Impact of Resmetirom on Liver Transplant Demand and Outcomes in U.S. Patients with MASH

POSTER
EPH135

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OBJECTIVES

- Metabolic Dysfunction-Associated Steatohepatitis (MASH) affects ~5% of US adults and is one of the leading indications for liver transplantation (LT), with costs >$800,000 per LT. [1,2]
- In 2024, the US Food and Drug Administration (FDA) conditionally approved resmetirom for the treatment of noncirrhotic MASH with moderate-to-advanced liver fibrosis.
- The availability of resmetirom has the potential to decrease demand for LT, thereby improving access to donor livers for patients with any LT indications.

Aim

- **To evaluate the potential population-level impact of resmetirom on LT demand and allocation outcomes in the US**

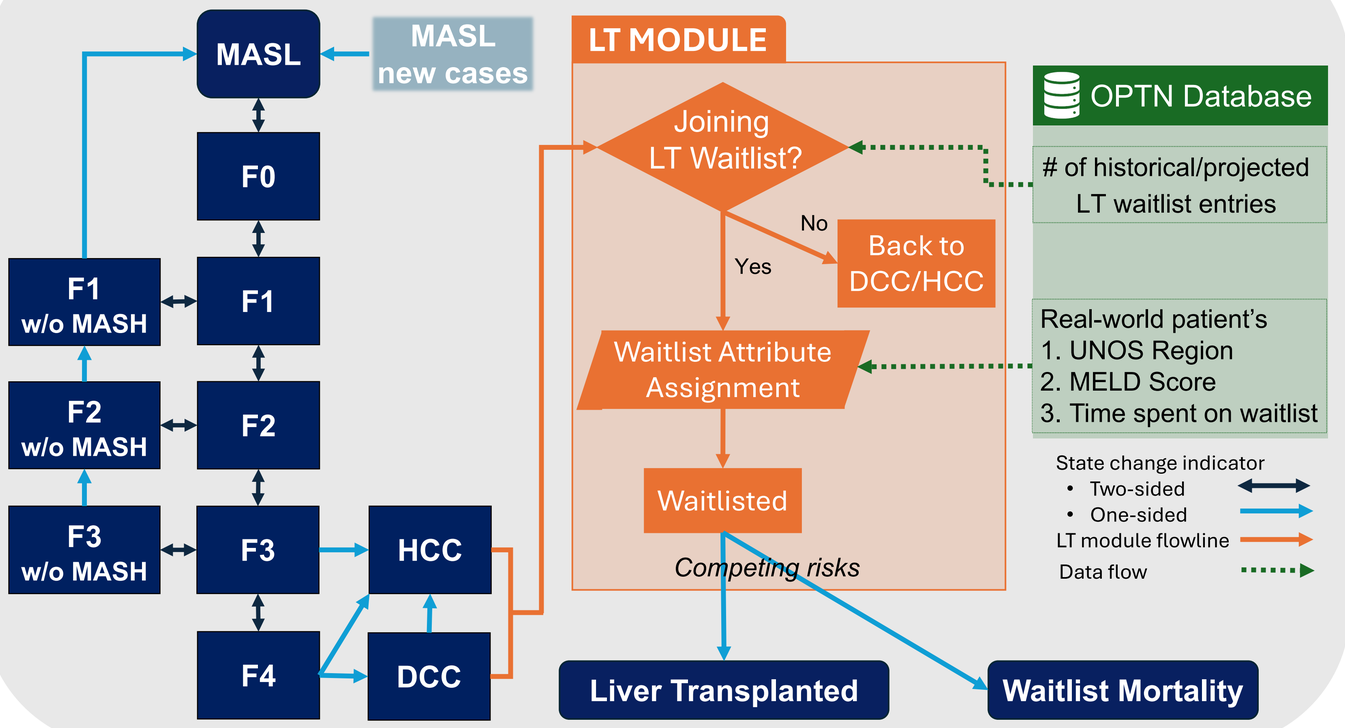
METHODS (Scenario Analysis)

- Along with the natural history scenario, where no one received resmetirom (**NoRES**), we tested the resmetirom scenario (**RES**), where the model assumed 5% of patients with F2/F3 each year start resmetirom treatment from 2024 onwards.
  - Additional sensitivity analyses were conducted with varying annual treatment rates: 10%, 15%, 20%, and 25%
- **Model Execution Order**:
  1. Simulated the NoRES scenario and recorded all patients' disease trajectories and LT outcomes
  2. Selected patients who would initiate resmetirom treatment in a year when they were in F2/F3 in the NoRES scenario.
  3. Simulated the RES scenario only for patients with resmetirom
  4. Re-allocated donor livers that become idle in the RES scenario, due to avoided LTs with resmetirom
  5. Compared the LT outcomes between the NoRES and RES scenarios
- **Outcomes:** (1) avoided waitlist entries, (2) avoided LTs, (3) reduction in the proportion of MASH patients on LT waitlists, and (4) reduction in time and mortality without LT (across patients with any LT indications)

METHODS (Model)

- A **hybrid decision analytic model**, including an individual state-transition (Markov) sub-model and a discrete event simulation (DES) sub-model, was developed.
- **Populations**: Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) patients with age/sex distribution reflecting the US population (mean age 50.1 yrs, 49.1% male)
- **Markov model:** simulating MASLD disease progression [3] (Figure 1)
  - Population-level model with yearly cycle and lifetime horizon, introducing new MASL (i.e., simple steatosis) cases over time
- **LT Module with DES:** a synthetic LT waiting list system, developed with the Organ Procurement and Transplantation Network (OPTN) database, with two primary features:
  - Control the number of simulated patients with decompensated cirrhosis (DCC) and hepatocellular carcinoma (HCC) joining the LT waiting list (proxy for LT eligibility)
  - Assign patient-specific attributes (MELD score and time on the waitlist) that mirrored real-world patients in the LT waiting lists
- **Simulation Period:** 2024 – 2054 (after simulating 1970-2023 for validation)

FIGURE 1. Model Schematic of the MASLD and LT Module



RESULTS

- Patients who were eligible and received resmetirom achieved either **slower disease progression** or **resolution of steatohepatitis** (i.e., MASH resolution) compared to themselves in the NoRES scenario → **Fewer** patients developed DCC and HCC that required LTs
  - **Fewer waitlist entries & LTs**: # of patients who would have been added to the LT waitlist & received LTs without resmetirom (i.e., in their natural history) but did not because they received resmetirom and their disease either improved or stabilized (Table 2)
  - **Reduction in the MASH patients on LT waitlists**, induced by the avoided waitlist entries (Figure 3)
    - Due to the avoided LTs, the associated donor livers could be reallocated to other patients (regardless of LT indication or liver disease etiologies) → **Reallocated** saved livers to patients with the highest MELD score on the waitlist at the time of availability
      - Compared to the NoRES scenario, patients were able to receive LTs sooner → **Reduction in time on waitlist and waitlist mortality** (Table 2, Figure 2)

TABLE 2. Impact of resmetirom adoption on LT waitlists

Annual Treatment Rate*	Avoided Waitlist Entries	Avoided LTs	Waitlist Deaths Averted†,‡	Waitlist Time Reduction‡,§
5%	5,765	5,041	5.40%	8.88d
10%	11,179	9,659	9.53%	15.90d
15%	23,853	20,552	18.15%	31.25d
20%	31,082	26,477	23.02%	38.49d
25%	32,377	27,566	24.07%	40.31d

Abbreviation: d = days

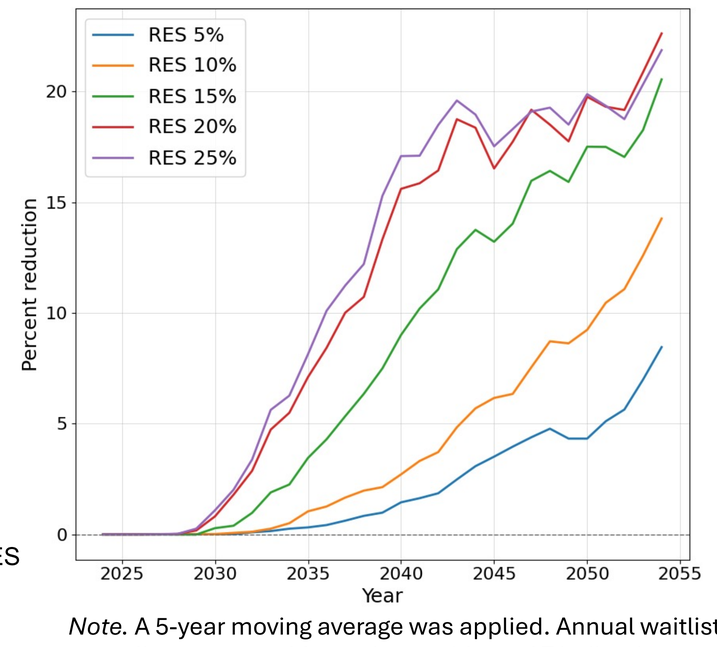
*: Proportion of F2/F3 patients who initiated resmetirom each year

†: Absolute reduction in deaths before LT; Percentage of deaths in NoRES averted in RES

‡: Waitlist outcomes include patients with any LT indications (e.g., MASH, HCV, ALD).

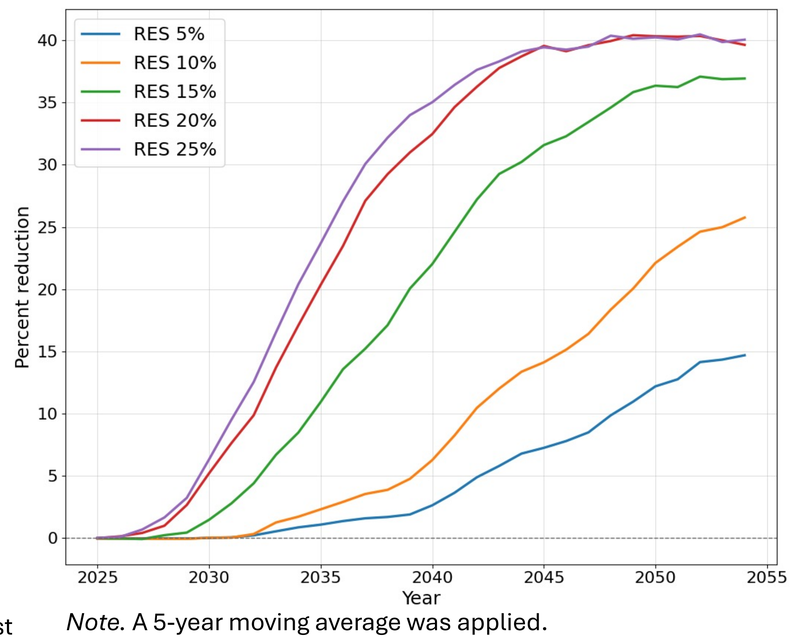
§: Reduction in the average days per waitlisted patient (including patients who did not receive resmetirom)

FIGURE 2. Waitlist Mortality: Percent Reduction from the No-RES scenario



Note. A 5-year moving average was applied. Annual waitlist mortality accounted for patients with any LT indications.

FIGURE 3. Number of MASH Patients in LT Waitlists: Percent Reduction from the No-RES scenario



Note. A 5-year moving average was applied.

CONCLUSION

- **Resmetirom has the potential to reduce the burden of MASH and alleviate pressure on the LT system in the US.**
- **By reducing the number of patients requiring LT, resmetirom may improve overall access to donor organs and lower waitlist mortality, thus demonstrating broader population-level benefits of early MASH treatment.**

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