Economic Implications of Response and Non-Response to Cardiac Resynchronization Therapy With Dynamic Atrioventricular Optimization Algorithm Use

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INTRODUCTION

Cardiac resynchronization therapy (CRT) has been shown to reduce mortality and symptoms in patients experiencing moderate to severe heart failure (HF)[1]. **Individual responses to CRT can vary**, where non-response leads to poor outcomes and increased healthcare expenditures[2]. CRT programming is commonly maintained at default settings regardless of individual intrinsic atrioventricular (AV) intervals[3]. The dynamic AV optimization algorithm aims to **improve CRT response** by enabling the **optimization of the AV delay**[2].

OBJECTIVE

The present analysis evaluates the economic implications of algorithm activation in patients treated with CRT in five European countries (**France**, **Germany**, **Italy**, **Spain**, and **UK**).

METHOD

The analysis compares two scenarios over a **3-year horizon**.

- In the **1st scenario**, algorithm activation is limited to a **small population segment**,
- In the **2nd scenario**, algorithm activation is **progressively expanded**.

AlTurki et al. defined **response to CRT** as a ≥10% increase in left ventricular ejection fraction which led to **response rates as low as 44%**, which **rose to 71% following algorithm activation**[4].

Rates for **HF hospitalizations (HFH)**, **unscheduled office visits**, and **all-cause mortality** events for **responders** versus **non-responders** were taken from the **ADVANCE CRT registry** (Figure 1)[5].

The respective costs per event were extracted from national DRG tariffs and relevant literature[6-16]. These were adapted to a **weighted average of the five European countries**. Notably, there is no additional cost for algorithm activation if the device is already equipped with it.

RESULTS

Considering a hypothetical cohort of 1,000 patients, approximately **30% receive CRT compatible with algorithm activation**.

Per patient average of the **total cost** amounted to **€4,315** for **non-responders** and **€922** for **responders**, resulting in a **79% cost reduction** for responders compared to non-responders (Figure 2).

The total costs incurred in the **1st scenario** over a **three-years period** amount to an average of **€842K**.

In contrast, the **2nd scenario**, which benefited from an **increased responder** rate due to **increasing algorithm activation**, resulted in significant annual cost savings thanks to the reduction in HFH, office visits and mortality (Figure 3).

Specifically, these savings amounted to **an average of €82,002 per year**, leading to a **cumulative total of €246,005** over a **three-year period** (Figure 3).

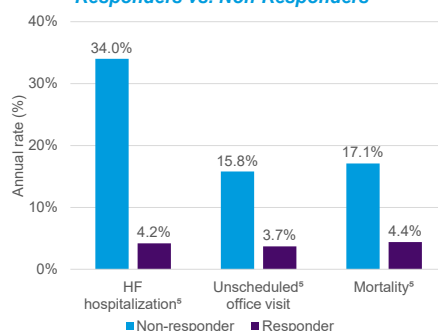**Figure 1. Clinical Data Comparison: Responders vs. Non-Responders[5]**

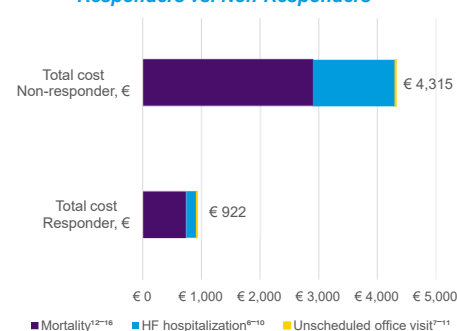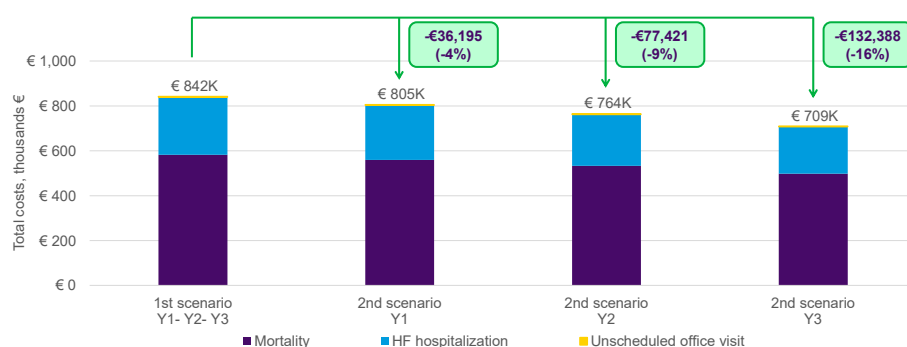**Figure 2. Total cost per patient: Responders vs. Non-Responders[6-16]**

Figure 2. Total costs: 1st scenario vs 2nd scenario

CONCLUSIONS

These findings suggest that **implementing CRT programming with a dynamic AV optimization algorithm could offer both clinical and economic advantages** in the management of **HF patients** in Europe.

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