Economic burden of hepatocellular carcinoma (HCC) treated with a curative resection or ablation (R/A) in France : LIVERPOOL study

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Background and objective

Hepatocellular carcinoma (HCC) accounts for approximately 90% of primary liver cancers in France. Globally, HCC is the third leading cause of cancer deaths, although it ranks sixth in the worldwide incidence of cancer, attesting to the poor general prognosis. Patients may be treated with curative intent including first-line surgical resection or ablation, according to European association for the study of liver (EASL) recommendations (1). Given the high recurrence rates of HCC (70% of cases within 5 years post-curative intent) following resection or ablation (2), understanding the implications of such recurrences on healthcare resource utilization throughout the patient pathway becomes crucial.

This study aimed to investigate healthcare resource utilization throughout the patient healthcare pathway for early-stage HCC patients undergoing first-line treatment with curative intent.

Method

A retrospective cohort of patients with patients who received a resection or ablation (R/A) as a first line hepatocellular carcinoma curative treatment was selected over the period 2014-2021 in the French national claims database (SNDS – Système National des Données de Santé), which covers around 99 % of the French population.

The included patients will be followed from the date of inclusion until death or December 31st, 2021. A retrospective period will be considered from January1st, 2012, to January 1st, 2014, for patients to ensure the absence of any previous HCC treatment.

For each incident case, the cost of healthcare expenditures was analyzed over two periods: (1) between the inclusion and the initiation of a new treatment or death, and (2) from the initiation of a new treatment to death. A minimum timeframe of two-months per period as described previously must be observed in order to minimize the bias from annualizing a short period of time. All results will be annualized.

The new treatment was identified by the following marker, whichever occurs first after curative resection or ablation (R/A):

- initiation of any first line systemic treatment, transarterial chemoembolization (TACE) ;
- or transarterial radioembolization (TARE) ;
- hospitalization for best supportive care (BSC) associated with an HCC ICD-10 code.

Costs included hospitalizations, outpatient (i.e., medical fees, pharmacy, laboratory tests, nursing) , and indirect costs (i.e., sick leaves and disability pensions). Mean cost per patient was estimated from societal perspective.

The costs were reported by period (Period 1 or Period 2) and by type of curative treatment (resection or ablation), with a breakdown by category of resource consumption.

Results

Among the eligible incident patients identified, 5,046 ablated patients and 4,758 resected patients were followed during period 1, with a mean follow-up of 24.5 months. In period 2, 2,527 ablated patients and 2,011 resected patients were followed, with a mean follow-up of 25.6 months.

The total breakdown cost per period and per surgery was presented in the table 1.

Table 1. Cost estimation for all patients*

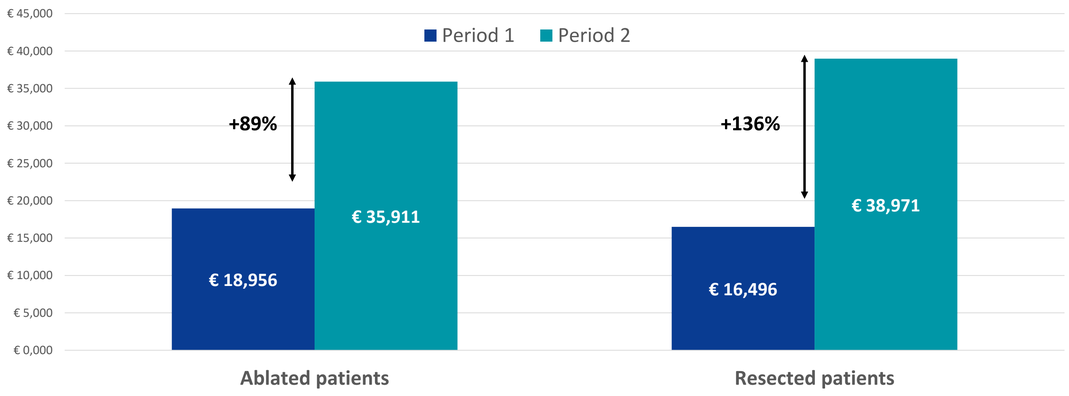
	Ablated patients		Resected patients	
	Period 1	Period 2	Period 1	Period 2
Patients included (n)	**5,046**	**2,527**	**4,758**	**2,011**
Total costs (€)	**18,956**	**35,911**	**16,496**	**38,971**
Outpatient costs (€) and distribution of expenditures (%)				
Total outpatient costs	**10,396** (55%)	**12,894** (36%)	**7,980** (48%)	**15,843** (41%)
Medical fees	1,484 (14%)	1,812 (14%)	1,540 (19%)	2,243 (14%)
Dental fees	128 (1%)	934 (1%)	123 (2%)	90 (1%)
Pharmacy	5,432 (52%)	6,222 (48%)	3,411 (43%)	8,719 (55%)
Biology	551 (5%)	7389 (6%)	588 (7%)	830 (5%)
Medical assistants	939 (9%)	1,151 (9%)	784 (10%)	951 (6%)
Device	736 (7%)	997 (8%)	728 (9%)	1,058 (7%)
Medical transport	990 (10%)	1,757 (14%)	724 (9%)	1,854 (12%)
Others	136 (1%)	122 (1%)	82 (1%)	98 (1%)
Hospital costs (MCO, HAD, SSR and PSY) (€) and distribution of expenditures (%)				
Total hospital costs	**8,559** (45%)	**23,016** (64%)	**8,516** (52%)	**23,128** (59%)

*all figures rounded

Total cost per period and surgery

For ablated patients, total costs were €18,956 in period 1 and increased to €35,911 in period 2. For resected patients, total costs were €16,496 in period 1 and rose to €38,971 in period 2. Period 2 was more expensive for both groups, accounting for 65% and 70% of total costs (period 1 + period 2) in ablated and resected patients, respectively. Costs increased significantly between period 1 and period 2 for both groups, but more sharply for resected patients: an 89% increase for ablated patients and a 136% increase for resected patients (Figure 1).

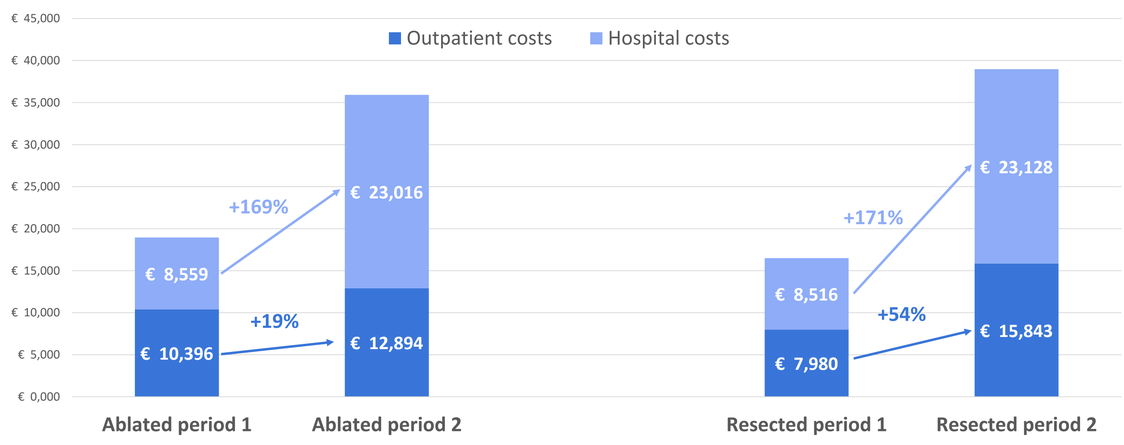
Figure 1. Cost distribution among period 1 and period 2



Breakdown by period and surgery

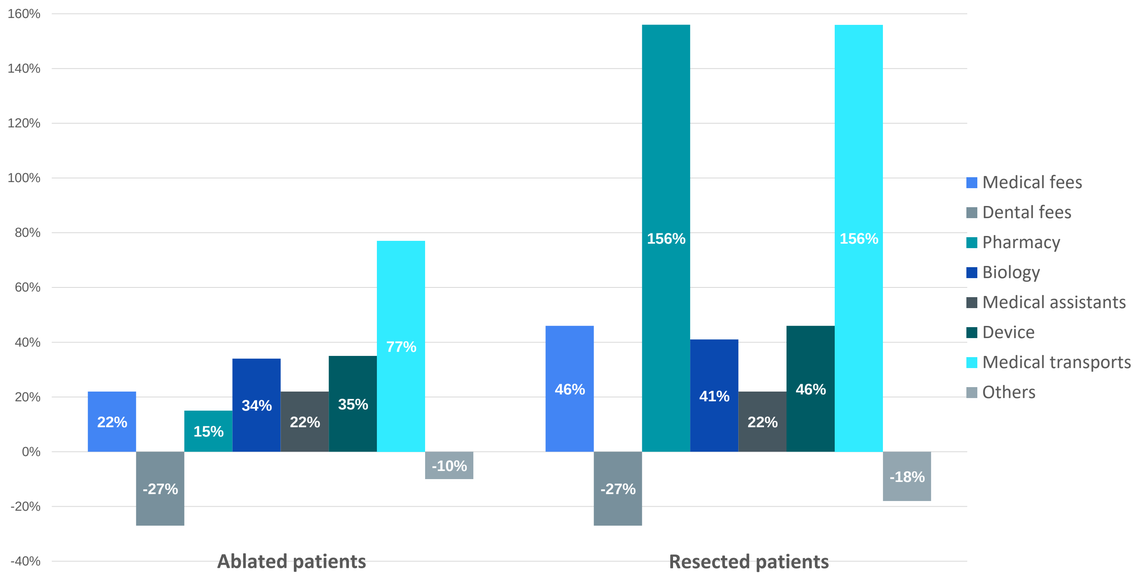
The rise in total costs between the two periods was driven by both hospital and outpatient costs. Hospitalization costs increased significantly (+170%) in both groups (Figure 2). However, outpatient costs followed different trends, with a more pronounced increase in the resection group, showing a 54% rise compared to 19% in the ablated group (Figure 2).

Figure 2. Cost distribution by healthcare structure



- For patients who underwent ablation, outpatient costs rose by 19%, mainly driven by a 77% increase in medical transport costs (figure 3).
- For patients who underwent resection, outpatient costs increased by 50%, primarily due to a 156% rise in pharmacy and medical transport costs, along with a 41% increase in biology costs (figure 3).

Figure 3. Evolution of outpatient costs between period 1 and period 2



Discussion

Progression after curative R/A in HCC has been associated with a significant increase in total costs, highlighting the impact of disease progression on healthcare resource utilization.

Although overall costs were similar, a greater increase was observed for resected patients (+89% versus +136%, respectively). While hospital costs represented the largest increase and followed a similar trend in both ablated and resected patients, this difference in the rate of increase underscores a marked disparity in the evolution of outpatient costs. Outpatient costs rose by 19% for ablated patients and by 54% for resected patients. Pharmacy and medical transport costs were among the most significantly increased categories of outpatient expenses, with a notable difference between the two patient groups.

This study emphasizes the distinct healthcare pathways for HCC patients treated with curative R/A.

Reference

1. Management of hepatocellular carcinoma, EASL, https://easl.eu/wp-content/uploads/2018/10/EASL-CPG-Management-of-hepatocellular-carcinoma-.pdf
2. Hepatocellular carcinoma recurrence : predictors and managment

Conclusion

The study underscored the substantial economic burden of HCC in patients who experience relapse after curative R/A. Introducing new strategies to manage HCC patients following curative attempts may help alleviate this burden.

Given the significant differences observed in expenditure items and their evolution, particularly in outpatient settings, further investigation into healthcare pathways could be of great significance.