PCN258

Healthcare Resource Utilisation Among Patients With Non-Small Cell Lung Cancer (NSCLC) in Sweden: The SCAN-LEAF Study

Simon Ekman,[1] Maria Planck,[2] Odd Terje Brustugun,[3] Pia Horvat,[4] Deborah Layton,[4] Joseph Kim,[4] Mats Rosenlund,[5] Ariadna Juarez-Garcia,[6] Melinda Daumont,[7] Hazel C Jacobs,[6] Laure Lacoin,[7] Jens Benn Sørensen[8]

[1]Karolinska Institutet/University Hospital, Stockholm, Sweden; [2]Lund University and Skåne University Hospital, Lund, Sweden; [3]Drammen Hospital, Drammen, Norway; [4]Real-World Insights, IQVIA, London, UK; [5]Real-World Insights, IQVIA, Stockholm, Sweden; [6]Bristol-Myers Squibb, Uxbridge, UK; [7]Bristol-Myers Squibb, Braine-L'Alleud, Belgium; [8]Rigshospitalet, Copenhagen, Denmark

Background

- Over the past decade, an increasing number of treatment options have become available for patients with NSCLC, most recently with the emergence of immunotherapies[1,2]
- In this rapidly evolving treatment landscape, a better understanding of real-world treatment patterns and associated healthcare burden is critical for informing clinical decision-making and optimising patient benefits
- SCAN-LEAF is a retrospective longitudinal study that aims to describe the epidemiology, clinical care, and outcomes of patients with NSCLC in Scandinavia
- The SCAN-LEAF project is based on 2 partly overlapping cohorts of patients:
  - Cohort 1 includes the entire NSCLC population across 3 Scandinavian countries (Denmark, Norway, and Sweden) using data from national healthcare registries
  - Cohort 2 includes NSCLC patients diagnosed at 2 select clinics in Sweden
- SCAN-LEAF is part of I-O Optimise, a multinational collaboration aimed at developing a research framework to provide timely insights into the evolving real-world management of thoracic malignancies (NSCLC, small cell lung cancer, and mesothelioma)[3]
- The current analysis reports on the healthcare resource utilisation (HCRU) for patients with incident NSCLC in the 2 select clinics in Sweden (Cohort 2)

Methods

Setting

- The SCAN-LEAF Swedish retrospective cohort includes all adult patients diagnosed with NSCLC from January 2012 to December 2015 (based on diagnoses reported in the National Cancer Registry) and followed in 2 major hospitals – Uppsala and Karolinska (Stockholm) University Hospitals
- Electronic medical record (EMR) data were extracted using the Pygargus CXP software and linked with national registries
- Patients were followed from the date of their first diagnosis of NSCLC until death, emigration, or the end of the study period (31 December 2016)

Study population

- Inclusion criteria:
  - EMR data linked with national registries
  - NSCLC identified in the study data source by International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3)
  - Date of initial NSCLC diagnosis during the study inclusion period
  - ≥18 years of age at diagnosis
- Exclusion criteria:
  - Missing data on age or gender
  - Concomitant primary tumour at time of diagnosis with the exception of non-metastatic non-melanoma skin cancer (International Statistical Classification of Diseases and Related Health Problems, 10th revision [ICD-10] codes C44, C4A), or low-grade superficial bladder cancer. A cancer was considered concomitant if it occurred within 5 years prior to NSCLC diagnosis

Analyses

- HCRU included hospitalisations, outpatient visits, lung surgery, radiotherapy procedures, use of systemic anti-cancer therapy (SACT), tissue sampling, imaging tests, and biomarker tests from date of diagnosis
- For the full cohort, HCRU was determined for the overall follow-up (FU) period (aggregate rate per patient-years), stratified by tumour, nodes, and metastases (TNM) stage (stage I–IIIA vs IIIB–IV) and histology (non-squamous cell carcinoma [NSQ] vs squamous cell carcinoma [SQ])
  - Aggregate rate of HCRU per patient-years = total number of HCRU/total patient-years of FU
- For stage IIIB–IV patients who received SACT, HCRU was determined by line of therapy (LoT) up to the 3rd LoT, stratified by histology
  - Weeks of LoT = (next LoT start date/death/censoring [whichever occurred first] – LoT start date +1)/7
  - Weekly HCRU rate during each LoT per 100 patient-weeks = 100 × (total number of HCRUs during the LoT/weeks of LoT)
- For all determinations, missing or absent HCRU data assumes no event

Results

Overall population

- A total of 2779 patients diagnosed between 2012 and 2015 were identified; median age was 70 years (range: 22–96) and 48.5% were male
  - 1095 patients (39.4%) were diagnosed at stage I–IIIA and 1625 (58.5%) at stage IIIB–IV
  - 1970 patients (70.9%) had NSQ (1928 [69.4%] had adenocarcinoma), 493 (17.7%) had SQ; 226 (8.1%) had not otherwise specified NSCLC, and 90 (3.2%) had other NSCLC
  - Many of the patients had non-cancer-related comorbid conditions, the most common being chronic pulmonary disease (19.3%) and diabetes (15.5%)

HCRU by TNM stage and histology

- **Table 1** shows the aggregate rate of HCRU per patient-years stratified by TNM stage and histology
- As expected, mean FU per patient was shorter for stage IIIB–IV NSCLC than for stage I–IIIA disease
- Although the proportion of patients requiring hospitalisation or an outpatient visit was relatively similar between the subgroups with stage I–IIIA and IIIB–IV disease, the number of visits per patient-year was higher in patients with stage IIIB–IV NSCLC
  - In addition, the number of days of hospitalisation per patient-year was higher in patients with stage IIIB–IV NSCLC than in patients with stage I–IIIA disease
- Surgical interventions were most common for stage I–IIIA disease
- The proportion receiving radiotherapy procedures was comparable across stage I–IIIA and IIIB–IV subgroups, but a higher number of procedures per patient-year was observed in the stage IIIB–IV population
  - A similar pattern was observed in relation to imaging tests
- Tissue sampling appeared to be more common among patients with stage I–IIIA disease and biomarker tests more common among patients with stage IIIB–IV disease. (Note that some biomarker tests were not routine in clinical practice during the study period)

Table 1. Rate of HCRU per patient-years by TNM stage and histology

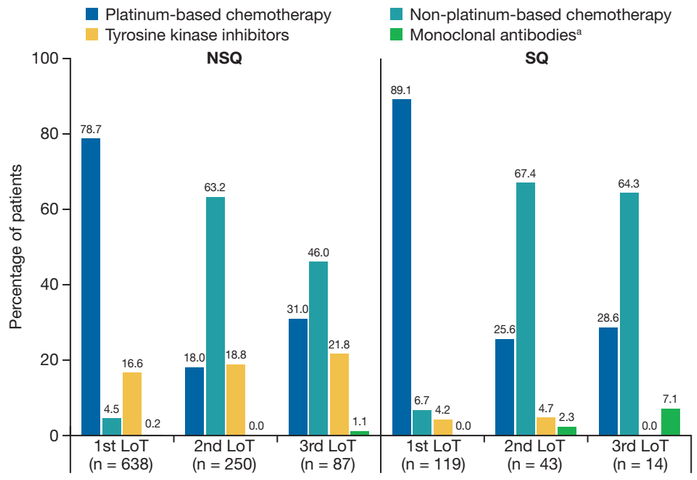
HCRU	Stage I–IIIA		Stage IIIB–IV	
	NSQ N = 769	SQ N = 240	NSQ N = 1161	SQ N = 241
Total FU, years	1739	472	1116	207
Mean FU per patient, year	2.3	2.0	1.0	0.9
Hospitalisations[a]				
No. of patients with ≥1 visit (%)	696 (90.5)	215 (89.6)	1086 (93.5)	224 (92.9)
No. of hospitalisations, per patient-years	1.5	1.9	3.4	3.9
Length of stay (days), per patient-years	9.8	15.2	29.3	34.8
Outpatient visits				
No. of patients with ≥1 visit (%)	767 (99.7)	236 (98.3)	1077 (92.8)	224 (92.9)
No. of visits, per patient-years	9.5	12.0	15.5	17.6
Lung surgery				
No. of patients with ≥1 intervention (%)	338 (44.0)	74 (30.8)	10 (0.9)	3 (1.2)
No. of interventions, per patient-years	0.2	0.2	<0.1	<0.1
Radiotherapy procedures				
No. of patients with ≥1 procedure (%)	398 (51.8)	144 (60.0)	594 (51.2)	128 (53.1)
No. of procedures, per patient-years	3.0	4.1	3.4	5.7
Tissue samplings				
No. of patients with ≥1 sampling (%)	274 (35.6)	55 (22.9)	213 (18.3)	34 (14.1)
No. of samplings, per patient-years	0.2	0.1	0.2	0.2
Imaging tests				
No. of patients with ≥1 test (%)	651 (84.7)	205 (85.4)	932 (80.3)	207 (85.9)
No. of tests, per patient-years	1.4	1.4	2.6	2.3
Biomarker tests[b]				
No. of patients with ≥1 test (%)	327 (42.5)	52 (21.7)	591 (50.9)	66 (27.4)
No. of tests, per patient-years	0.3	0.2	0.9	0.5

[a]Data represent "all departments"; [b]Includes tests for mutations in specific genes (EGFR, ALK, ROS1, KRAS, NRAS, MET, HER2, and RET) and for PD-L1 expression levels
ALK, anaplastic lymphoma kinase; EGFR, epidermal growth factor receptor; HER2, human epidermal growth factor receptor 2; PD-L1, programmed death ligand 1

SACT use in patients with stage IIIB–IV NSCLC

- Among the 1625 patients with stage IIIB or IV NSCLC, 888 (54.6%) received ≥1 LoT, 338 (20.8%) received ≥2 LoTs, and 111 (6.8%) received ≥3 LoTs
- Platinum-based chemotherapy was the predominant 1st LoT and non-platinum chemotherapy was the predominant 2nd or 3rd LoT (**Figure 1**)
  - Note that immune checkpoint inhibitors were not yet available to a large proportion of patients during the study period

Figure 1. SACT by histology and LoT in stage IIIB–IV NSCLC



[a]Monoclonal antibodies included immune checkpoint inhibitors (anti-PD-L1 and cytotoxic T lymphocyte antigen-4 inhibitors)

HCRU by histology and SACT LoT for patients with stage IIIB–IV NSCLC

- **Table 2** and **Figure 2** show HCRU based on histology and LoT

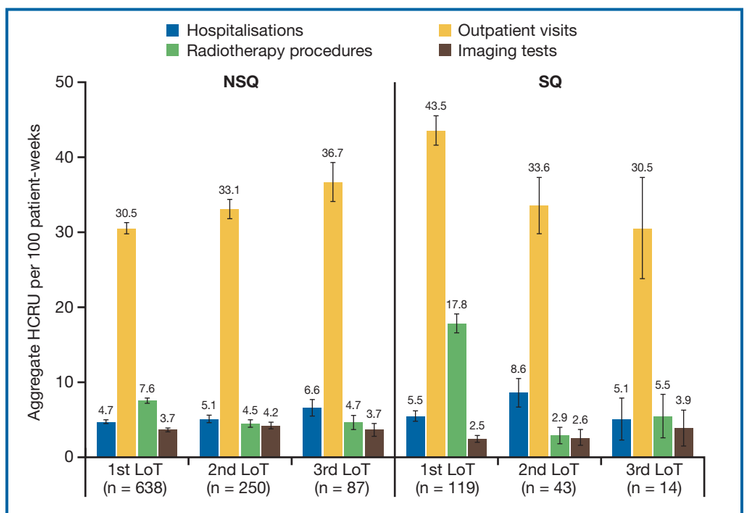
Table 2. HCRU by histology and SACT LoT in stage IIIB–IV NSCLC

HCRU	NSQ (N = 1161)			SQ (N = 241)		
	1st LoT n = 638	2nd LoT n = 250	3rd LoT n = 87	1st LoT n = 119	2nd LoT n = 43	3rd LoT n = 14
Total FU, weeks	22,659	7312	2105	4376	920	256
Mean number of FU weeks per LoT	35.5	29.2	24.2	36.8	21.4	18.3
Hospitalisations[a]						
No. of patients with ≥1 visit (%)	437 (68.5)	152 (60.8)	59 (67.8)	88 (73.9)	31 (72.1)	6 (42.9)
No. of hospitalisations[b], mean (SD)	2.5 (1.6)	2.5 (1.5)	2.4 (1.3)	2.7 (1.9)	2.5 (2.5)	2.2 (1.2)
Median (Q1–Q3)	2 (1.0–3.0)	2 (1.0–3.0)	2 (1.0–3.0)	2 (1.0–4.0)	1 (1.0–3.0)	2 (1.0–3.0)
Range	1.0–10.0	1.0–8.0	1.0–6.0	1.0–9.0	1.0–10.0	1.0–4.0
Stay per hospitalisation (days), mean (SD)	8.7 (12.4)	8.3 (9.5)	9.5 (13.4)	8.4 (10.4)	7.8 (9.9)	9.9 (12.6)
Outpatient visits						
No. of patients with ≥1 visit (%)	603 (94.5)	240 (96.0)	83 (95.4)	109 (91.6)	40 (93.0)	14 (100.0)
No. of visits[b], mean (SD)	11.5 (14.1)	10.1 (9.9)	9.3 (9.7)	17.5 (18.3)	7.7 (8.6)	5.6 (5.0)
Median (Q1–Q3)	7 (3.0–14.0)	7 (3.0–13.0)	7 (3.0–12.0)	8 (4.0–25.0)	4 (2.5–9.0)	3.5 (2.0–9.0)
Range	1.0–133.0	1.0–70.0	1.0–66.0	1.0–79.0	1.0–32.0	1.0–17.0
Radiotherapy procedures						
No. of patients with ≥1 procedure (%)	207 (32.4)	78 (31.2)	25 (28.7)	48 (40.3)	5 (11.6)	4 (28.6)
No. of procedures[b], mean (SD)	8.3 (10.0)	4.2 (6.2)	3.9 (2.5)	16.3 (14.1)	5.4 (5.8)	3.5 (2.4)
Median (Q1–Q3)	5 (2.0–10.0)	3 (1.0–5.0)	5 (1.0–5.0)	11 (5.0–33.5)	4 (1.0–6.0)	3.5 (1.5–5.5)
Range	1.0–42.0	1.0–44.0	1.0–10.0	1.0–44.0	1.0–15.0	1.0–6.0
Imaging tests						
No. of patients with ≥1 test (%)	327 (51.3)	127 (50.8)	38 (43.7)	56 (47.1)	12 (27.9)	5 (35.7)
No. of tests[b], mean (SD)	2.5 (2.5)	2.4 (2.1)	2.0 (1.4)	1.9 (1.4)	2.0 (1.2)	2.0 (1.0)
Median (Q1–Q3)	2 (1.0–3.0)	2 (1.0–3.0)	2 (1.0–2.0)	1 (1.0–2.0)	1.5 (1.0–3.0)	2 (1.0–3.0)
Range	1.0–22.0	1.0–13.0	1.0–7.0	1.0–7.0	1.0–4.0	1.0–3.0

Numbers of patients are shown based on the total FU period. [a]Data represent "all departments"; [b]Among patients with ≥1 HCRU
Q, quartile; SD, standard deviation

- Patients with NSQ NSCLC:
  - The proportion of patients requiring hospitalisation was comparable during each LoT (>60%). Mean length of each hospitalisation ranged between 8.3 and 9.5 days and the rate per 100 patient-weeks ranged from 4.7 to 6.6 visits, with no clear trend between LoTs
  - The proportion of patients requiring an outpatient visit was comparable during each LoT (>90%). The rate per 100 patient-weeks ranged from 30.5 to 36.7 visits, with a slight increase across the LoTs
  - Around one-third of patients received radiotherapy during each SACT LoT. The number of procedures declined after the first LoT
- Patients with SQ NSCLC:
  - The proportion of patients requiring hospitalisation was similar during the 1st and 2nd LoT (>70%) but was lower in the 3rd LoT (42.9%). Mean length of each hospitalisation was 7.8–9.9 days. The rate per 100 patient-weeks ranged from 5.1 to 8.6 visits, with no clear trend between LoTs
  - The proportion of patients requiring an outpatient visit was comparable during each LoT (>90%). However, the number of visits was highest during the 1st LoT and declined during the 2nd and 3rd LoTs
  - The proportion of patients receiving radiotherapy, and the number of procedures, was highest during the 1st LoT and declined during the 2nd and 3rd LoTs. However, even during the 3rd LoT, almost one-third of patients received radiotherapy
- Regardless of histology, the proportions of patients undergoing imaging tests appeared to reflect the proportions of patients not dying during each LoT, with around one-third to one-half undergoing a test across the histologies and LoTs. There was no clear trend between LoTs in relation to the rates per 100 patient-weeks
- Data for surgical interventions are not shown as no lung surgeries were performed on patients receiving SACT. Likewise, data for tissue sampling and biomarker tests are not shown as these HCRUs relate to the periods prior to treatment, thus are not relevant for analysis of HCRU during LoTs

Figure 2. Rate of HCRU per 100 patient-weeks by histology and SACT LoT in stage IIIB–IV NSCLC



Error bars represent 95% confidence intervals

Conclusions

- NSCLC was associated with a substantial HCRU burden among this sample of Swedish patients, with a particularly high burden for those diagnosed with stage IIIB–IV with:
  - An average length of hospital stay of 1 month per patient-year
  - An average number of outpatient visits per patient-year of 15.5 for NSQ and 17.6 for SQ
- Among patients with stage IIIB–IV NSCLC who received SACT, the HCRU burden remained high across sequential LoTs, regardless of histology
  - Per 100 patient-weeks, the number of hospitalisations ranged between 4.7 and 8.6 (average length of each stay was >1 week), and the number of outpatient visits ranged between 30.5 and 43.5 across the LoTs
- These results are broadly consistent with those from a recent global observational study,[4] and further support the high burden of advanced NSCLC among predominantly chemotherapy-treated patients
- Future studies using data from after the introduction of routine biomarker testing (post-2015) will allow investigation of HCRU by biomarker testing status
- In addition, further analyses will assess the potential impact of increased use of newer therapies (including immune checkpoint inhibitors and new tyrosine kinase inhibitors) on HCRU burden among patients with NSCLC in Sweden

References

1. Herzberg B, et al. *Oncologist*. 2017;22:81–88.
2. Russo A, et al. *Crit Rev Oncol Hematol*. 2018;130:1–12.
3. Durand-Zaleski I, et al. Presented at the ISPOR 20th Annual European Congress, 4–8 November 2017, Glasgow, Scotland. Poster PRM69.
4. Lee DH, et al. *BMC Health Serv Res* 2018;18:147.

Acknowledgements

- This work is part of the I-O Optimise programme, an initiative of Bristol-Myers Squibb
- All authors contributed to and approved the presentation; professional writing and editorial services were provided by PAREXEL, funded by Bristol-Myers Squibb

Scientific Content On-demand
To request a copy of this poster: **scan QR code** via a barcode reader application

Presented at the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 21st Annual European Congress, 10–14 November 2018; Barcelona, Spain

Email: simon.ekman@ki.se