Delivering value with digital technologies
Briefing: January 2022

Using digital technologies to prevent stroke

Case study

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Delivering value with digital technologies

Digital technologies such as digital medicine, genomics, artificial intelligence and robotics have a huge potential to transform the delivery of healthcare.[1]

These technologies can empower patients to participate actively in their care, with a greater focus on wellbeing and prevention. They also support the prediction of individual disease risk and personalise the management of long-term conditions.

The HFMA, supported by Health Education England, is delivering a 12-month programme of work to increase awareness amongst NHS finance staff about digital healthcare technologies, and enable finance to take an active role in supporting the use of digital technology to transform services and drive value and efficiency.[2]

As part of the programme, the HFMA is publishing a series of case studies. Working with organisations who have started on the digital transformation journey, we will identify examples of good practice and highlight the challenges that services face. This will include specific challenges relating to NHS finance.

This case study describes how Harefield Hospital has re-designed the pathway for patients with atrial fibrillation. Digital technology has supported the development of an innovative community pharmacy-based service to improve the detection and treatment of atrial fibrillation, and thus reduce the number of people having a stroke.

[1] HFMA *Introduction to digital healthcare technologies*, July 2021
[2] HFMA *Delivering value with digital technologies*

Introduction

The *NHS long term plan*[3] states 'Stroke, a preventable disease, is the fourth single leading cause of death in the UK and the single largest cause of complex disability.'

It is estimated that there are half a million people in the UK with undiagnosed atrial fibrillation (AF). Without preventative treatment approximately one in 20 (5%) with AF will have a stroke each year.

The arrhythmia[4] care team at Harefield Hospital (part of Guy's and St Thomas' NHS Foundation Trust) has developed an innovative community pharmacy-based AF service to improve the detection and treatment of AF incorporating a robust referral pathway to a specialist cardiology centre. The service is called *Capture AF.*

Capture AF service

The objectives of the service are to:

- improve the detection and treatment of undiagnosed AF
- improve anticoagulation prescribing in patients with diagnosed AF
- facilitate early referral to a specialist centre.

What is atrial fibrillation?

Atrial fibrillation (AF) is characterised by a rapid, irregular heartbeat.

One third of patients who have AF are asymptomatic, often leading to a delay in diagnosis. Too often, AF is only detected when the patient presents with a serious complication, such as a stroke.

AF is associated with a five-fold increase in stroke risk, three-fold increase in the incidence of congestive heart failure and increased mortality rates.

AF-related strokes are often severe and result in long-term disability or death.

Treating patients who have AF with anticoagulant medicines reduce their risk of stroke by around two thirds.

Using digital technology to support service transformation

In 2015 the arrythmia care team were keen to develop and pilot a service that would address the 'detection gap' of AF in the Hillingdon area. Data[5] showed that in the population served by Hillingdon CCG 5,836 people were expected to have AF, but there were only 3,837 patients on GP registers recorded as having it, indicating that there were potentially nearly 2,000 patients who were undiagnosed. Their aim was to broaden access to screening for AF so that fewer people would go on to have a stroke.

The team decided to base the service in community pharmacies, as the pharmacists were already providing medicine use reviews (MURs) and were identified as being ideally placed to facilitate the diagnosis of AF with the aid of a mobile electrocardiogram (ECG) monitor. They were also well positioned to identify 'hard to reach' populations of patients who may not have regular contact with other healthcare professionals.

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[3] NHS Long Term Plan, 2019
[4] Arrhythmia is a condition characterised by abnormal heart rhythm. AF is the most common type.
[5] Data was sourced from *Quality and outcomes framework 2015/16* and National Cardiovascular Intelligence Network 2013/14

Community pharmacists measure the heart rate and rhythm of patients identified with risk factors for developing AF, which include age, hypertension and diabetes.

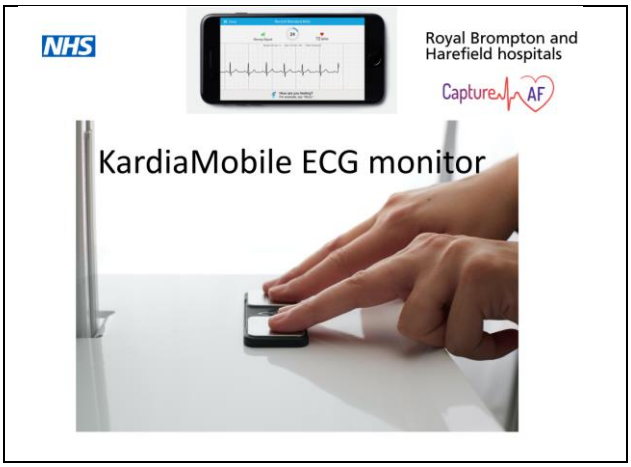
The clinicians recognise the benefits of this approach as being cheap, very simple and non- invasive.

'Capture AF is a new preventative care model covering primary and secondary care, which would not be possible without digital technology.'

Zainab Khanbai, Capture AF lead

The team chose the KardiaMobile heart monitor (AliveCor) which is a portable single lead ECG monitor (**figure 1**). The monitor works with a compatible mobile device (such as an iPad) running the Kardia app, which analyses the ECG recording and sends it to the hospital for interpretation by a cardiologist. Data is transferred securely via a web-based platform (PharmOutcomes).

Figure 1: Portable single lead ECG monitor



Implementation of the new pathway

The team carried out pilots in Hillingdon CCG which has a population of 273,900 and 62 pharmacies. The initial set-up included:

- creating contacts in primary care via local pharmacists and Hillingdon Local Practice Committees
- establishing pharmacist, GP, and patient working/ focus groups
- designing patient and GP information leaflets and a patient satisfaction survey (see **figure 2** for an example)
- identifying key pharmacists for the initial pilot sites
- implementing a training programme for pharmacists
- designing an enhanced AF MUR checklist for use during pharmacy consultations
- constructing a data collection and analysis database
- developing pre-defined protocols for patient enrolment, diagnosis and assessment, referral pathway and link to specialist arrhythmia pharmacist for ongoing support and guidance.

Figure 2: Patient leaflet

Figure 3 describes the change to the patient pathway following the implementation of the new care model. You can hear from clinicians and patients on how Capture AF has improved patient outcomes here: https://www.youtube.com/watch?v=_9JKlHWQWY4

Figure 3: Impact of digital technology on the patient pathway

Before digital transformation

Two scenarios:

Patient A

- patient A suffers a stroke and is admitted to hospital
- patient A is cared for on a stroke unit and may be transferred to a community hospital for rehabilitation. Depending on how serious the stroke is, they may stay in hospital for anything from a few days to a few months.[6]
- patient A either goes home where they may need long term support from family or carers, or is discharged to a care home

Patient B

- patient B feels unwell and goes to GP
- GP carries out clinical examination
- if the GP suspects AF, they refer patient B either to the local hospital or the rapid access AF clinic
- anticoagulation is initiated if AF is confirmed

After digital transformation

- patient visits local pharmacy to collect medication, buy over the counter medicine or seek advice from pharmacist. If pharmacist identifies that the patient is at risk, they offer ECG monitoring, or patient may see leaflet and ask.
- community pharmacist measures the heart rate and rhythm of patient using the ECG monitor
- Kardia app analyses the ECG recording and transfers data to KardiaPro (a web-based portal) which physicians have access to in Harefield Hospital, filtering the results into normal and abnormal
- cardiologist logs in and reviews abnormal ECG results and adds their own interpretation
- patient is sent an appointment to see the arrythmia care team at the hospital as appropriate
- patient's heart is monitored using a 12-lead ECG and anticoagulation is initiated if AF is confirmed

Funding

The initial development and piloting of the Capture AF service was funded by a grant from the Health Foundation. The subsequent two years have been funded by the Bristol-Myers Squibb- Pfizer Alliance, supported by the local academic health science network, Imperial College Health Partners. The team is currently putting together a business case to apply for funding from the integrated care system (ICS) they are part of.

Making the case for investment

Before investing in digital technologies, a business case needs to be developed that sets out what the problem is and how the proposed solution will deliver value for the NHS body and its patients. The business case will need to set out a compelling case for investment which requires an understanding of its financial and non-financial impact.

[6] Stroke Recovery | Stroke Association

Non-financial impact

The team have refined the project's outcome measures since the first pilot, learning from experience which are the important ones. They are divided into primary outcomes, process outcomes and secondary outcomes (**figure 4**).

Figure 4: Capture AF outcome measures

Primary Outcomes

- number of patients newly diagnosed with AF
- number of patients with previous AF diagnosed that were not anticoagulated
- number of patients that had their anticoagulation optimised
- number of patients that had their rate/ rhythm control optimised
- number of patients that had other medicines optimised e.g. antiplatelet ceased
- number of patients referred for new medicine service[7]
- average time to be seen
- average length of consultation time
- average length of time from diagnosis to initiation of anticoagulation

Process outcomes

Number of patients:

- enrolled in the Capture AF service
- identified as having suboptimal AF treatment
- declining treatment

Secondary Outcomes

- cost effective analysis to determine long term cost savings associated with potential stroke reduction
- patient satisfaction of service

Financial impact

Understanding the costs of the new care model

Understanding the resource impact of the new care model across the whole patient pathway is key when putting together a case for investment. The team developed a cost model which identified all the additional costs of the new pathway over a five-year period.

First some assumptions were developed to inform the cost model, based on previous pilot work:

- how many patients would be screened by the community pharmacist?
- of those patients screened, how many would be detected to have AF?
- of those detected with AF, how many would start treatment?

This provided them with an estimate of how many strokes would be avoided.

The cost model includes the following types of cost:

- salary costs including primary and secondary care arrhythmia pharmacists, consultant cardiologist, admin staff and project manager

[7] New Medicine Service (NMS) - NHS (www.nhs.uk)

- screening costs including the cost of buying ECG monitors and iPads for use in the community pharmacy, licence fee for use of ECG monitors, payment to community pharmacists for each patient screened and subscription to the web platform PharmOutcomes
- additional costs incurred by the NHS due to identifying new patients with AF including medication and screening of patients on medication.

The team decided it was not necessary to include costs for information governance, as the care model has a secure method of sharing information, and the standard GP/ hospital information governance arrangements cover this initiative. The project manager's salary includes training costs as well as the cost of evaluating the benefits of the model.

Identifying the potential financial benefits

The team estimated the financial savings of treating fewer stroke patients, using cost data from a 2017 study which derived patient-level estimates of the cost of stroke care, both in the NHS and social care.[8]

The study results calculated the mean costs per patient at one and five years (**figure 5**).

Figure 5: Baseline mean costs per patient at one and five years

	Year 1 £	Year 5 £
Mean healthcare costs per patient[9]	13,452	17,963
Mean social care costs per patient[10]	8,977	28,076
Mean total health and social care costs per patient	22,429	46,039

The team has not compared the 2017 study results with their own patient-level cost data (PLICS), but there are plans to carry out a health economics study on Capture AF.

The cost model demonstrates that the Capture AF service has the potential to make substantial savings for both the NHS and social care. The initial set-up costs in year one means that the NHS savings start in year two, but there are already savings for social care in the first year. Some of the costs, for example salary costs will be incurred each year, while others will be up front like the cost of the iPads (**figure 6**).

Figure 6: Estimated savings for Hillingdon

	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
	£	**£**	**£**	**£**	**£**
NHS savings	-112,777	134,276	728,808	1,595,194	2,769,578
Social care savings	198,616	701,490	1,499,644	2,588,304	3,967,469

[8] The economic burden of stroke care in England, Wales and Northern Ireland: Using a national stroke register to estimate and report patient-level health economic outcomes in stroke (sagepub.com)

[9] Healthcare costs include ambulance, MRI or CT scan, thrombolysis, acute stroke unit care, rehabilitation stroke unit care, general medical ward care, community rehabilitation, GP visits, secondary prevention and early supported discharge therapists

[10] Social care costs include care home, home help, meals on wheels and social service day centre visits

Accounting treatment of expenditure

NHS bodies are required to classify all expenditure as either capital or revenue. It is important to understand whether expenditure on a new digital product or service meets the definition of capital expenditure, as there is a limit on the amount of capital expenditure that the NHS as a whole can incur in any one year. The complex accounting rules means that it is not always immediately clear whether new digital investments are capital or revenue expenditure.

The income and expenditure associated with Capture AF are currently accounted for within the hospital's research and development department. If the project becomes part of mainstream funding, it is likely that all the costs will be treated as revenue. The majority of costs will be revenue items incurred each year, while the iPads and ECG monitors cost less than £5,000 each, and are unlikely to meet the criteria for being capitalised as a grouped asset (see **figure 7**).

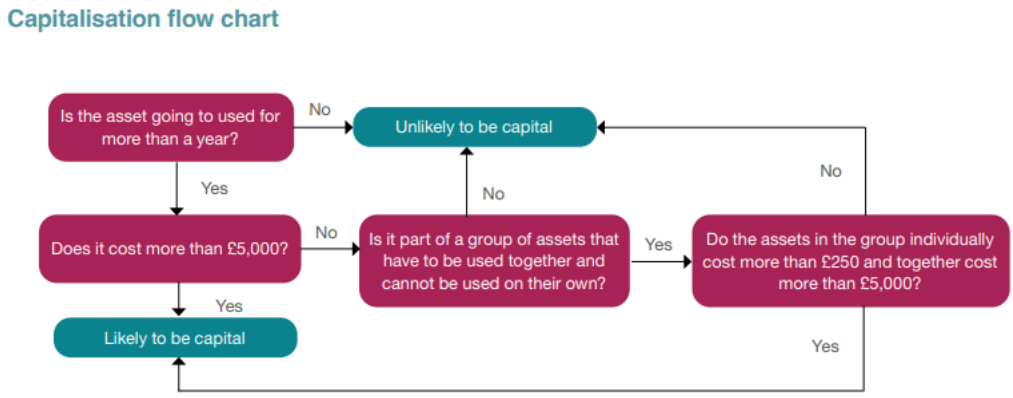
Figure 7: Low-value and grouped assets[11]

In the NHS, the accounting policy is that assets (tangible or intangible) that cost less than £5,000 are not capitalised. The £5,000 de minimis includes non-recoverable VAT. The cost of these assets is charged to revenue as it is incurred.

However, if several low-value assets are purchased as part of a single collective asset, they are capitalised as a grouped asset. To be capitalised as a group, each of the items in the group must meet all these criteria:

- the total cost of the grouped asset is greater than £5,000
- the assets are functionally interdependent – so they can only be used together
- the assets are bought at the same time and are planned to be disposed of at approximately the same time – effectively, the plan is to use the assets together for the whole of their useful economic life
- the group of assets is under single managerial control
- each individual asset has a value of more than £250.

The flowchart below sets out the main questions that need to be asked when determining whether or not expenditure can be capitalised.



[11] HFMA, Accounting for revenue and capital: implications for the digital age, December 2021, explores the key funding and accounting issues that NHS finance teams need to consider when developing business cases for digital transformation

Benefits realisation

Evaluating the success of any transformation project and answering the question of have the expected benefits been realised is challenging.

While it is fairly straightforward to track the non-financial benefits of Capture AF, the team has yet to attempt to track the financial benefits. Fewer people being admitted to hospital with a stroke should free up capacity in the hospital, but is unlikely to generate cash-releasing benefits (see **figure 8**). It may be easier to identify the savings in social care, where fewer carers are required to carry out domiciliary visits.

Tracking how NHS resources have been used differently and extracting the savings can be difficult. Questions to consider include:

- what has the NHS and social care stopped doing as a result of the digital transformation?
- how have the resources that are no longer required (for caring for stroke patients) been repurposed?
- have there been additional costs which were not budgeted for?

Figure 8: Types of financial benefits

Cash releasing benefits reduce the cost of the care model so that the resources can be completely re-allocated elsewhere, or the cost can be removed from a budget, for example reduced number of healthcare staff required.

Non-cash releasing benefits provide economic value through savings from increased efficiency and effectiveness, but they do not release cash, for example reallocation of staff time.

Future plans

The team is now planning to adapt the Capture AF service pathway so that patients identified with AF following the ECG monitoring are seen in a new specialist AF hub in a primary care setting. This would provide care closer to home, with prompt, personalised management. The existing infrastructure and multi-disciplinary team based at Harefield Hospital would support this primary care referral model, and serve to upskill professionals in the specialist AF hub. Any patients requiring more specialist input would then be referred and managed in secondary care.

How to find out more

If you want to find out more about Capture AF, contact:

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This case study is part of the *Delivering value with digital technologies* programme that the HFMA is undertaking, supported by Health Education England. The programme aims to increase awareness amongst NHS finance staff about digital healthcare technologies, and enable finance to take an active role in supporting the use of digital technology to transform services and drive value and efficiency. For more information click here.

About Health Education England

Health Education England (HEE) is part of the NHS, and we work with partners to plan, recruit, educate and train the health workforce. HEE exists for one reason only: to support the delivery of excellent healthcare and health improvement to the patients and public of England by ensuring that the workforce of today and tomorrow has the right numbers, skills, values and behaviours, at the right time and in the right place.

HEE's Digital Readiness Programme, commissioned by NHSX, aims to uplift digital skills, knowledge, understanding and awareness for all our health and care workforce. This includes:

- Supporting the right culture and environment, for example by ensuring digital is understood, embedded and championed at trust and ICS board level.
- Professionalising the digital workforce through support for professional bodies, regional Informatics Skills Development Networks, and collaborative community networks.
- Establishing learning and development through the NHS Digital Academy and specific learning and development initiatives, for example the Florence Nightingale Digital Nurse Scholarship, and through access to tailored, appropriate online learning for all.
- Building our future digital workforce by undertaking workforce analysis and demand forecasting, and sustainable models to recruit talent, for example through graduate schemes, as well as opportunities for nurturing existing talent, for example through the Topol Digital Health Fellowships.

For more information visit the Digital Readiness Programme website or follow the programme on Twitter @HEE_DigiReady.

About the HFMA

The Healthcare Financial Management Association (HFMA) is the professional body for finance staff in healthcare. For over 70 years, it has provided independent and objective advice to its members and the wider healthcare community. It is a charitable organisation that promotes best practice and innovation in financial management and governance across the UK health economy through its local and national networks.

The association also analyses and responds to national policy and aims to exert influence in shaping the wider healthcare agenda. It has particular interest in promoting the highest professional standards in financial management and governance and is keen to work with other organisations to promote approaches that really are 'fit for purpose' and effective.

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