

Royal Free London DeepMind update

Background

In November 2016 the Royal Free London entered into an exciting five-year partnership with the British technology company DeepMind.

The landmark agreement brought together some of the best minds in healthcare and technology to help transform care through the use of a mobile app called Streams.

The app delivers improved care for patients by getting the right data to the right clinician at the right time. Similar to a breaking news alert on a mobile phone, the technology notifies nurses and doctors immediately when test results show a patient is at risk of becoming seriously ill with acute kidney injury (AKI), and provides all the information they need to take action.

How it works

Work on Streams started in 2015 and the app is now helping clinicians detect AKI at its earliest stages. AKI affects one in six in-patients and is an indication that a patient is deteriorating but it can be difficult to diagnose. Streams uses a range of patient data to determine whether a patient is at risk of developing AKI and sends an instant alert to clinicians who are able to take appropriate action promptly.

Because patient information is contained in one place – on a mobile application – it reduces the administrative burden on staff and means they can dedicate more time to delivering direct patient care.

Using patient data

The Royal Free London provides DeepMind with NHS patient data in accordance with strict information governance rules and for the purpose of direct clinical care only.

We used our standard data sharing agreement, which is in line with the legislation and policy requirements as published by the regulators. Over 1,500 third party organisations have undergone similar NHS information governance processes.

All information sent to, and processed by, DeepMind is encrypted both in transit to, and at rest within, the DeepMind Health cluster.

The data used to provide the app has always been strictly controlled by the Royal Free and has never been used for commercial purposes or combined with Google products, services or ads – and never will be. It can and will only ever be used to help improve hospital care, under the control of the Royal Free.

All data is shared with the purpose of improving patient safety and care. The Streams app uses data to provide diagnostic support and track patient outcomes. Therefore, a range of patient data must be analysed.

Historical data is used to analyse trends and detect historical tests and diagnoses that may affect patient care.

The partnership introduces an unprecedented level of data security and audit. All data access is logged, and subject to review by the Royal Free as well as DeepMind's nine independent reviewers. In addition, DeepMind's software and data centres will undergo deep technical audits by experts commissioned by its independent reviewers.

Furthermore, DeepMind is developing an unprecedented new infrastructure that will enable ongoing audit by the Royal Free, allowing administrators to easily and continually verify exactly when, where, by whom and for what purpose patient information is accessed.

You can learn more about how the Royal Free London uses patient information here: <https://www.royalfree.nhs.uk/patients-visitors/how-we-use-patient-information/>

The Information Commissioner's Office investigation

The ICO has been looking at the way patient data was used to test Streams for safety. This process was first governed by a partnership agreement signed between DeepMind and the Royal Free NHS Foundation Trust in September 2015, which has since been superseded by an agreement signed in November 2016. The ICO have not been investigating the live clinical use of Streams which is being carried out under the existing agreement between the Royal Free London and DeepMind and is delivering improved outcomes for patients with acute kidney injury.

The focus of the investigation has been on the Royal Free London as the data controller and the ICO raised concerns about whether we could have done more to inform patients that their information was being processed to test the safety of Streams app and the amount of information that was processed.

The ICO concluded that we had not done enough to inform patients that their information was being processed by DeepMind during the testing phase of the app.

The ICO said there was a lack of transparency about how we were using patient information to test the new app and therefore patients could not exercise their statutory right to object to the processing of their information.

They have asked us to deliver five undertakings (we have not received an enforcement notice or a fine) and we have agreed to address all of them and will be reporting back to the ICO soon. However we are of the opinion that the use of five years of data during the testing phase of the app was critical to ensuring it could safely be deployed on our wards. We have asked for greater clarity about how trusts like ours can test new technology to ensure it is safe without using real data.

Who Streams is helping

One patient who has benefited from Streams is Afia Ahmed, 38, from Hampstead, who suffered complications following the birth of her daughter Aleeza by emergency caesarean in January 2017.

Afia developed sepsis (an infection in the blood) during her labour, which then led to AKI. Using data from Afia's blood test, the Streams app detected a problem with her kidney function and an alert was sent to a specialist kidney doctor.

The kidney specialist was able to provide guidance to the obstetric team on Afia's condition and advised them to adjust the antibiotics, intravenous fluid treatment and pain killers that might put a strain on her kidneys. Afia continued to be monitored by a kidney specialist until her kidney function recovered and she was discharged home with baby Aleeza.

It is thought that the number of extra deaths in England each year associated with an episode of AKI may approach 40,000. The financial burden of AKI on the NHS in England alone is also believed to be in excess of £1 billion every year, which is greater than the annual cost of treating breast cancer.

The next stage of the partnership with DeepMind will see Streams being developed to help clinicians diagnose conditions such as sepsis and organ failure.