Progression of Metabolic Dysfunction-Associated Steatohepatitis and Economic Burden: Use of Real-world Health Record Data in England to Inform Economic Models

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BACKGROUND

- Metabolic dysfunction-associated steatohepatitis (MASH) is a progressive liver disease that can advance to compensated cirrhosis (CC), decompensated cirrhosis (DCC), hepatocellular carcinoma (HCC), liver transplantation, and death.[1-3]
- Real-world evidence on the economic burden of MASH is limited. Estimates of healthcare resource use and costs associated with disease progression are needed to inform economic models of advanced liver disease.[4,5]

OBJECTIVE

- **To characterise progression to advanced liver disease among patients and associated healthcare costs among patients with MASH in England, combining real-world progression and cost estimates to inform economic models.**

METHODS

- A retrospective cohort study was conducted using linked Clinical Practice Research Datalink (CPRD) Aurum, Hospital Episode Statistics (HES), and death registration datasets.
- Adults with ≥1 MASH-coded primary or secondary care record between 2011 and 2020 who were followed for progression to CC, DCC, HCC, liver transplantation, and death, based on diagnoses recorded in CPRD and HES.
- Kaplan-Meier methods were used to estimate median time to progression among patients who progressed.
- Mean all-cause healthcare costs were calculated per-patient per-year (PPPY) among patients with at least 12 months of follow-up and inflated to 2024/25 £ values using NHS cost inflation indices.
- Full details of the study design, selection criteria, and methods have been previously published.[6]

RESULTS

Progression to Advanced Liver Disease

- A total of 2,696 patients with MASH were included who met the selection criteria, with a mean follow-up of 4 years (**Table 1**).
- During observed follow-up, 356 (13.2%) patients experienced progression to ≥advanced liver disease state.
- Among patients with advanced liver disease progression, 234 progressed to CC, (65.7%), 174 to DCC (48.9%), and 18 developed HCC (5.1%) (**Table 2**).
- Among patients who progressed to DCC, 31.0% (n=54) had known prior CC and among patients who developed HCC, 61.1% (n=11) had known prior CC (**Table 2**).
- Median time to progression was 1.43 years for CC, 1.74 years for DCC, and 1.11 years for HCC.

Healthcare Costs and Disease Progression

- Among patients who progressed to CC or DCC (n=349), mean inpatient costs were numerically higher than among those without progression (n=2,347): £4,236 versus £1,509 PPPY, respectively.
- Among patients with DCC (n=163), mean overall healthcare costs were £7,009 per patient in year 1, £7,932 in year 2 (n=163), and £10,389 in year 3 (n=145) of follow-up (**Figure 1**).
- Among patients with HCC (n=14), mean overall healthcare costs were £5,112 per patient in year 1, £6,404 in year 2 (n=14), and £6,609 in year 3 (n=13) of follow-up (**Figure 1**).

LIMITATIONS

- Advanced liver disease states were identified from healthcare records; fibrosis staging was not directly available in the data sources.
- The HCC cohort was very small (n=14), which should be considered when interpreting cost estimates.
- Some oncology-related costs, particularly systemic anticancer therapy, are not fully captured in CPRD-HES data.

RESULTS (CONT.)

TABLE 1. Baseline Characteristics of Patients With MASH

Characteristic	Overall (N=2,696)
Age, years, mean (SD)	56.4 (15.0)
Sex, n(%)	
Male	1,228 (45.5)
Female	1,468 (54.5)
Follow-up, months, mean (SD)	52 (32.5)
Comorbidities, n (%)	
Obesity	1,206 (44.7)
Type 2 diabetes	1,104 (40.9)
Hypertension	1,274 (47.3)
Cardiovascular disease	517 (19.2)

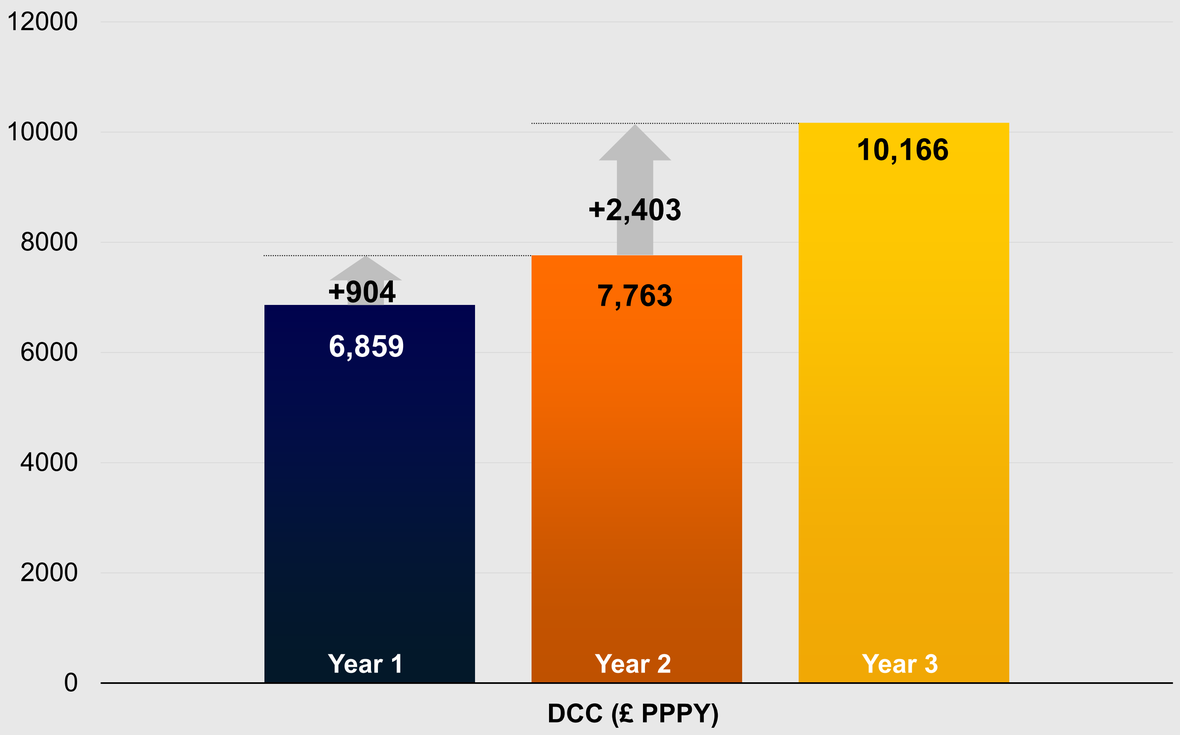
Abbreviation: MASH, metabolic dysfunction-associated steatohepatitis

TABLE 2. Progression to Advanced Liver Disease States Following MASH Diagnosis

Source cohort	Patients at risk (N)	Progression state/prior state	Patients progressed N (%)	Incidence (per 1,000 PY)
All patients with MASH	2,696	Any advanced liver disease	356 (13.2)	30.9
		CC	234 (8.7)	20.3
		DCC	174 (6.5)	15.1
		HCC	18 (0.7)	1.6
Patients with DCC	174	Prior CC	54 (31.0)	-
Patients with HCC	18	Prior CC	11 (61.1)	-

Abbreviations: CC = compensated cirrhosis; DCC = decompensated cirrhosis; HCC = hepatocellular carcinoma; MASH = metabolic dysfunction-associated steatohepatitis; PY = person-year

FIGURE 1. Annual Healthcare Costs Following Progression to DCC



Abbreviations: DCC = decompensated cirrhosis; PPPY = per-patient per-year

Arrows indicate the change in mean healthcare cost from the preceding year

CONCLUSION

- **This real-world study provides clinically interpretable estimates of progression to advanced liver disease and associated healthcare costs among patients with MASH in England.**
- **Healthcare costs were numerically higher among patients who progressed to cirrhosis than among those without progression, and remained substantial following progression to DCC and HCC, with observed DCC costs exceeding HCC costs during follow-up.**
- **CC, DCC, and HCC outcomes can inform later-stage economic model structures; however, routine healthcare data capture clinical diagnoses rather than fibrosis stages, and additional assumptions are warranted when considering all progression events.**
- **Additionally, real-world estimates derived from small sample sizes may benefit from interpretation alongside simulation model estimates.[7]**

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