

Evolution of Immune Checkpoint Inhibitors (ICI) administration in Hospitalization At Home (HAH) for cancer patients in France in 2019-2020: descriptive analysis from the French public health insurance database (PMSI)

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Context

- Hospitalizations At Home (HAH) are hospital units that provide home care by both hospital and outpatient providers. They are allowed to infuse drugs at home limited to hospital use (1).
- One third of HAH stays involved cancers in 2019 (2). 2.0% of stays were related to chemotherapy for cancer. Protocols and infusion management are specified in local protocols.
- In addition, recent advances in the treatment of cancers have been made with the introduction of Immuno-Oncology (IO) including Immune Checkpoint Inhibitors (ICI).
- ICI limited to hospital use are mainly infused in Day Care Units (DCU) that can regularly be saturated. HAH ICI infusions can have different advantages: in terms of quality of life for patients by limiting their stay within a hospital, in adjuvant indications for patient acceptance issues, or in terms of limiting the constraints related to the management of long-term survivor patients.
- The study conducted in France with the 2019 data (3) showed that ICI infusions remained very limited (only 60 patients treated with ICI) and the patients' pathways treated with ICI in HAH were very varied. In connection with the 2021-2030 ten-year anti-cancer strategy and the goal of maintaining patients at home, development of HAH management for ICI administrations was expected in 2020, particularly in the COVID-19 epidemic context.
- The increase in the HAH use rate per 100,000 inhabitants in France between 2019 and 2020 (based on 2020 regions cuts) was particularly strong in Auvergne-Rhône-Alpes (from 21 to 24 patients) and Occitanie (from 18 to 22 patients) (4).

Objective

- This work aims to describe the evolution of HAH ICI administrations between 2019 and 2020 in the COVID epidemic context, to characterize patients, to describe the HAH use in 2019 and 2020 in the administration of ICI and the management methods in HAH (duration of care management before switching to HAH and during HAH, frequency of administration, alternating HAH and Hospital stays after switching to HAH).

Method

- This study is a retrospective analysis using data from the French public hospital databases Medicine, Surgery and Obstetric (MSO) PMSI and HAH PMSI 2014-2020. The patient data included in one of the French article 51 experiments* called "Home follow-up of cancer patients treated with immunotherapy" are not available in the PMSI (1st patient included in 2nd of June 2020).
- An extraction of hospital stays of patients treated with ICI in 2019-2020 was performed with two cohorts:
 - A cohort of patients who had at least one HAH infusion in 2019 with retrospective chaining of all stays for ICI administration until 2014, hereinafter referred to as "2019 HAH patients".
 - A cohort of patients who had at least one HAH infusion in 2020 with retrospective chaining of all stays for ICI administration until 2014, hereinafter referred to as "2020 HAH patients".
- The various databases of French public hospitals were linked using the anonymous patient identifier:
 - MSO-PMSI database (for hospital stays in inpatient or day care units)
 - HAH-PMSI database (for HAH)
 - fich-Comp-PMSI databases (for consumption of drugs listed on the "extra drug list**" (LES codes)).
- Melanomas are classified into 3 categories for 2020:
 - Adjuvant melanomas: "extra drug list***" codes of each molecule
 - Unresectable or metastatic melanomas: "extra drug list***" codes for each molecule
 - Other melanomas: other codings (outside the intended indication)
- Descriptive analyses were performed for characterization of patients and stays, by indication.
- Patient care pathways were analyzed descriptively and by treatment sequences with the TAK® algorithm: Time sequence Analysis K-clustering (5).
- Finally, an analysis of the distribution of HAH vs. Hospital stays on a monthly basis over 2020 was carried out with a view to highlight the impact of COVID-19-related lockdowns on management procedures.

Results

Table 1. Patient characteristics and prevalence of indications and molecules

	2019 HAH	2020 HAH	2020- 2019 Differences
No. patients	60	339	+279
Mean age	62.3 yo	66.3 yo	+4y
Women (%)	23 (38.3%)	113 (33.3%)	+90
Lung cancer	46 (77%)	216 (63.7%)	+170
Melanoma	14 (23%)	90 (26.5%)	+76
Adjuvant	n.a.	31 (9.1%)	n.a.
Metastatic	n.a.	50 (14.7%)	n.a.
Other	n.a.	9 (2.7%)	n.a.
Renal carcinoma	0	10 (2.9%)	+10
Head and neck cancer	0	26 (7.7%)	+26
Other cancers	0	15 (4.4%)	+15
Nivolumab (monotherapy)	35 (58%)	167 (49%)	+132
Nivolumab and Ipilimumab (bitherapy)	0	7 (2.1%)	+7
Atezolizumab	1 (2%)	19 (5.6%)	+18
Durvalumab	0	18 (5.3%)	+18
Ipilimumab	0	0	0
Pembrolizumab	24 (40%)	139 (41%)	+115

Note : Some patients may be managed for multiple indications or by multiple immunotherapies, so they are counted for each.
n.a. (not applicable): none patient concerned in 2019.

Description of the total population

- In 2020, 50,819 patients were treated with ICI across all indications, compared to 36,526 in 2019 (+4%). 0.67% (n=339) of 2020 patients received at least one ICI HAH infusion, compared to 0.16% (n=60) in 2019 patients. Descriptions of patients' characteristics, indication and immunotherapy delivered are available in Table 1.
- HAH patients in 2020 are older with a higher proportion of men than in 2019. Nivolumab is still the majority treatment and indications are diversifying (more than 15% of stays with an indication other than melanoma and lung cancer in 2020), although lung cancer remains the majority as well.

Description of the HAH care offer

- In 2020 10 out of 13 regions were undertaking HAH ICI therapies while there were 5 out of 22 in 2019.

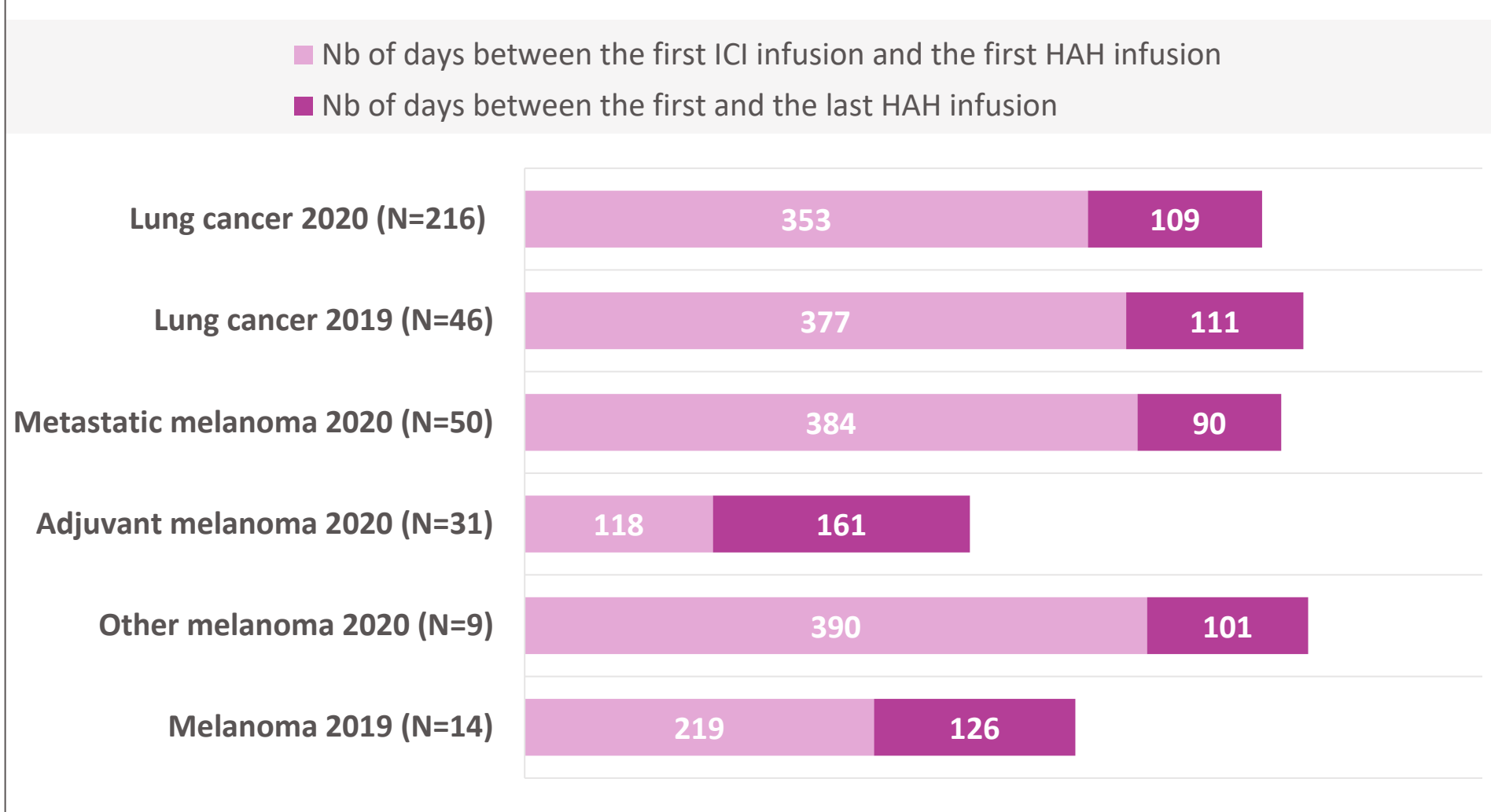
Table 2. Number of centers offering HAH care by region in 2020

French Regions	No. HAH Centers (% centers in France)	No. HAH Patients by center (% patients)
Ile-de-France	12 (26%)	36 (11%)
Auvergne-Rhône-Alpes	10 (21%)	90 (27%)
Nouvelle-Aquitaine	8 (17%)	124 (37%)
Occitanie	6 (13%)	34 (10%)
Hauts-de-France	4 (9%)	44 (13%)
Bretagne	2 (4%)	n.a.
PACA	2 (4%)	n.a.
Bourgogne-Franche-Comté	1 (2%)	n.a.
Centre-Val de Loire	1 (2%)	n.a.
Normandie	1 (2%)	n.a.
Pays de la Loire	0	0
Grand Est	0	0
Corse	0	0

Note : Some patients may be managed in multiple regions, so they are counted for each.
n.a. (not applicable): in conformity with data regulation, information with less than 11 patients should be hidden.

- In 2020, 98.5% of ICI infusions were linked to a public hospital and 100% were in 2019. The 1.5% left in 2020 were attached to independent public or private non-profit HAH facility.
- Access to HAH differs a lot from a region to another : in 2020, almost half of the HAH offer is proposed in Ile-de-France and Auvergne-Rhône-Alpes, as shown in Table 2. Auvergne-Rhône-Alpes and Nouvelle-Aquitaine are the two main regions in terms of number of HAH patients

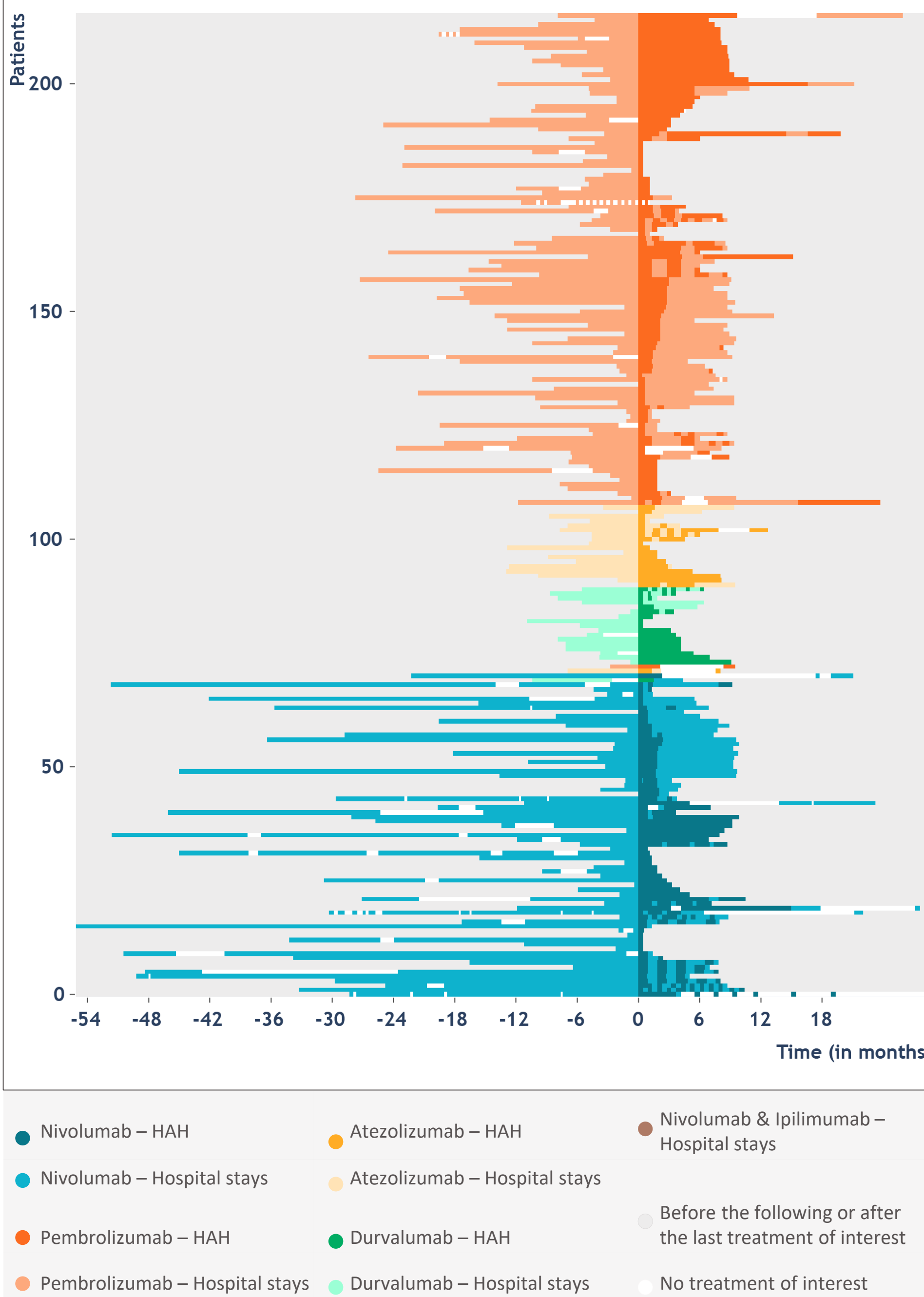
Figure 1. Average length of time under ICI treatment before and after ICI first HAH infusion



Length of time before and after ICI first HAH administration

- In 2020, mean number of days before HAH was close to a year (340 days) and higher than the mean number of days spent in HAH (110). Results are very similar when looking at 2019 : 341 days from first infusion in hospital to the initiation of HAH and 115 days between first and last infusion in HAH. Figure 1 shows details by indication.
- A high variability of these durations is observed between patients and between indications. 2020 melanoma analysis detailed by categories shows that strategy depends on the type of melanoma treated.

Figure 2. Duration and infusion method of ICI for 2020 HAH patients before and after their first HAH infusion - TAK® Lung Cancer



Reading TAK®: Each patient is represented by a line, his/her follow-up is represented from left to right, so that his/her initialization at the HAH takes place at t=0. Patients are ordered according to their treatment sequence after their first HAH infusion. Hospital stays administrations that occur prior to the first HAH infusion are displayed for informational purposes but not considered for alignment. The colors represent the treatment (molecule and infusion method) received by the patient.

Figure 3. Duration and infusions management of ICI for 2020 HAH patients before and after their first HAH infusion - TAK® Melanoma

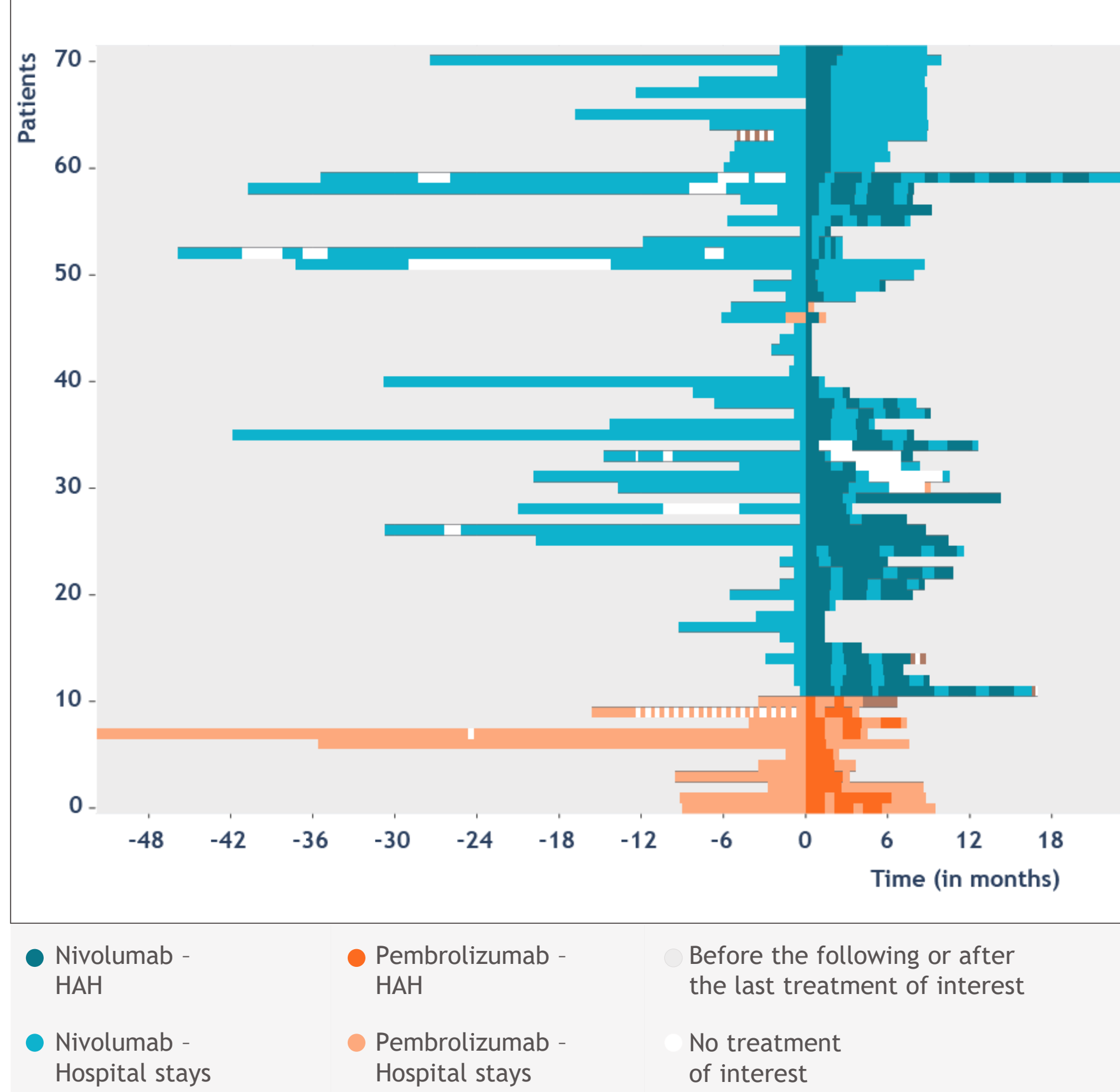
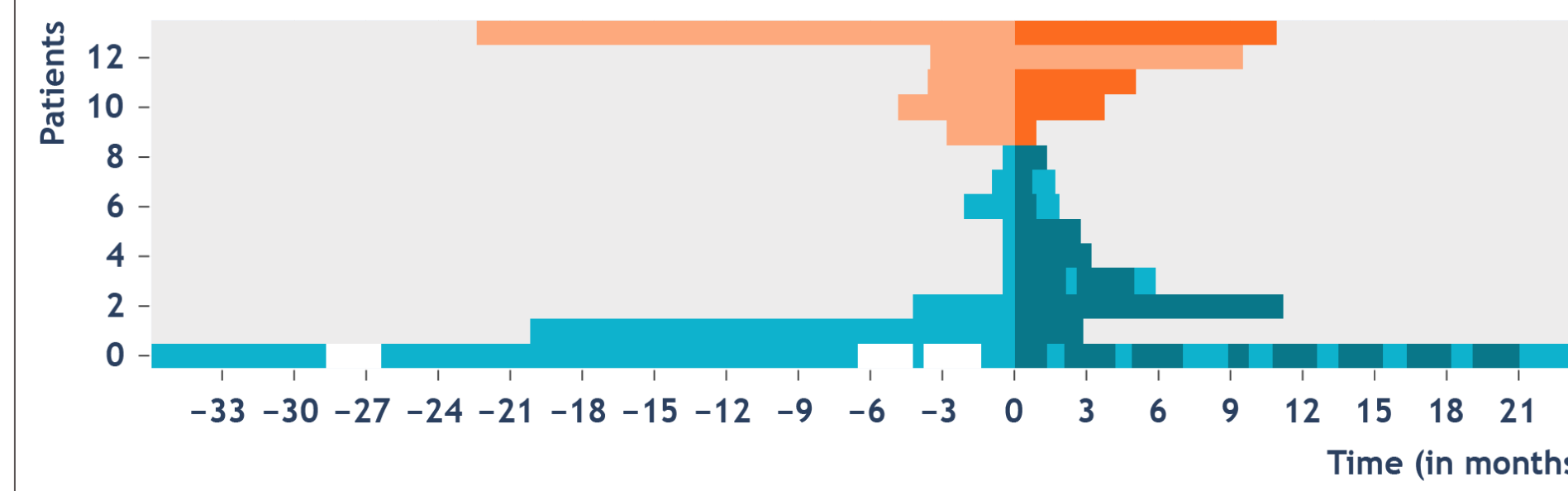


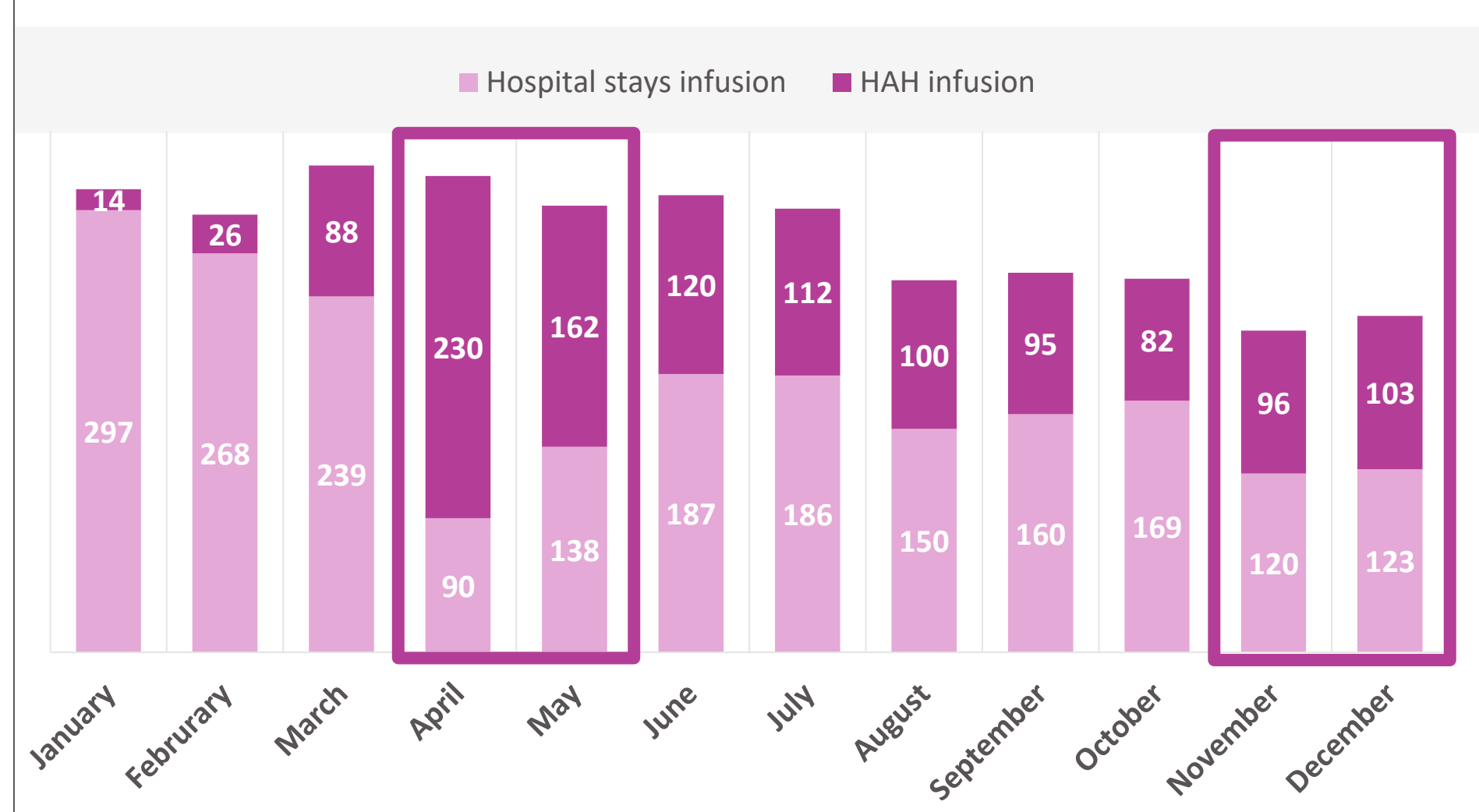
Figure 4. Duration and infusions management of ICI for 2019 HAH patients before and after their first HAH infusion - TAK® Melanoma



Description of the management procedures

- In both years, 3 patient pathways are observed by TAK® (Figure 2, Figure 3 and Figure 4) after HAH first infusion:
 - Patients managed exclusively in HAH
 - Patients with alternating HAD/Hospital stays
 - Patients with a return to hospital stays after a few months of HAH management
- In 2020, most of lung cancer pathways after the first HAH infusion is done exclusively in HAH (Figure 2) while melanoma takes place more in alternating HAH/Hospital stays (Figure 3).
- This trend was not observed in 2019 for melanoma patients (Figure 4), with very few patients treated and for whom the majority pathways was exclusively for HAH.
- Management in Hospital stays before the first HAH infusion does not appear to impact the pathways management after the first HAH infusion or the HAH duration neither in 2020 nor in 2019.

Figure 5. Monthly number of ICI HAH infusions and ICI Hospital stays infusion sessions in 2020 for HAH patients



Impact of COVID-19 on HAD management in 2020

- Figure 5 shows the number of Hospital stays vs HAH infusions per month in 2020 for HAH patients. This number of administrations is calculated on patients with at least one HAH stay in 2020. It shows that patients have been heavily using HAH during the lockdown months but also HAH has remained an important infusion option even after lockdown in spring 2020.

Conclusions

- The number of HAH patients treated with ICI increased around 6-fold between 2019 and 2020. These patients are mostly treated with Nivolumab in lung cancer.
- This study highlights the wide variability in the management modalities of HAH patients treated by ICI in 2020, between patients treated with ICI, indications and regions of France. In particular, the modality of alternating Hospital stays and HAD vary between indications and molecules.
- The increase in the number of melanoma patients managed between 2019 and 2020 allows us to observe new modes of management, in particular Hospital stays/HAH alternation.
- Despite easier HAH access since the COVID-19 health crisis, HAH development remains limited. The publication of good practice guidelines on ICI HAH infusion by the French Cancer Immunotherapy Society (FITC), at the end of 2020, is expected to contribute in part to its development.

Notes

*Experimentations called "Article 51" refer to public financing and organization experiments conducted in France since 2018. As they are still ongoing, patients' data from the experiments are not in the PMSI database.

** Extra drug list called "Liste En Sus" (LES) in French is the drugs list for which an extra payment from DRG system is claimed, because of the differential between their price and the DRG tariff (innovative, rare disease etc)

References

- art R. 6121-4 du Code de la Santé Publique
- FNEHAD, 2019/2020 Activity report
- Lemasson H et al. Poster presentation at Virtual ISPOR Europe 2021; POSA235
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