Assessing carbon emissions of an immunization program against respiratory syncytial virus in infants in France.

Bouaraba F[1], Levy P[2], Sarrasin N[1], Menin G[1], De Mari P[1], Damois J[1], Antoniali L[1]

[1]Sanofi, Paris, France

[2]Université Paris-Dauphine, Université PSL, LEDA[LEGOS], 75016 PARIS, France

Poster Number: HTA371

INTRODUCTION

The healthcare sector's carbon footprint is equivalent to about 8% of France's emissions, totaling nearly 49 million tons of CO2 equivalent (CO2eq) per year[1]. To achieve carbon neutrality, reducing these emissions is crucial. Most emissions are directly related to care delivery[1].

Respiratory Syncytial Virus (RSV) significantly impacts children <2 years-old, often causing lower respiratory tract infection (LRTI) during its epidemic season in France (October to March). The novel treatment, nirsevimab, is indicated in the prevention of RSV-LRTI for all infants entering their first RSV season.

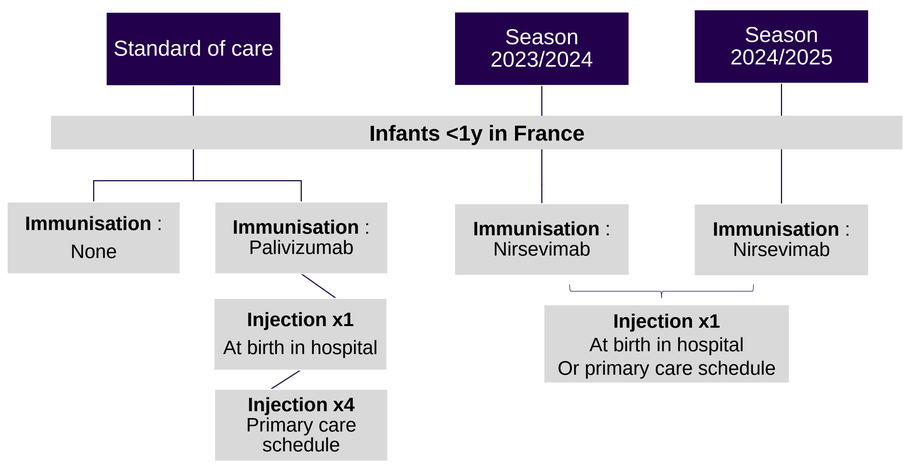
OBJECTIVE

- **This study aims to evaluate the associated net carbon emissions, comparing nirsevimab with standard of care (SoC) in terms of patient care pathways and healthcare utilization.**

METHODS

- Our study estimates the greenhouse gas (GHG) emissions using a health-economic model and healthcare-specific GHG emission factors. This analysis allows to compare the incremental carbon impact of one pharmaceutical intervention to another.
- Avoided RSV-related events from five health outcomes, ranging from primary care visits to ICU admissions, were calculated using data from a cost-effectiveness model[2] comparing nirsevimab with SoC (palivizumab when eligible or no drug). Carbon emissions were then estimated by including emission factors from the production of nirsevimab (using a monoclonal antibody proxy), the administration, healthcare utilization and patient travel[3].
- **Two scenarios** were considered : 2023-2024 and 2024-2025 seasons projected immunization for 250,000 and ~600,000 infants, respectively.

Figure 1: Patient care pathway of new drug intervention vs comparator



RESULTS

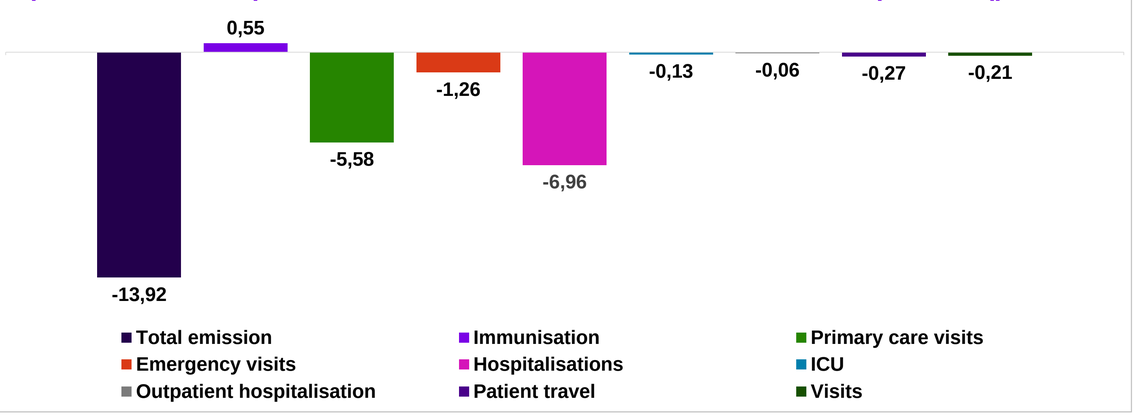
- The emissions associated with five health outcomes were modelled, from primary care visits to ICU admissions

Table 1: RSV-related events in infants in their first season in France

RSV-related events	Standard of care	Season 2023/2024 (250k doses)	Season 2024/2025 (~600k doses)
Five health outcomes			
Primary care visits	184 775	126 097	71 767
Emergency visits	35 956	24 617	14 382
Hospitalization	27 443	15 179	6 358
ICU	1 469	732	279
Outpatient hospitalization	2 020	1 484	864

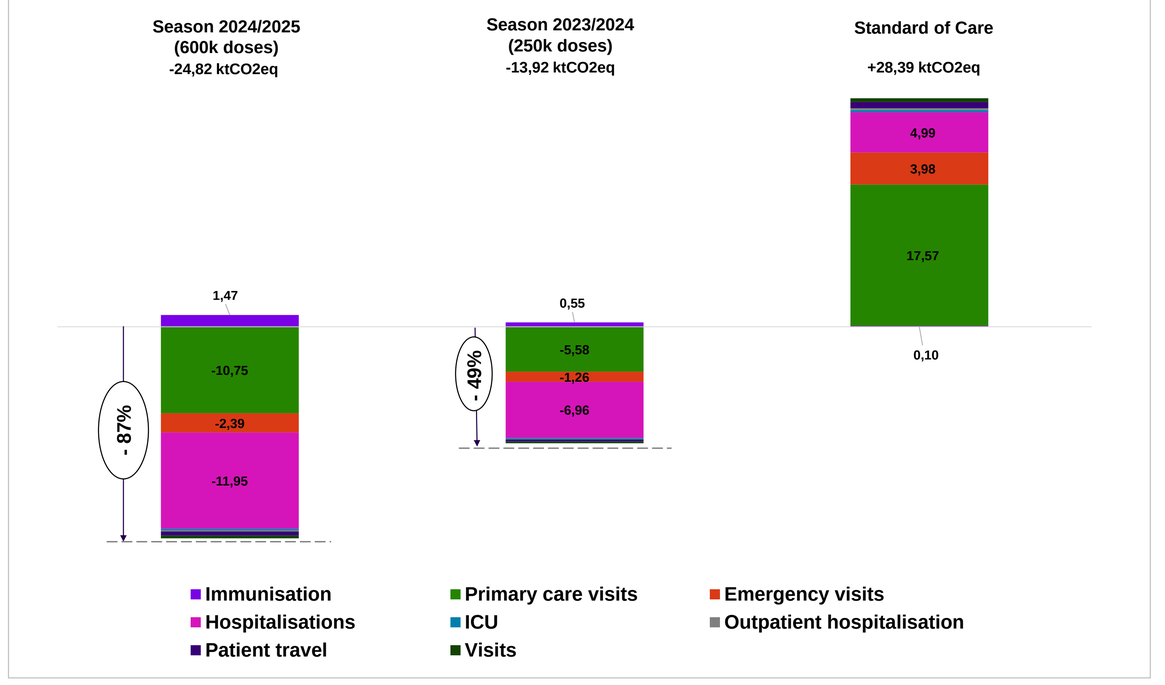
- **Inpatient hospitalizations** and **primary care visits** represent the largest part of **avoided emissions** in each nirsevimab season scenario.

Figure 2 : Predicted avoided disease burden and immunization emissions with nirsevimab implementation compared to standard of care in the 2023/2024 season (kt CO2eq)



- Compared with SoC, the RSV **immunization program using nirsevimab was found to avoid substantial carbon emissions** amounting to a net avoided **~13.92 ktCO2eq/year** in the 2023-2024 season scenario and **~24.82 ktCO2eq/year** in the 2024-2025 season scenario.
- This represents 0.03 to 0.05% of healthcare-related emissions in France (49 MtCO2eq), for a single healthcare product.

Figure 3 : Predicted avoided disease burden and immunization emissions with nirsevimab implementation compared to standard of care in 2 scenarios compared to SoC (kt CO2eq)



CONCLUSIONS

- **By significantly reducing the incidence of RSV-LRTI, nirsevimab also contributes to the decarbonization of healthcare systems via preventing emissions associated with the patient's care pathway.**
- **This innovative approach enables to assess the carbon impact of a healthcare intervention, putting into perspective the production's emissions with the carbon footprint avoided throughout the patient's care pathway.**
- **As limitations of this analysis, emission factors associated with hospitalizations are not specific to RSV-LRTI and those associated with nirsevimab's production were approached with the use of a proxy.**

REFERENCES

1. The Shift Project 2023. Available : https://theshiftproject.org/wp-content/uploads/2023/04/180423-TSP-PTEF-Rapport-final-Sante_v2.pdf
2. Kieffer and all. Expected Impact of Universal Immunization With Nirsevimab Against RSV-Related Outcomes and Costs Among All US Infants in Their First RSV Season: A Static Model
3. AP-HP 2022 Carbon footprint. Available : https://www.aphp.fr/contenu/lap-hp-publie-son-bilan-carbone-pour-2022-et-sengage-dans-une-demarche-ambitieuse-et#:~:text=En%202022%2C%20les%20%C3%A9missions%20de,e%20d'%C3%A9missions%20par%20ETP.

CONFLICTS OF INTEREST

This study was sponsored by Sanofi and AstraZeneca

BF, NS, GM, PDM, JD and LA are Sanofi employees and may hold Sanofi shares and/or stock options.