Long-term healthcare resource utilization and costs associated with patients treated with nivolumab for advanced non-small cell lung cancer

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Introduction

In advanced or metastatic tumor stages, healthcare resources utilization (HCRU) and costs are usually increasing until the end of life. However, few studies describe long-term HCRU of patients treated with immunotherapy.

UNIVOC background

UNIVOC is a cohort of 10,452 patients, encompassing all patients with advanced non-small cell lung cancer (aNSCLC) starting treatment with nivolumab within two years of the date of its availability in France, identified in the National Health Data System (SNDS) which provides detailed data on the use of health resources by all beneficiaries of the French health system insurance.

Study Rationale

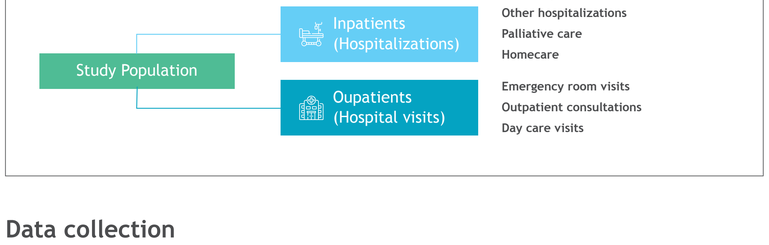
- In advanced or metastatic lung cancer patients, intensity of care usually increases until the end-of-life [1,2].
- Around 30% of patients with aNSCLC are still alive 2 years after nivolumab treatment initiation in 2nd line. Beyond those two years, patients are considered long-term survivors [3].
- For these patients, quality of life appears to be maintained or even improved but little is known about their total cost of care [4]. In particular, no data are available on the evolution of healthcare resources utilization (HCRU) and costs associated with the management of these patients.
- We hypothesize that long-term survivorship in patients initiating nivolumab may lead to substantial decrease of HCRU and costs.

Study objectives

- To describe long-term (3-y) HCRU evolution of patients who initiated nivolumab for pre-treated aNSCLC (i.e. number of hospital visits per patient and number of hospitalization days per patient).
- To describe the evolution of the long-term (3-y) costs evolution of patients who initiated nivolumab for pre-treated aNSCLC.

Methods

Figure 1. Study design



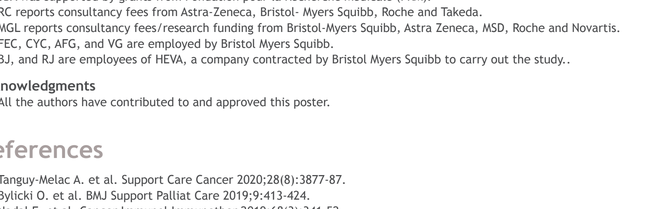
Study design

- The study was a retrospective cohort study of all aNSCLC patients initiating nivolumab between 01/01/2015 and 31/12/2016 based on the National hospital database (PMSI). The PMSI databases analyzed in this study were the MCO (Medicine, Surgery, and Obstetrics facilities), HAD (Homecare), SSR (Follow-up and rehabilitation care), and ACE (Outpatients hospital visits) databases, the FICHCOMP « liste en sus » and FICHCOMP ATU (Temporary use authorization) files.
- The study period extended from 01/01/2015 to 31/12/2018 **(Figure 1)**.

Study population

Patients were included when having a hospital stay mentionning the C34* ICD-10 code and nivolumab UCD codes found in the FICHCOMP and FICHCOMP ATU files.

Figure 2. Data collection



Data collection

- Data were collected during hospital visits and hospitalizations. Hospital visits data contained day care visits (e.g. drug administration, exam), emergency room visits and outpatient consultations. Hospitalizations were divided into intensive/resuscitation care, palliative care, follow-up and rehabilitation, homecare and other hospitalizations **(Figure 2)**.
- Costs were valued in Euro 2018.

Statistical analysis

Trends in hospital visits, hospitalization days and costs were assessed with Mann-Kendall tests.

Results

Study population

- The study included 10,452 patients **(Figure 3)**, of which 71.0% were men. The mean age at inclusion was 63.8 years (standard deviation of 9.6 years) and the median 64 years.
- Comorbidities or disease statuses affecting included patients during the year preceeding inclusion were mainly hypertension (19.0% of patients), malnutrition (18.7% of patients), and brain metastases (17.2% of patients).
- The most common histological type was squamous cell (44.5%).
- Over 90% patients required hospital visits during the follow-up period. The % of patients requiring hospitalizations decreased over the follow-up, from 76.8% the first year to 46.2% the last year **(Table 1)**.

HCRU - Hospital visits per patient

- There was a decreasing trend of hospital visits per patient over the years ($p<10^{-4}$) **(Table 2)**. The number of patients at risk also decreased from 10,452 patients for Y1 to 2,514 patients at the beginning of Y3. The overall number of hospital visits per patient was 21.1 for Y1, 19.6 for Y2, and 13.1 for Y3.
- The overall number decreased by 7.0% between Y1 and Y2 (-1.5 visits) ($p<10^{-4}$). It decreased by 33.0% between year Y2 and Y3 (-6.5 visits) ($p<10^{-4}$) and by 37.7% between Y1 and Y3 (-8.0 visits) ($p<10^{-4}$).
- The overall number of day care visits per patient decreased by 46.1% between Y1 and Y3 (-6.4 visits). It decreased by 37.5% for emergency room visits between Y1 and Y3 (-0.3 visit) and by 20.3% for outpatient consultations (-1.3 visits).
- Hospital visits represented 90.2%, 91.9%, and 92.2% of the sum of Y1, Y2, and Y3 hospital visits and hospitalizations, respectively. Day care visits represented 59.7%, 55.6%, and 52.6% of the sum of Y1, Y2, and Y3 hospital visits and hospitalizations, respectively. Emergency room visits represented 3.4%, 3.2%, and 3.2% of the sum of Y1, Y2, and Y3 hospital visits and hospitalizations, respectively. Outpatient consultations represented 27.2%, 33.1%, and 36.3% of the sum of Y1, Y2, and Y3 hospital visits and hospitalizations, respectively.

HCRU - Hospitalizations per patient

- The mean cumulative number of hospital days per patient significantly decreased over the years ($p<10^{-4}$) **(Table 3)**. The number of patients for risk also decreased from 10,452 patients for Y1 to 2,514 patients for the beginning of Y3. The mean cumulative number of hospitalization days per patients was 27.6 days for Y1, 22.0 days for Y2, and 13.5 days for Y3 **(Table 3)**.
- The mean cumulative number decreased by 20.1% between Y1 and Y2 (-5.5 days) ($p<10^{-4}$). It decreased by 38.7% between year Y2 and Y3 (-8.5 days) ($p<10^{-4}$) and by 51.0% between Y1 and Y3 (-14.0 days) ($p<10^{-4}$).
- The mean cumulative number of days per patient for other hospitalizations decreased by 53.9% between Y1 and Y3 (-4.9 days). It decreased between Y1 and Y3 by 63.4% for palliative care (-5.4 days), by 45.0% for homecare (-2.3 days), by 32.6% for follow-up and rehabilitation care (-1.4 visits), and by 28.5% for intensive or resuscitation care (-0.3 day).

HCRU associated costs

- The mean HCRU costs per patient significantly decreased over the years ($p<10^{-4}$) **(Table 4)**. The extra diagnosis-related group drug cost per patient significantly decreased between Y1 and Y2 and between Y2 and Y3 ($p<10^{-4}$). The results were the same regarding hospital visits and hospitalizations.
- For each year, extra diagnosis-related group drugs accounted for the majority of the costs.
- The cost per patient of hospitalizations and hospital visits significantly decreased from year 1 to year 3 ($p<10^{-4}$) **(Table 5)**. The number of patients at risk also decreased from 10,452 patients for Y1, to 4,636 patients at the beginning of Y2, to 2,514 patients at the beginning of Y3. The overall hospitalizations and hospital visits mean cost per patient was €16,790 for Y1, €13,405 for Y2, and €8,524 for Y3 **(Table 5)**.
- The costs decreased by 20.2% between Y1 and Y2 (€-3,384) ($p<10^{-4}$). It decreased by 36.4% between year Y2 and Y3 (€-4,881) (p<10-3) and by 49.2% between Y1 and Y3 (€-8,265) ($p<10^{-4}$).
- The costs per patients for hospital visits decreased by 44.2% between Y1 and Y3 (€-2,792). It decreased between Y1 and Y3 by 52.3% for hospitalizations (€-5,474).

Figure 3. Kaplan-Meier overall survival

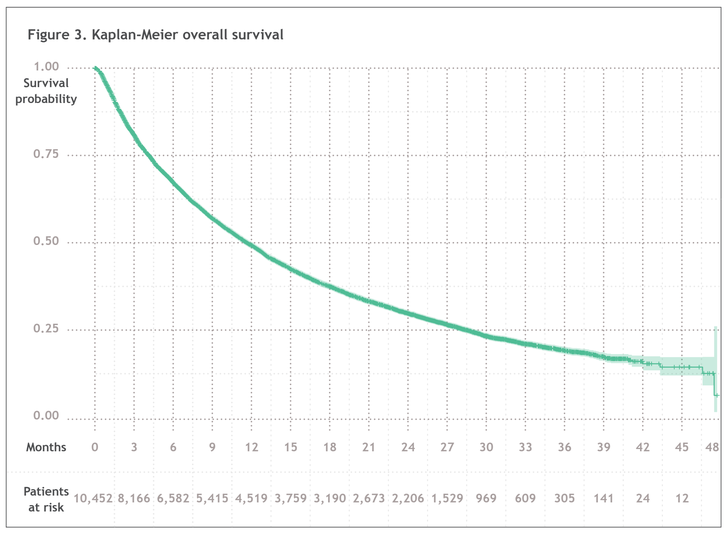


Table 1. Percentage of patients with at least one hospital visit or one hospitalization, by year

	Year 1	Year 2	Year 3
Hospital visits	98.1%	94.3%	95.7%
Hospitalizations	76.8%	62.9%	46.2%

Table 2. HCRU - Mean hospital visits per patient, overall and by type of visit

	Year 1	Year 2	Year 3
Number of visits per patient (mean)	21.1	19.6	13.1
Day care visits (mean, % of yearly visits in all visits)	13.9 (65.9%)	11.9 (60.7%)	7.5 (57.3%)
Outpatient consultations (mean, % of yearly visits in all visits)	6.4 (30.3%)	7.0 (35.7%)	5.1 (38.4%)
Emergency room visits (mean, % of yearly visits in all visits)	0.8 (3.8%)	0.7 (3.6%)	0.5 (3.8%)

Table 3. HCRU - Hospitalizations per patient, overall and by type of hospitalization

	Year 1	Year 2	Year 3
Mean cumulative number of hospital days per patient (+/- standard deviation)	27.6 ±40.7	22 ±38.2	13.5 ±29.1
Other hospitalizations	9.1 ±14.6	6.2 ±11.4	4.2 ±9.5
Palliative care	8.5 ±16.7	6.2 ±14.3	3.1 ±9.9
Homecare	5 ±22.6	4.2 ±20.6	2.8 ±16
Follow-up and rehabilitation care	4.3 ±18	4.8 ±20.5	2.9 ±14
Intensive or resuscitation care	0.9 ±5.5	0.7 ±4.2	0.6 ±4.7

Table 4. HCRU - Costs distribution

	Year 1	Year 2	Year 3
Mean cost per patient	€43,332	€31,157	€19,861
Extra diagnosis-related group drug	26,452 (61.0%)	17,752 (57.0%)	11,337 (57.1%)
Hospitalizations	10,471 (24.2%)	7,941 (25.5%)	4,998 (25.2%)
Hospital visits	6,318 (14.6%)	5,464 (17.5%)	3,527 (17.8%)

Table 5. HCRU - Hospitalizations and Hospital visits costs distribution per patient and per year

	Year 1	Year 2	Year 3
Other hospitalizations	€9,227	€6,878	€4,288
Day care visits	€5,614	€4,673	€2,939
Homecare	€1,244	€1,063	€710
Outpatient hospital visits	€677	€766	€567
Emergency room	€28	€26	€21

Conclusion

- The UNIVOC large cohort of patients with aNSCLC treated with nivolumab allowed to describe HCRU and costs evolution of those patients.
- The percentage of patients requiring hospitalizations decreased over the follow-up period, from 76.8% the first year to 46.2% the last year.
- There was a decreasing trend in the number of sessions per patient (from 21.1 during the first year to 13.1 during the third year).
- There was a decreasing trend in the cumulative number of hospital days per patient (from around 28 days during the first year to around 14 days during the third year).
- There was a decreasing trend in the mean cost per patient (from around €43,332 during the first year to €19,861 during the third year). In addition to the large decrease in the treatment-associated costs, the other main drivers were the decreases in palliative care and other hospitalizations' costs.
- HCRU and their associated costs decreased over the 3-years of follow-up and thus, de-intensification of care for long-survivors should be explored.

Disclosure

Funding
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Conflincting interests
- CC reports consultancy fees from Astra Zeneca, Boehringer Ingelheim, MSD, Pierre Fabre Oncology, Lilly, Roche, Bristol- Myers Squibb and Novartis.
- JBA was supported by grants from Fondation pour la Recherche Médicale (FRM).
- RC reports consultancy fees from Astra-Zeneca, Bristol- Myers Squibb, Roche and Takeda.
- MGL reports consultancy fees/research funding from Bristol-Myers Squibb, Astra Zeneca, MSD, Roche and Novartis.
- FEC, CYC, AFG, and VG are employed by Bristol Myers Squibb.
- BJ, and RJ are employees of HEVA, a company contracted by Bristol Myers Squibb to carry out the study..

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- All the authors have contributed to and approved this poster.

References

1. Tanguy-Melac A. et al. Support Care Cancer 2020;28(8):3877-87.
2. Bylicki O. et al. BMJ Support Palliat Care 2019;9:413-424.
3. Nadal E. et al. Cancer Immunol Immunother 2019;68(3):341-52.
4. Barlesi F. et al. OncoImmunology 2020;9(1):1744898.

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