Delivering value with digital technologies
Briefing: October 2022

Using radio frequency identification to deliver efficiencies and improve patient care

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 University Hospitals Plymouth NHS Trust has implemented a radio-frequency identification (RFID) system in its hospital to track and manage its medical equipment, with the potential to deliver significant efficiencies and improve patient care.

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

Introduction

Keeping track of large numbers of medical devices in a hospital is a challenge. Clinical staff waste time looking for equipment and there can be delays in delivering patient care. The cost of searching for and sometimes having to write off assets can be significant. Ensuring maintenance records are up to date can be resource intensive, and organisations lack data on how frequently specific assets are used to inform procurement plans.

University Hospitals Plymouth NHS Trust has implemented a radio-frequency identification (RFID) system in its hospital to track its 40,000 medical assets, winning a prize for 'best global implementation in healthcare' at the 2022 RFID Journal awards.

What is radio-frequency identification?

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. When the tag is triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, it transmits digital data, usually an identifying inventory number, back to the reader. Unlike a barcode, the tag does not need to be within the line of sight of the reader.

RFID in healthcare

NHS England's transformation directorate's digital productivity programme is using evidence-based research to identify digital technologies that improve productivity and efficiency to free up capacity and release time to care. They have prioritised three technologies that can realise significant results, one of which is automated identification and data capture (AIDC) systems such as RFID and real time location systems (RTLS).

> *'AIDC refers to any technology that collects information from objects, sounds or images without a person needing to manually enter the data.*
>
> *RFID and RTLS use tags attached to objects to track them without the need for the physical process of scanning, and they are already widely used in distribution, logistics, aviation, retail and banking. In healthcare, the current main uses of RFID and RTLS are for asset management and tracking. Organisations with this capability are seeing significant reductions in asset loss, maintenance and repair and vastly improved inventory error rates and stock control accuracy.'*
>
> *Jade Ackers, programme director – digital productivity, NHS transformation directorate, NHS England*

Using digital technology at Plymouth to track and manage medical devices

The implementation of the RFID system at Plymouth started during the pandemic. Currently the trust is tracking 25,000 medical devices, but once fully implemented, the system will be able to locate and identify up to 50,000 medical devices, 5,000 sterilisation and disinfection unit (SDU) assets and 10,000 pieces of IT equipment.

The RFID infrastructure has been installed across all 12 floors of the hospital, with antennae and readers strategically positioned throughout all key corridor junctions, wards and department entrances.

120 fixed readers are responsible for tracking the location of the 25,000 medical devices which have been fitted with RFID tags, and in future will also track the SDU assets and IT equipment. In addition seven fixed wide area readers[3] have been installed at the entrance to the hospital's clinical

[3] The wide area readers are used in key locations where frequent equipment movements take place or equipment is intended to accumulate. The wide area readers are more sensitive, but also more expensive than the fixed readers, so their deployment needs to be justified in terms of cost/benefit.

engineering department, the SDU and the medical equipment library, helping to continuously detect the movement of equipment in and out of these large open-space areas which house a large number of devices.

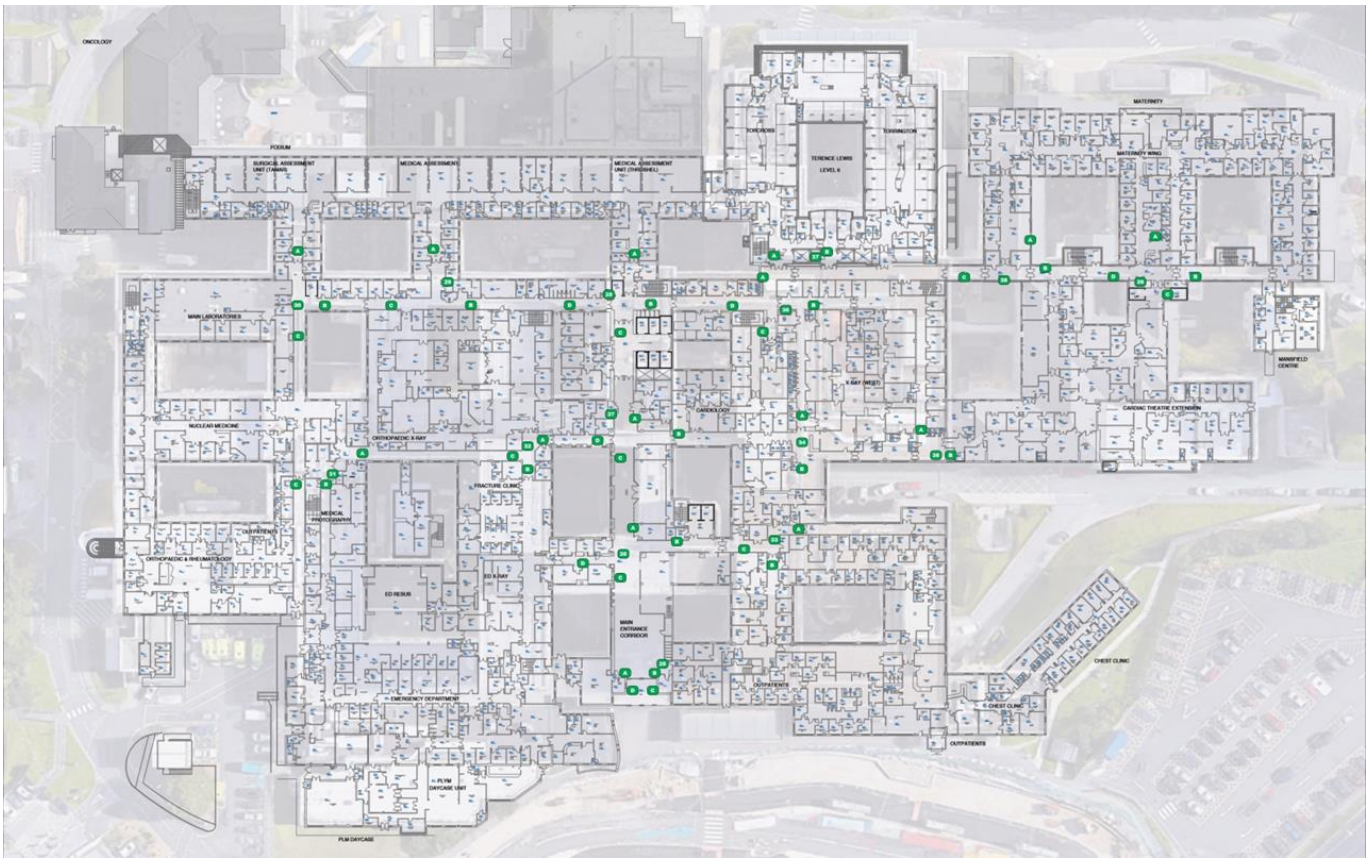
Figures 1 to 4 shows RFID equipment in use at Plymouth.

Figure 1: Wall mounted antenna in corridors.

Figure 2: RFID labels and embedded tags.

Figure 3: Mobile RFID reader and hand scanner.

Figure 4: Derriford Hospital single level, antenna mounting positions.



Making the case for investment

Business case

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 and patients. The business case will need to set out a compelling case for investment, clearly articulating what the anticipated benefits (both financial and non-financial) are.

Funding for the RFID project at Plymouth was sourced via a capital bid to the trust board in the form of a business case, which spelled out what the business needs were, and how RFID was the solution to addressing the problem. Examples from other trusts who had already implemented RFID were built into the business case to support the case for investment.

Evaluating the impact

Evaluating the effectiveness of the digital investment following implementation is key to ensuring that resources are used wisely in the NHS. Have the benefits set out in the business case been realised?

The trust is currently carrying out a formal evaluation of the investment in RFID. Some of the benefits which have already been identified are listed in the next section.

What have been the benefits so far?

The RFID system makes finding medical devices in the hospital easier and quicker. Some of the opportunities the trust has identified are described below.

Improved patient care

Finding medical devices across the 12-floor hospital was challenging in the past, and sometimes the device was not available when needed. This led wards to hoard equipment, which exacerbated the problem.

The central tracking function generated by the RFID system means that hospital staff can find devices more quickly, ensuring that the equipment is available in the right place at the right time for patient care. Reducing delays in the use of medical equipment could reduce patients' length of stay.

Better use of clinical and technical staff time

Spending less time looking for medical devices frees up staff time for patient care and other activities.

According to a Nursing Times survey[4], nursing staff spend an average of one hour per shift looking for equipment. Assuming this is true for Plymouth, the trust estimates that over 3,850 hours per week are spent by nurses and healthcare assistants looking for devices, which equates to 100 staff members.

Improved maintenance scheduling

The central tracking system also supports engineering and technical staff locate devices due for maintenance, which reduces the chances of equipment failure.

Reduction in costs of auditing the medical devices inventory

Previously the trust paid an external company to audit the medical devices inventory every few years at a cost of about £50,000. The process would take over two weeks to complete. Since the installation of the RFID system, the trust can audit the same number of devices in a single day without any additional cost.

Reduction in loaned equipment costs

In the past the trust spent £46,000 a year on loaned equipment. A significant proportion of this cost was due to not being able to locate equipment. Being able to now track and ensure the timely return of equipment has reduced hire costs by about 30%.

Future plans

The current RFID infrastructure is located in the trust's main hospital building. There are plans to expand this, for example financial approval is in place to introduce RFID to the emergency department, the eye hospital and the hospital waste hub.

The trust also sees the potential for using RFID in the estates department (building maintenance), stores and patient tracking in future.

The data generated from the RFID system could be used in a number of ways, for example information on the movement of medical equipment across a number of units could support quality improvement projects, while data on the frequency of use of equipment could support better procurement decisions.

[4]Nursing Times, Nurses waste 'an hour a shift' finding equipment, 2009

How to find out more

If you want to find out more, 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 Education Programme aims to create an uplift of digital skills, knowledge, understanding and awareness across the whole multi-disciplinary health and care workforce to support new ways of working. It is developing, delivering and maintaining – through the NHS Digital Academy service - a range of learning and development products and offerings for both the future/incoming workforce and for the current workforce, including senior leaders, digital (DDAT) experts and the wider workforce. Increasing workforce digital adaptability supports improved health and care services. It is for everyone, at all stages of their career journey.

This includes learning products that are person-based (e.g. the Digital Self-Assessment Toolkit, or the PGDip for Digital Health Leadership with Imperial College, or online learning modules for the finance profession); team based (e.g. Digital Boards and ICB development offers in collaboration with NHS Providers, or the Digital Futures programme with Yale); or technology based (e.g. our DART-Ed programme delivering training around Machine Learning and AI). All this is supported notably through the Informatics Skills Development Networks we have now helped establish across all regions.

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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