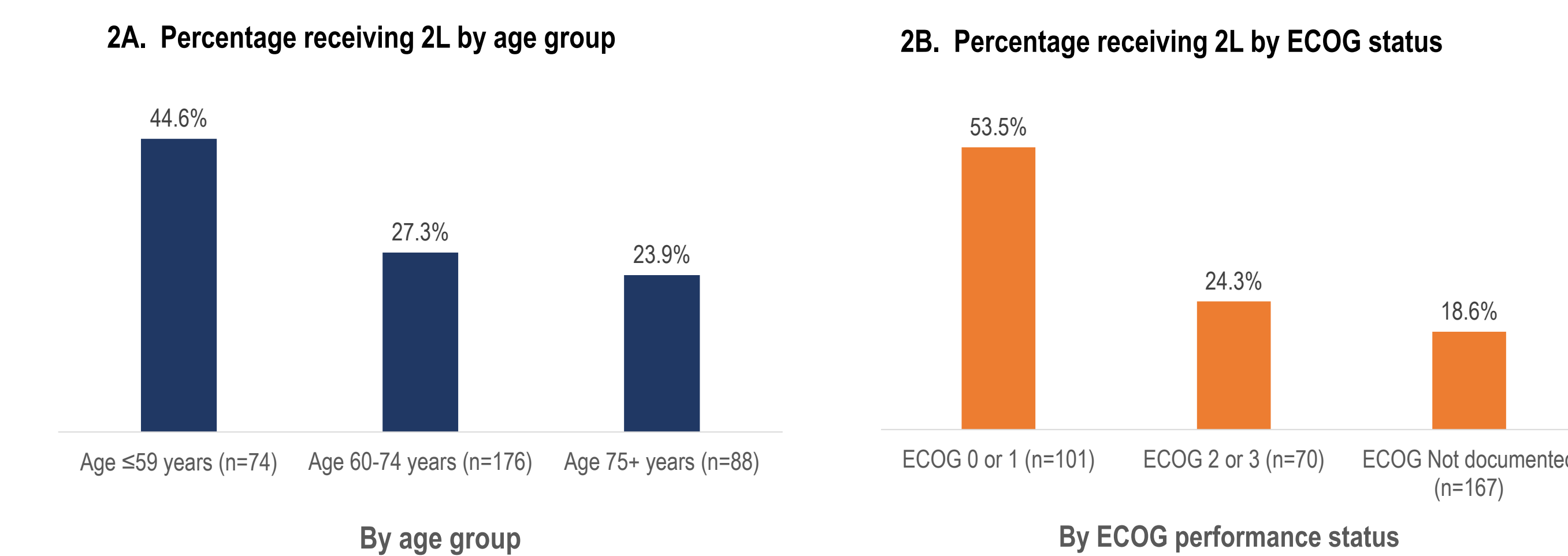### MULTIVARIATE LOGISTIC REGRESSION RESULTS

- Multivariate regression analyses identified no significant associations between patient characteristics and myelosuppression (**Table 3**)
- Similar findings were observed in age-specific and lineage-specific regression models
- The AUC was 0.65 (**Figure 3**) for the main model predicting myelosuppression among all patients and the AUC was highest when the model was restricted to patients ≤59 years of age (0.79) and lowest for predicting thrombocytopenia (0.59) (**Table 4**)

Table 1: SCLC Patients' Baseline Demographic and Clinical Characteristics

Characteristic	Patients (N=338)
Age, years	
Mean (SD)	66.5 (9.6)
Median	67
Range	35-93
Gender, n (%)	
Female	166 (49.1%)
Male	172 (50.9%)
Race, n (%)	
White	303 (89.6%)
Other/Unknown	35 (10.4%)
SCLC stage at diagnosis, n (%)	
Stage I to III (limited stage)	111 (32.8%)
Stage IV (extensive stage)	212 (62.7%)
Stage not documented	15 (4.4%)
ECOG performance status, n (%)	
0 or 1	101 (29.9%)
2 or 3	70 (20.7%)
Not documented	167 (49.4%)
Smoking status, n (%)	
Current smoker	127 (37.6%)
Never or past smoker	111 (32.8%)
Not documented	100 (29.6%)
Radiation status, n (%)	
Received radiation	145 (42.9%)
Did not receive radiation	193 (57.1%)
Lines of chemotherapy, n (%)	
Received 2L chemotherapy after 1L	102 (30.2%)
Received 1L chemotherapy only	236 (69.8%)

Table 2. Events and Percentage of SCLC Patients Experienced Grade ≥3 Myelosuppression, Stratified by Patient Characteristics

	Patients with Grade≥3 Myelosuppression, n (%)	Patients with Grade ≥3 Anemia, n (%)	Patients with Grade ≥3 Neutropenia, n (%)	Patients with Grade ≥3 Thrombocytopenia, n (%)
All patients (n=338)	206 (60.9%)	139 (41.1%)	152 (45.0%)	86 (25.4%)
Age				
≤59 years (n=74)	49 (66.2%)	32 (43.2%)	35 (47.3%)	18 (24.3%)
60-74 years (n=176)	110 (62.5%)	79 (44.9%)	79 (44.9%)	46 (26.1%)
75+ years (n=88)	47 (53.4%)	28 (31.8%)	38 (43.2%)	22 (25.0%)
Gender				
Female (n=166)	105 (63.3%)	73 (44.0%)	78 (47.0%)	40 (24.1%)
Male (n=172)	101 (58.7%)	66 (38.4%)	74 (43.0%)	46 (26.7%)
Race				
White (n=303)	184 (60.7%)	122 (40.3%)	135 (44.6%)	75 (24.8%)
Other/Unknown (n=35)	22 (62.9%)	17 (48.6%)	17 (48.6%)	11 (31.4%)
SCLC stage at diagnosis				
Stage I to III (n=111)	71 (64.0%)	48 (43.2%)	56 (50.5%)	28 (25.2%)
Stage IV (n=212)	129 (60.8%)	87 (41.0%)	92 (43.4%)	56 (26.4%)
Stage not documented (n=15)	6 (40.0%)	4 (26.7%)	4 (26.7%)	2 (13.3%)
ECOG performance status				
0 or 1 (n=101)	74 (73.3%)	48 (47.5%)	61 (60.4%)	30 (29.7%)
2 or 3 (n=70)	43 (61.4%)	23 (32.9%)	37 (52.9%)	15 (21.4%)
Not documented (n=167)	89 (53.3%)	68 (40.7%)	54 (32.3%)	41 (24.6%)
Smoking status				
Current smoker (n=127)	81 (63.8%)	57 (44.9%)	61 (48.0%)	37 (29.1%)
Never or past smoker (n=111)	70 (63.1%)	48 (43.2%)	50 (45.0%)	27 (24.3%)
Not documented (n=100)	55 (55.0%)	34 (34.0%)	41 (41.0%)	22 (22.0%)
Radiation status				
Received radiation (n=145)	95 (65.5%)	64 (44.1%)	74 (51.0%)	39 (26.9%)
Did not receive radiation (n=193)	111 (57.5%)	75 (38.9%)	78 (40.4%)	47 (24.4%)
Lines of chemotherapy				
Received 2L chemotherapy (n=102)	73 (71.6%)	48 (47.1%)	58 (56.9%)	32 (31.4%)
Received 1L chemotherapy only (n=236)	133 (56.4%)	91 (38.6%)	94 (39.8%)	54 (22.9%)

Abbreviations: 1L, first-line; 2L, second-line; ECOG, Eastern Cooperative Oncology Group; SCLC, small cell lung cancer

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Figure 2. Percentage of SCLC patients receiving 2L by age group (2A) and ECOG status(2B)

2A. Percentage receiving 2L by age group

- Age ≤59 years (n=74): 44.6%
- Age 60-74 years (n=176): 27.3%
- Age 75+ years (n=88): 23.9%

By age group

2B. Percentage receiving 2L by ECOG status

- ECOG 0 or 1 (n=101): 53.5%
- ECOG 2 or 3 (n=70): 24.3%
- ECOG Not documented (n=167): 18.6%

By ECOG performance status

Abbreviations: 2L, second-line; ECOG, Eastern Cooperative Oncology Group; SCLC, small cell lung cancer

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Table 3. Logistic Regression Results for Grade ≥3 Myelosuppression After Chemotherapy Initiation Among SCLC Patients (Main Model)

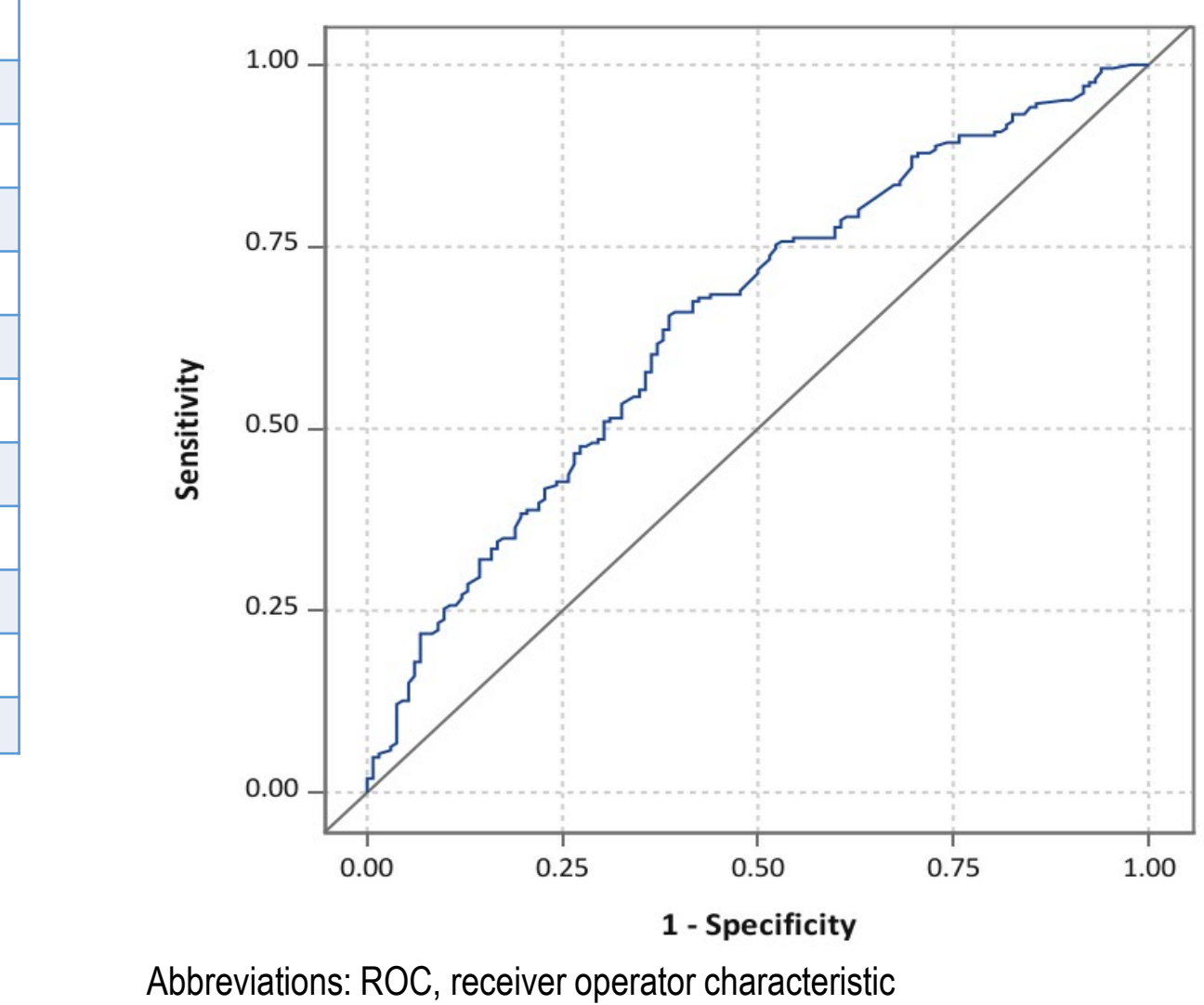| Parameter	Odds Ratio (95% CI)	P-value
Age ≤59 (vs age 60-74)	1.15 (0.63-2.10)	0.654
Age ≥75 (vs age 60-74)	0.72 (0.41-1.25)	0.242
Female (vs male)	1.22 (0.77-1.95)	0.394
White (vs non-White)	0.76 (0.35-1.63)	0.479
Extensive stage (vs limited stage)	0.92 (0.54-1.55)	0.741
Missing stage (vs limited stage)	0.36 (0.12-1.15)	0.085
ECOG =0,1 (vs ECOG = 2,3)	1.43 (0.72-2.84)	0.313
ECOG missing (vs ECOG= 2,3)	0.72 (0.40-1.29)	0.270
Current smoker (vs past/never smoker)	1.01 (0.57-1.78)	0.971
Missing smoker status (vs past/never smoker)	0.66 (0.37-1.20)	0.173
Radiation received (vs no radiation)	1.21 (0.74-1.96)	0.447
Received 2L chemotherapy (vs received 1L chemotherapy only)	1.57 (0.90-2.74)	0.114

Figure 3. ROC Curve for the Main Model

Abbreviations: ROC, receiver operator characteristic

Table 4. Summary of Logistic Regression Models

Logistic regression models	Model outcome	Population	AUC
Main model	Risk of experiencing grade ≥3 myelosuppression	Total population	0.652
Age specific models			
Model among age<60		Patients aged <60 years	0.793
Model among age 60-74	Risk of experiencing grade ≥3 myelosuppression	Patients aged 60-74 years	0.678
Model among aged >75		Patients aged >75 years	0.682
Lineage specific models			
Model for anemia	Risk of experiencing grade ≥3 anemia		0.629
Model for neutropenia	Risk of experiencing grade ≥3 neutropenia	Total population	0.669
Model for thrombocytopenia	Risk of experiencing grade ≥3 thrombocytopenia		0.589

Abbreviations: SCLC, small cell lung cancer; AUC, area under the curve

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LIMITATIONS

- Due to the database limitations, it was not possible to acquire certain data/variables that may be relevant to the research objectives
- This study did not consider the impact of CIM with the grade lower than 3, which may also influence patients' treatment and quality of life

CONCLUSION

- To the best of our knowledge, this study, despite its limitations, is the first to evaluate patient characteristics and myelosuppression (grade ≥3) among SCLC patients in the US
- This study's results suggest no association exists between patient characteristics and the risk of myelosuppressive events among SCLC patients receiving chemotherapy in the real-world database used in this study
- Future studies including a more comprehensive list of disease- and treatment-related variables are recommended to confirm this study's findings

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REFERENCE
1. Lung cancer – small cell: statistics. https://www.cancer.net/cancer-types/lung-cancer-small-cell/statistics
2. Lung cancer – small cell. https://www.cancer.net/cancer-types/lung-cancer-small-cell/stages
3. Small cell lung cancer (version 3.2021). https://www.nccn.org/professionals/physician_gls/pdf/sclc.pdf
4. Carey PJ. Drug Saf. 2003;26(10):691-706.

5. Epstein RS, Weerasinghe RK, Parrish AS, et al. J Med Econ. 2022;25(1):108-118.
6. Kuter DJ. Oncology (Williston Park). 2015;29(4):282-294.
7. Lalami Y, Klastersky J. Crit Rev Oncol Hematol. 2017;120:163-179.
8. Weycker D, Hatfield M, Grossman A, et al. BMC Cancer. Feb 14 2019;19(1):151.
9. Lyman GH, Kuderer NM, Crawford J, et al. Cancer. 2011;117(9):1917-1927.

10. Pawloski PA, Thomas AJ, Kane S, et al. J Am Med Inform Assoc. 2017;24(e1):e129-e135.
11. Jiang N, Chen XC, Zhao Y. Support Care Cancer. 2013;21(3):785-791.
12. Saito Y, Takekuma Y; Shinagawa N, et al. Support Care Cancer. 2022;30(5):4081-4088.