



Driving Digital Healthcare and Improving Patient Outcomes at NHS Tayside

New Intelligent Liver Function (iLFT) pathway developed by the University of Dundee and NHS Tayside.

The iLFT pathway uses Siemens Healthineers Automation and IT in combination with the laboratory information management system, to improve diagnosis of liver disease and patient outcomes.

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The problem with existing liver function tests

In contrast to most major diseases in the UK, the mortality rate for liver disease continues to rise (400% increase since 1970) and is now the third most common cause of premature death.⁽¹⁾

The Abnormal Liver Function Investigations Evaluation (ALFIE) performed in NHS Tayside between 1989 and 2003 revealed that over 20% of primary care liver function tests included at least one abnormal result. Abnormal test results lead to a highly variable response by healthcare professionals and often a failure to adhere to established guidelines. Alarming, a significant number of these patients have, or will develop, a serious liver disease.

“Less than half of the liver tests carried out at Tayside in the last 30 years were investigated or followed up appropriately. Minor abnormalities may be considered as non-priority but eventually lead to cirrhosis.”

John Dillon, Professor of Hepatology and Gastroenterology

The solution: the iLFT pathway

iLFT is a new and innovative approach that uses advanced Siemens Healthineers laboratory equipment and intelligent algorithms programmed into the LIMS to allow real-time, automated analysis of blood tests.

Siemens Healthineers Aptio automation delivers the required samples to the appropriate analysers with no human interaction.

The results are combined with clinical details and reported according to criteria formulated by expert hepatologists. This process generates diagnoses or suggested further investigations and management plans which are then returned electronically to the requestor as a URL in the laboratory report.

The iLFT pathway can identify the cause and severity of liver disease. Consequently, the pathway facilitates:

- improved risk stratification of patients;
 - earlier diagnosis of disease;
 - effective referral to secondary care;
 - improved cost-effectiveness;
 - reduced GP workloads
- and, long-term, lower morbidity and mortality.



Requirements for iLFT implementation

The iLFT pathway requires a fully automated blood sciences approach incorporating analytical parameters covering biochemistry, haematology, immunology and virology. The highly encouraging data generated by the study was facilitated by the integration of laboratory automation and reflex testing algorithms, achieved using the intelligence of Siemens Healthineers Aptio automation and Centralink data management solutions.

Proven benefits of the iLFT pathway

The iLFT pathway has led to a 43% increase in the diagnosis of liver disease, whilst retaining high cost-efficiency.⁽²⁾ The pathway was brought into active service across NHS Tayside in mid-2018 and continues to function effectively, aiding the diagnosis, stratification and management of patients with liver disease.

“This has hugely transformed the way I think about liver function tests. We do hundreds and hundreds of these every day and so many of them are very slightly abnormal. With iLFT I am seeing a much fuller profile of results with other indicators that let me know whether the results are serious. It’s wonderful to be able to differentiate between the things that are essentially harmless and the things that are serious - where the patient needs further help and management. ”

Ellie Dow, Consultant in Biochemical Medicine, Ninewells Hospital, Dundee.

Improved cost-efficiency in primary care settings

iLFT offers value for money by carrying out appropriate investigations upfront to achieve earlier diagnosis and reduce progression to end-stage liver disease. A Monte Carlo simulation confirmed that iLFT has a 100% cost-effective probability at the UK threshold of £30,000 per Quality Adjusted Life Year.

iLFT has shown that **70%** of patients are suitable for ongoing investigation and management in primary care, streamlining the process of referral to hepatology services.

The iLFT pilot study demonstrated:

- iLFT increases the probability of a correct (true positive/negative) diagnosis by **51%**.
 - iLFT proves to be cost-efficient with an incremental cost-effectiveness ratio of just **£284** per correct diagnosis.
 - A saving to the NHS of **£3,216** per patient lifetime.
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Conclusions and future developments

The iLFT pathway enables the early diagnosis of patients at risk of progressive liver disease and is therefore very effective in preventing the development of end stage disease in a cost-efficient manner.

Siemens Healthineers continues to collaborate with NHS Tayside in working towards the digitalisation of healthcare and improvement of patient outcomes. Future developments may include the integration of Enhanced Liver Fibrosis testing to the pathway in order to provide an end to end solution, and further align the iLFT pathway with the British Society of Gastroenterology (BSG) guidelines on the management of abnormal liver blood tests.

At Siemens Healthineers, our goal is cost-effective delivery of excellent health outcomes, with the patient at the heart of everything we do. If you would like to discuss any of the information in this brochure, please contact us at Ldenquiries.team@siemens-healthineers.com

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References:

1. Williams et al Addressing Liver Disease in the UK Lancet 2014,384,1953-97
2. Dillon et al Intelligent liver function testing (iLFT) J of Hepatology 2019,71,699-706

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