Oklahoma State University Medical Center Department of Internal Medicine

Use of Non-Invasive Assessments for the Evaluation of Metabolic Dysfunction-Associated Fatty Liver Disease

OKLAHOMA STATE UNIVERSITY
CENTER FOR HEALTH SCIENCES

Reagan Livingston DO PGY-3, Corbin Walters DO PGY-2, Andrew Harris DO PGY-1

Background

More than 2 million deaths each year are attributed to liver disease[1]. A growing cause of liver disease is metabolic dysfunction-associated fatty liver disease (MAFLD), previously known as non-alcoholic fatty liver disease (NAFLD), with an estimated global prevalence of 25% of adults. MAFLD is characterized by fatty infiltration, inflammation, with and without fibrotic liver changes in the absence of secondary causes of steatosis, such as significant alcohol use, viral infection, or autoimmune disease. Common sources of MAFLD include type 2 diabetes, dyslipidemia, obesity, and hypertension. Due to its association with metabolic syndrome as well as an independent risk factor, human immunodeficiency virus (HIV), is a known, but under-represented cause of MAFLD. The feared complication is progression to nonalcoholic steatohepatitis (NASH) which is defined by hepatic inflammation and hepatocyte injury as demonstrated by liver biopsy[2]. Presently, MAFLD/NASH is the second leading cause of liver transplant in the United States, with the expectation of becoming the leading cause in the near future as highly effective treatments for hepatitis C become more widely utilized[2]. As such, noninvasive means of measuring hepatic fibrotic changes have prompted the development of scoring systems based on laboratory values and imaging modalities, such as the FIB-4 and elastography, respectively. Gaps in care exist regarding the use of these tools to identify patients for hepatology referral in order to minimize progression of disease and eventual need for transplant.

Aim

Our previous study has highlighted the gaps of care in identifying patients with MAFLD and referring to hepatology when indicated in a timely manner.

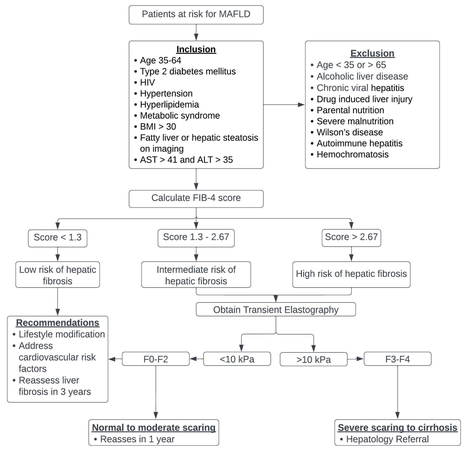
The aim of this study was the identification of patients at risk for metabolic dysfunction-associated fatty liver disease by calculating a FIB-4 score to evaluate the need for transient elastography and hepatology referral as appropriate. We have included patients since data collection began in 2021 through present day as well as those with HIV in the current analysis.

METHODS

We performed a chart review of patients at the Oklahoma State University Medical Center Internal Medicine Clinics from 2021-2024 in both internal medicine and HIV specialty clinics. We screened patients using the following inclusion criteria: 1) type 2 diabetes mellitus as a diagnosis, 2) 2 or more of the following, which includes hypertension, hyperlipidemia, metabolic syndrome, or BMI greater than or equal to 30 as a diagnosis, or 3) fatty liver or hepatic steatosis on imaging and/or elevated liver function tests with AST > 41 and ALT > 35. Exclusion criteria were any patients that had any other contributing diagnosis that could lead to hepatic steatosis such as alcoholic liver disease, chronic viral hepatitis, drug induced liver injury, parental nutrition, severe malnutrition, Wilson's disease, autoimmune hepatitis, or hemochromatosis. This data was used to estimate hepatic fibrosis with calculation of a FIB-4 score to identify patients that were either low, intermediate, or high risk for hepatic fibrosis. Using this calculation, patients at intermediate to high risk were further stratified with evaluation of liver stiffness measurement with transient elastography or referred to hepatology for further evaluation and management (Figure 1).

RESULTS

Figure 1. Treatment Algorithm



Our chart review returned 657 patients meeting initial inclusion criteria from the OSU Internal Medicine and Specialty Clinics. Stratification for FIB-4 scores >1.3 indicating intermediate to high risk of fibrosis included 73 (28%) patients with HIV and 99 (24%) patients without HIV for screening. Three patients were excluded from evaluation after hepatic steatosis was determined to be due to secondary causes, leaving 172 patients for final analysis (Figure 2). Among patients with HIV, the average FIB-4 score was 1.15 and 1.21 in patients without HIV. General study characteristics are included in Table 1. Of the 73 patients with HIV, 9 (9/73, 3.5%) met criteria for being at a high risk of fibrosis based on FIB-4 score. Of the 99 patients without HIV, 18 (18/99, 4.4%) met criteria for being at a high risk of fibrosis based on FIB-4 score. Only 7 (7/73, 9.5%) patients with HIV and 6 (6/99, 6%) without HIV underwent transient elastography to measure for liver fibrosis. A total of four (4/73, 5.5%) patients with HIV and 11 (11/99, 11.1%) patients without HIV were referred to hepatology. The average liver stiffness measurement as determined by transient elastography in patients with HIV was 8.7 kPA and 19.6 kPa in patients without HIV.

Figure 2. Study Participants

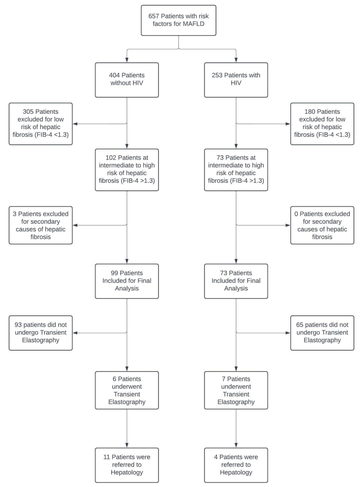


Table 1. Study Characteristics

Table 1 Study characteristics

Variable (units)	Average (non-HIV)	Average (HIV +)	Range (non-HIV)	Range (HIV)
ALT (U/L)	28.02	30.69	7-130	8 - 109
AST (U/L)	25.88	26.58	9-147	11 - 142
BMI	38.03	35.7	22.2 - 74.3	18.8 – 72.78
PLT (10,000 u/L)	259.6	244.29	42 - 641	75 - 534
Age (years)	52.73	51.03	35 - 65	35 - 65
Fib-4	1.21	1.15	0.29 – 14.75	0.32 – 5.12
Transient Elastography	19.62	8.74	9.98 – 20.7 kPA	4.5 – 13.49 kPA

Abbreviations: ALT (alanine transaminase): AST (Aspartate transaminase): BMI (Body mass index): PLT (Platelet count)

CONCLUSION

Our study highlights a key deficiency at identifying patients at risk for MAFLD and proceeding with imaging and referral as appropriate which indicates a gap in care. This shortcoming has the potential to increase time to diagnosis, progression of disease, delay in starting treatment, and failure to refer prudently. However, thorough chart review indicated that many of these patients underwent liver ultrasounds, were screened for secondary causes of hepatic steatosis, such as viral hepatitis, and started on appropriate treatments for MAFLD. In their 2023 guideline on NAFLD, the American Association for the Study of Liver Diseases recommends thiazolidines, vitamin E, glucagon-like peptide 1 receptor agonists, and sodium glucose cotransporter 2 inhibitors in the treatment of NAFLD, with several new medications expected within the coming years[2]. Therefore, further education of resident and attending physicians is warranted to improve patient outcomes at risk of complications related to MAFLD.

Next Steps

We expect to educate through improved uptake of the MAFLD dot phrase in the electronic health record system by the Oklahoma State University Internal Medicine Resident Physicians in both internal medicine and HIV specialty clinics. The use of this phrase imports key patient elements into the assessment and plan and reminds staff of appropriate next steps including FIB-4 score calculation as well as orders for transient elastography and hepatology referral as appropriate. It is our opinion that these physicians are not missing diagnosis of MAFLD with frequency, it is the follow through according to the algorithm for those at intermediate to high risk of fibrosis that needs to be addressed. Our future studies will evaluate the use of this dot phrase by Internal Medicine Resident Physicians to identify those at risk for MAFLD compared with those identified by chart review.

References

1. Asrani SK, Devarbhavi H, Eaton J, Kamath PS. Burden of liver diseases in the world. J Hepatol. 2019;70(1):151-171.

2. Rinella ME, Neuschwander-Tetri BA, Siddiqui MS, et al. AASLD Practice Guidance on the clinical assessment and management of nonalcoholic fatty liver disease. Hepatology. 2023;77(5):1797-1835.

REFERENCES OR ACKNOWLEDGEMENTS

This presentation is IRB-exempt. No patient identifying information is contained within this report.

Scan here to watch video