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A probabilistic decision model using non-invasive fibrosis markers in Primary Care NAFLD pathways predicts increased cirrhosis detection rates and reduced overall healthcare expenditure

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Background: Risk factors for Non-Alcoholic Fatty Liver Disease (NAFLD) have reached epidemic proportions and whilst only a minority of at-risk individuals develop significant liver disease warranting specialist referral, ensuring identification of this group is a primary care challenge. Non-invasive tests (NIT) for liver fibrosis enable community-based doctors to identify patients with NAFLD who have advanced fibrosis and would benefit from early referral for specialist care and interventions to limit the complications of cirrhosis. As part of an evaluation of a novel primary care NAFLD pathway in two London boroughs (Camden and Islington, C&I), which uses NIT to stratify patients for advanced liver fibrosis, we have constructed an analytical model to examine the potential cost implications of this strategy on an intention-to-treat basis. **Methods:** A probabilistic decision analytical model was constructed to explore the financial dimensions of two strategies in community based management of NAFLD from a healthcare payer perspective: 1) Standard of care (SOC) comprising physicians' clinical judgment based on clinical history, examination, blood tests and ultrasound 2) SOC plus Non-Invasive Testing for liver fibrosis using FIB-4, and the ELF test (to resolve indeterminate FIB-4 tests) to guide referral. The model was populated from the literature, national UK data and expert opinion. A five year time horizon was applied. **Results:** The C&I population is 434,958. It was assumed that 30% of the NAFLD population consult their general practitioner (GP) annually. >F2 fibrosis prevalence in NAFLD was set at 5%. Local clinical audit estimated SOC sensitivities and specificities of 0.35 and 0.70. The model estimated 24% needed ELF test. Utilizing NIT reduced referrals of ≤F2 disease by over 80% and resulted in over 50% increase in the detection of cirrhosis. There was a significant reduction in liver transplantation rates by approximately 15%. The overall expenditure was reduced by a fifth, primarily through reductions in referrals for low risk cases, costs related to HCC management and emergency inpatient admissions. **Discussion:** The use of NIT led to a reduction in inappropriate referrals and improvement in the early detection of cirrhosis and its complications. These changes are likely to result in significant health gains and economic cost savings. With NAFLD prevalence likely to increase, policy needs to address these challenges. Modeling suggests that the Camden and Islington NAFLD pathway employing FIB-4 and ELF to guide GPs' risk stratification of patients will achieve these goals. A full clinical effectiveness and cost consequence analysis is underway.