

FibroScan for assessing liver fibrosis and cirrhosis in primary care

Medtech innovation briefing

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Summary

- The **technology** described in this briefing is FibroScan. It is for assessing liver fibrosis and cirrhosis in primary care.
- The **innovative aspects** of the technology are that it uses a proprietary technology to measure liver stiffness. Smaller versions of the device can be used in primary care.
- The **intended place in therapy** would be in primary care for people with liver fibrosis or cirrhosis. The technology is already used extensively in specialised care settings.
- The **main points from the evidence** summarised in this briefing are from 4 studies (2 prospective cross-sectional studies and 2 feasibility studies) including 2,835 adults in primary care. They show that FibroScan can detect liver disease in this population.
- **Key uncertainties** around the evidence or technology are that it is unclear if every primary care centre would be able to support a FibroScan clinic.
- The **cost** of FibroScan is £30,000 to £70,000 per unit (excluding VAT). The **resource impact** would be additional to standard care.

The technology

FibroScan (Echosens) is a non-invasive medical device that assesses liver fibrosis and cirrhosis by measuring the degree of liver stiffness (transient elastography). FibroScan uses proprietary vibration controlled transient elastography and a proprietary controlled attenuation parameter. It is recommended in secondary care, the focus of this briefing will be on use of the technology in primary care.

Innovations

FibroScan uses a proprietary version of transient elastography to non-invasively assess liver fibrosis and cirrhosis that is used in specialist care settings. This briefing considers a new smaller, more portable version developed for primary care.

Current care pathway

Liver biopsy and transient elastography, done in a secondary care setting, are the most common methods of assessing fibrosis in people with chronic hepatitis B and chronic hepatitis C in the NHS. FibroScan can assess liver fibrosis and cirrhosis in primary care.

Transient elastography is the first test recommended for liver disease in adults newly referred for assessment. Liver biopsy is offered or considered based on a transient elastography score.

Transient elastography is also recommended for the diagnosis of cirrhosis, and either transient elastography or acoustic radiation force impulse imaging (whichever is available) for the diagnosis of cirrhosis in people with non-alcoholic fatty liver disease and advanced liver fibrosis. Liver biopsy should be considered for the diagnosis of cirrhosis in people when transient elastography is not available.

Liver ultrasound is recommended to test children and young people for non-alcoholic fatty liver. The enhanced liver fibrosis test should be used for people who have been diagnosed with non-alcoholic fatty liver disease, to test for advanced liver fibrosis.

The following publications have been identified as relevant to this care pathway:

- [NICE Pathway on liver conditions](#)
- [NICE's guideline on hepatitis B \(chronic\)](#)

- [NICE's guideline on cirrhosis in over 16s](#)
- [NICE's guideline on non-alcoholic fatty liver disease \(NAFLD\)](#)

Population, setting and intended user

FibroScan is for confirmed or suspected liver fibrosis and cirrhosis in primary care to assess the severity of liver disease. The technology will be used by GPs and nurse specialists. Training is needed, this is provided by the company and lasts around half a day at a cost of £1,150 for up to 3 people. Supervision from a competent user is needed for around the first 50 uses.

There is an increased risk of liver cirrhosis in people who have hepatitis B and C, people who misuse alcohol, people who are obese (body mass index of 30 kg/m² or higher) and people with type 2 diabetes.

Costs

Technology costs

The company has provided prices for each of the FibroScan technologies. The company guarantees that FibroScan will work for at least 7 years, if the technology is used and maintained correctly. The company states that there is no tariff set up for this treatment but it estimates that use of FibroScan will cost between £50 and £400, depending on the centre and whether or not the patient is being scanned for the first time or as a follow up.

- FibroScan 430 Mini and M probe (mobile): £30,000.
- FibroScan 430 Mini+ and M probe (mobile): £48,000.
- FibroScan 530 Compact and M probe (transportable): £48,000.
- FibroScan 630 Expert Spleen Pack and M probe: £70,000.
- Additional probes (small, medium or extra large): £16,250.

Costs of standard care

When FibroScan is not already used, it could replace laboratory testing of serum fibrosis markers or acoustic radiation force impulse (£199 average reference cost). Using FibroScan could reduce the need for liver biopsies. The cost of a liver biopsy is approximately £500. This is an invasive procedure which could result in complications that need further treatment. Liver biopsy might not

be suitable for people with advanced liver disease, and biopsies cannot be repeated indefinitely to monitor disease progress.

Resource consequences

FibroScan is widely used in the NHS in secondary care. It is used in a few primary care centres that are involved in pilot studies supported by the company.

Using FibroScan instead of liver biopsy is likely to be resource releasing because it is quicker, non-invasive and the procedure cost is cheaper. The technology can be used by anyone who has completed the company training.

Using the technology in primary care centres could be resource releasing if it means fewer hospital visits and reduces waiting times at secondary care centres. There is currently no evidence to support this.

A cost-effectiveness analysis ([Serra-Burriel et al. 2019](#)) on using FibroScan to screen for liver fibrosis in 6,295 people with non-alcoholic fatty liver disease and alcoholic liver disease was done using prospective data from 5 European cohorts and 1 Asian cohort. The study concluded that FibroScan was cost-effective with a mean incremental cost-effectiveness ratio of €2,570 per quality-adjusted life year (95% confidence interval [CI] 2,456 to 2,683) for a population at risk of alcohol-related liver disease, aged 45 years and above.

Regulatory information

FibroScan is a CE marked class IIa medical device.

Equality considerations

NICE is committed to promoting equality of opportunity, eliminating unlawful discrimination and fostering good relations between people with particular protected characteristics and others.

There are different types of liver diseases which can be associated with alcohol, obesity, viral infection, and genetic factors. Many liver diseases do not cause any symptoms in the early stages, and develop over the course of time, leading to long-term conditions. This may mean someone is disabled if their liver disease has a substantial and long-term effect on their abilities to do daily activities. Disability is a protected characteristic under the Equality Act 2010.

Clinical and technical evidence

A literature search was carried out for this briefing in accordance with the [interim process and methods statement](#). This briefing includes the most relevant or best available published evidence relating to the clinical effectiveness of the technology. Further information about how the evidence for this briefing was selected is available on request by contacting mibs@nice.org.uk.

Published evidence

There are 4 studies including 2,835 adults summarised in this briefing.

There are over 1,000 published studies on the use of FibroScan including recent reviews on its use in hepatitis C ([Erman et al. 2018](#)), hepatitis B ([Xiao et al. 2017](#)) and liver fibrosis ([Mikolasevic et al. 2016](#)) in secondary care. FibroScan in secondary care is supported by the evidence and is widely used in the NHS. The studies included in this briefing consider the technology in primary care only.

The clinical evidence and its strengths and limitations is summarised in the overall assessment of the evidence.

Overall assessment of the evidence

The 4 studies included in this briefing describe the use of FibroScan across large primary care cohorts and show how the technology can detect liver disease. The results of these studies are likely to be generalisable to the NHS, and 3 of the studies were done in an NHS setting. The studies are non-comparative, but the effectiveness of FibroScan has been investigated in previous studies.

El-Gohary et al. (2018)

Study size, design and location

[Cluster-randomised feasibility study of 910 adults at risk of liver disease in the UK.](#)

Intervention and comparator

Nurse-led liver health clinic (FibroScan) and standard care.

Key outcomes

There were 10 GP practices randomised to either intervention with nurse-led liver health clinic or

usual care (referral to secondary and specialist care). People at risk of liver disease were identified through 3 pathways: identification by GPs and practice nurses (1), nurse-led case findings of people with risk factors (2) and population screening of excessive alcohol use through a questionnaire (3).

There were 910 people seen in the nurse-led clinic who were examined with FibroScan. Of these, 44 (4.8%) had probable cirrhosis, 141 (15.5%) had progressive fibrosis, 220 (24.2%) were assigned as 'liver warning' and 505 (55.5%) had no evidence of liver fibrosis. There were 450 (49.5%) people who had non-alcoholic fatty liver disease and 356 (39.1%) people who had liver disease from alcohol. In the 405 with a liver disease diagnosis, 136 (33.6%) were found by pathway 1, 218 (53.8%) by pathway 2 and 51 (12.6%) by pathway 3. The authors noted that pathways 1 and 2 were more effective at finding people with liver disease than pathway 3. There were 544 cases found by the nurse-led clinic compared with 221 in the control arm (adjusted odds ratio 2.4, 95% confidence interval [CI] 2.1 to 2.8).

Strengths and limitations

This study was done in the UK in an NHS setting. It is likely that these results would be generalisable to other NHS primary care centres. The study involved lots of people from urban and rural areas.

Harman et al. (2017)

Study size, design and location

Prospective cross-sectional study of 919 adults with 1 or more selected risk factors (alcohol misuse, type 2 diabetes or persistently elevated alanine aminotransferase liver function enzyme with negative serology) for developing chronic liver disease in the UK.

Intervention and comparators

FibroScan, cirrhosis confirmed by established histological, radiological and biochemical methods.

Key outcomes

Diagnosis of clinically significant liver disease (liver stiffness above 8 kPa) in adults identified as at risk from the total population of 4 primary care centres (20,868). From the total population, 2,368 people were identified as at risk and 919 of these agreed to investigation. Of those that agreed, 97.8% had valid measurements by FibroScan, 230 had elevated liver stiffness and 27 had cirrhosis. The authors noted that using FibroScan to selectively screen for liver disease in primary care resulted in an increase of more than double the number of cirrhosis diagnoses in the studied

population.

Risk factors for new cirrhosis diagnoses were obesity or type 2 diabetes, or both, in 16 people (59.3%), alcohol alone in 3 (11.1%) and both alcohol and obesity or diabetes in 8 (29.6%). Cirrhosis was significantly increased in people with obesity and type 2 diabetes or hazardous alcohol use compared with people who did not have obesity (odds ratio 9.4 [95% CI 2.2 to 40.9] and 5.6 [95% CI 1.6 to 19.7], respectively).

Strengths and limitations

This study was done in the UK in an NHS setting. It is likely that these results would be generalisable to other NHS primary care centres. The study involved lots of people from urban and rural areas. The study methodology is the same as in Harman et al. 2014, but further explores the risk factors for cirrhosis identified using FibroScan. The authors stated that the FibroScan FS402 M probe (in primary care) was unable to scan 14 people with a body mass index over 35 kg/m², they were then scanned in hospital using the FibroScan FS502 XL probe.

Harman et al. (2014)

Study size, design and location

Prospective cross-sectional study of 504 adults with 1 or more selected risk factors (alcohol misuse, type 2 diabetes or persistently elevated alanine aminotransferase liver function enzyme with negative serology) for developing chronic liver disease in the UK.

Intervention and comparator

FibroScan.

Key outcomes

Diagnosis of clinically significant liver disease (liver stiffness above 8 kPa) in adults identified as at risk from the total population of 2 primary care centres (10,479). From the total population, 920 people were identified as at risk and 504 of these agreed to investigation. Normal blood biomarkers were found in 62 people (12.3%) who needed no further investigation. There were 378 people who had FibroScan, 98 of these had elevated liver stiffness. Of these 98 people with elevated stiffness, 71 had normal liver enzymes. Eleven people were identified as having liver cirrhosis. These were new cases, representing a 140% increase in the number of diagnosed cases in this population.

Strengths and limitations

This study was done in the UK in an NHS setting. It is likely that these results would be generalisable to other NHS primary care centres. The authors noted that the diagnostic algorithm used in this study is likely to be quicker and cheaper than investigating liver disease based on elevated liver function enzyme testing. Because of the pragmatic design of the study, diagnostic accuracy values could not be calculated.

Fabrellas et al. (2013)

Study size, design and location

[Feasibility pilot study of 502 adults with no previous history of liver disease in Spain.](#)

Intervention and comparator

FibroScan.

Key outcomes

Accurate liver stiffness measurements were taken in 495 of 502 (98.6%) of people in the study. Elevated liver stiffness (6.8 kPa or above) was seen in 28 of 495 people (5.7%). The 28 people with elevated liver stiffness were older, more likely to be male, and had a higher frequency of metabolic syndrome than those with normal liver stiffness. Non-alcoholic fatty liver disease was the most common cause of liver disease in this population.

Strengths and limitations

FibroScan was operated by nurses in primary care. Although there was a high success rate of over 98%, the authors noted that it is not always possible to take a liver stiffness measurement with FibroScan, particularly if the patient is obese or has a narrow intercostal space. The authors noted that the company's half-day training course was sufficient, but this should be supported by several supervised procedures with a fully trained operator.

Sustainability

Using FibroScan in primary care is likely to reduce the need for emergency, secondary and specialist care. This includes the need for immediate resources for more invasive or time-consuming procedures, such as biopsy, and needing further treatment later because of earlier interventions and better health outcomes. There is no published evidence on the sustainability

impact of using FibroScan.

Recent and ongoing studies

There are a very high number of recent and ongoing studies for FibroScan. It is not clear which of these will consider use of the technology in primary care.

Expert comments

Comments on this technology were invited from clinical experts working in the field and relevant patient organisations. The comments received are individual opinions and do not represent NICE's view.

All 5 experts were well experienced in using this technology in specialist liver clinics, secondary care and primary care outreach schemes.

Level of innovation

All 5 experts agreed that the technology is innovative and has not been superseded. The experts noted that there are other technologies that can assess liver fibrosis non-invasively (MRI, CT, ultrasound, acoustic radiation force impulse, shear wave elastography and blood biomarkers) but they do not offer the same benefits as FibroScan and are generally less portable, need more time and training to use and are more expensive.

Potential patient impact

Three experts stated that if people with liver fibrosis and cirrhosis can be identified in primary care before significant symptoms have developed and referred earlier for specialist surveillance, then this may reduce the number of people attending the emergency department with variceal bleeds and decompensated liver diseases, which have high mortality rates.

Three experts explained that because the results of the scan are available immediately there is a high level of engagement from the patient in the test, results and the clinician patient conversation. The immediate availability of results can help encourage lifestyle changes that can often have a significant effect on liver disease progression.

One expert noted that for people who do not have advanced liver fibrosis or cirrhosis, but do have risk factors that would benefit from regular (every 3 years) liver assessment, having this

assessment done in primary care rather than secondary care is less stressful. Also, people are more likely to attend their appointment. One expert stated that they have had feedback from patients that they prefer being able to have a scan at their GP because it needs less travelling than going to hospital. One expert noted that using FibroScan was quicker than other methods of liver assessment.

The clinical experts stated that people with potential chronic liver disease could benefit from FibroScan. People at risk of liver disease include those with type 2 diabetes, obesity (including children), those drinking harmful amounts of alcohol and those at risk of viral hepatitis (including people using intravenous drugs).

Potential system impact

All experts agreed that using FibroScan would improve management of people at risk of liver disease, if it was not used already. Two experts gave examples of how using FibroScan in primary care had improved care. One expert noted that they had found that 9 in 10 people sent to specialist care could have been managed in primary care. They were able to identify which patients did not need to be referred for an endoscopy, begin alcohol detox management and reduce emergency department attendance. The other expert noted that their specialist centre had seen a drop in referrals and first clinic appointments since FibroScan had been implemented in a nearby GP practice.

One expert stated that using FibroScan in primary care could improve liver disease risk stratification to ensure people are referred for the most appropriate care and reduce referrals to specialist centres. In cases when lifestyle changes can improve outcomes, using FibroScan in primary care could reduce morbidity, mortality, associated healthcare costs and wider societal costs.

Two experts stated that introducing FibroScan has already profoundly changed the management pathways for liver disease.

All experts agreed that using FibroScan in primary care could lead to cost savings for the NHS through reduced need for treatment, referrals, biopsy, improved accuracy and speed. One expert noted that using FibroScan in primary care would have a higher initial cost, minor cost increase per person, and a potential increase in the number of referrals to secondary care (because of more people being identified). However, they expected that using FibroScan could give an overall decrease in costs if there are reductions in the number of unnecessary referrals, the need for emergency and hospital services and liver failure and mortality.

All clinical experts noted that using FibroScan in primary care would need training for users and dedicated clinic services. One expert noted that using FibroScan can take between 20 to 40 minutes, which is longer than the standard 10-minute GP appointment. One expert stated that governance would be needed to ensure the quality of scans and that FibroScan would need maintenance support.

One clinical expert stated that FibroScan with medium probe had a high rate of unsuccessful readings (up to 10%) in people with obesity. They stated that these people can be scanned using the extra large probe, which is an additional cost. The expert also noted that FibroScan probes are delicate and can be broken.

General comments

One expert stated that around one-third of FibroScan devices in the NHS would need to be updated and that this would need investment. One expert noted that the product lifespan of FibroScan is around 5 to 7 years.

One expert noted that the FibroScan 430 Mini/Mini+ is mobile and can be transported by public transport. The 530 compact is larger and heavier and would need transport by car.

Expert commentators

The following clinicians contributed to this briefing:

- Louise Campbell, medical director and nurse consultant, Tawazun Health. Has received fees from the company for speaking engagements.
- Dr Janisha Patel, consultant hepatologist, University Hospital Southampton NHS Foundation Trust. No conflicts declared.
- Dr Jeremy Cobbold, consultant hepatologist, Oxford University Hospitals NHS Trust. No conflicts declared.
- Prof Massimo Pinzani professor of medicine and Sheila Sherlock chair of hepatology at University College London, Institute for Liver and Digestive Health, Royal Free Hospital. No conflicts declared.
- Andrew Holt, consultant hepatologist, Queen Elizabeth Hospital Birmingham. No conflicts declared.

Development of this briefing

This briefing was developed by NICE. The [interim process and methods statement](#) sets out the process NICE uses to select topics, and how the briefings are developed, quality-assured and approved for publication.

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