SUSQI PROJECT REPORT

Digitalisation of Orthopaedic information and exercise booklets

Start date of Project: May 2025
Date of Report: August 2025

Team Members:

- Harriet Corbett
  harriet.corbett@hhft.nhs.uk
- Laura Thomson
  laura.thomson@hhft.nhs.uk

Background:

The Problem

On the Trauma and Orthopaedic wards in Hampshire Hospitals, patients receive therapy related information and exercises in paper form. The physical amount of paper used is a concern to our team, especially as duplications are often required due to damage or mislaid booklets. Lost information may result in patients not adhering to prescribed exercises or other healthcare professionals not being aware of information or exercises provided.

Why is it important?

Reducing paper use is important as it directly contributes to lowering the carbon footprint, supporting the NHS's commitment to environmental sustainability and helping combat climate change. Additionally, cutting down on printing and paper costs can lead to significant financial savings, allowing resources to be better allocated within the healthcare system. Beyond environmental and financial benefits, improving communication with patients by providing information digitally ensures they have more reliable and immediate access to their therapy instructions. This can enhance understanding, encourage adherence to prescribed exercises, and ultimately support better health outcomes.

Literature/research

Aligned with the NHS 10-Year Plan's Shift 2 on digital transformation, which highlights that parts of the NHS remain reliant on paper, our project aims to eliminate paper use for the majority of patients by providing therapy information digitally. This supports the broader goal of making better use of technology to improve efficiency and sustainability in healthcare.

Current literature highlights that digital exercise delivery methods offer clear advantages over printed leaflets, including increased initial engagement, higher patient satisfaction, and more sustained

exercise routines (Mansson et al., 2020). Additionally, studies show greater post-treatment improvements with digital formats compared to paper-based materials (Lara-Palomo et al., 2022).

Describe the context in which the change is taking place:

- Acute hospital trauma and elective orthopedic wards.
- IT literate adult patients (including family members and carers) with varying additional comorbidities.
- Pre and post operative information and exercises to continue following discharge.

Who was involved and why your team/organization is suited to tackling the challenge.
Qualified physiotherapists, who work directly with patients, are responsible for providing accurate and relevant information both pre- and post-operatively. The physiotherapy team plays a critical role in assessing each patient's individual needs and determining the most appropriate type and format of information to support their recovery. Their clinical expertise, direct patient engagement, and understanding of the rehabilitation process make them well-positioned to address this challenge effectively.

Specific Aims:

To reduce paper usage across orthopaedics (specifically post op information and exercises for both elective and trauma ward patients). Ultimately, reducing our carbon footprint and costs whilst maintaining/improving patient access to information.

Methods:

We assessed the amount of paper distributed to patients in both the trauma and elective wards. For elective patients, we reviewed the surgery lists from the past four months. Each surgery involves a booklet containing a varying number of pages. By counting the pages for each surgery type, we estimated the total number of pages distributed over a full year.

For trauma patients, we analysed a typical week's data across all trauma wards to calculate the total number of booklets handed out. Using the varying page counts of each booklet, we then projected the annual paper usage.

We combined the totals from both trauma and elective patients to estimate the overall paper consumption for the service over one year and calculate the associated carbon footprint.

To determine printing costs, we contacted the person responsible for ordering the booklets to obtain the annual quantity required for outsourced printing. For in-house printing, costs were calculated based on the estimated total number of pages needed per year.

Additionally, we estimated the number of patients unable to access digital information by taking a snapshot of ward patients on a specific day. Patients with cognitive impairments or no access to smartphones or digital tablets were excluded from this count. This group represented approximately one-third of trauma patients.

To support the transition to digital information sharing while QR codes are being developed, we collaborated with the IT department to establish a generic email address for the therapy team. This

shared mailbox allows all team members to access and monitor incoming communications, ensuring that patient-related information is reviewed daily. This solution was implemented with patient safety and timely communication in mind. It provides a reliable interim method for digitally sending resources and updates, while maintaining continuity of care and responsiveness across both RHCH and BNH orthopedic therapy teams.

We have identified varying levels of digital literacy among therapy team members across both RHCH and BNH sites. To ensure consistent and confident use of digital tools, it is essential that all staff members possess the competence not only to utilize digital information effectively but also to support and educate patients in using their own devices. To address this, we propose an in-house training initiative aimed at upskilling staff in digital literacy. This approach leverages existing team expertise and resources, requiring no additional financial investment. The training will focus on practical, patient-facing digital skills and will be tailored to meet the needs of both teams.

Measurement:

Patient outcomes:

From the literature, we would expect that our patient outcomes may stay the same or improve (Lara-Palomo et al., 2022). The digital information provided is identical to the paper format, however the scope of this project does not allow for accurate measuring due to multiple external factors that can affect recovery.

Environmental sustainability:

The GHG emissions associated with both the external and internal booklets were estimated using a cradle-to-grave, process-based carbon footprint analysis. This evaluation encompassed emissions from raw material production, transportation, and end-of-life disposal. Emissions related to packaging were excluded from the assessment.

For the external booklets, weights were provided by the team and converted into carbon emissions using the virgin paper emission factor from the Department for Energy Security and Net Zero (DESNZ) 2025 database. It was assumed the booklets were made from virgin paper rather than recycled material. Although the booklets are centrally stapled, emissions from the staples were excluded due to their minimal impact.

The external booklets are printed by CSP in Maidstone, Kent. It was assumed they are transported to the hospital via HGV. For end-of-life, it was assumed that patients would dispose of the booklets in household recycling.

To estimate emissions associated with the electricity used for printing, the energy consumption per page was calculated based on the electricity usage of the printer at the hospital. This approach was taken due to a lack of available data on the printing equipment used by CSP.

For the internal booklet, GHG emissions were estimated on a per-page basis using the same methodology applied to the external booklets. Unlike the external booklet assessment, the calculation was performed for a single A4 sheet rather than for the entire booklet.

Economic sustainability:
Costs of external printing were obtained from the printing company.

The costs of internal printing have been difficult to determine; therefore, only the cost of paper has been included. Expenses such as electricity and photocopier toner are not accounted for. Existing trust-approved digital platforms and in-house staff are being used, so no additional costs or external resources are required.

Social sustainability:
Feedback from patients has been varied. While no formal survey was conducted, informal discussions revealed that some older patients prefer paper copies, citing greater ease of use due to lower IT literacy. Conversely, younger patients generally expressed a preference for digital formats. In retrospect, incorporating a formal survey would have provided more comprehensive insights. Notably, the literature reviewed in the results section supports the adoption of digital formats for patient information delivery.

Results:

Patient outcomes:
The project has enhanced the standard of care by making it more efficient and potentially more patient-centered. While patients continue to receive the same information, the introduction of digital access—such as QR codes—means they can view materials immediately on their devices during follow-up appointments or from other locations. This improves the timeliness and convenience of care. Although the time spent by therapists remains similar whether printing or sending information digitally, the QR code system reduces administrative tasks, supporting a smoother and more streamlined experience for both patients and staff.

Appropriate standards of care have continued to be met, with no changes to the clinical content or guidance provided to patients, ensuring alignment with national guidelines. While the initiative has not altered the core standards of care, it has made the delivery of care more efficient and accessible. By enabling immediate digital access to information—such as through QR codes—patients can engage with their care in a more timely and convenient way. This supports greater effectiveness in communication and may enhance patient understanding, without compromising safety or the quality of care provided.

While patient outcome data isn't yet available, the initiative is expected to reduce paper use and printing costs, lowering the carbon footprint and supporting sustainability. Digital access via QR codes may also improve patient engagement, timely information access, and overall care efficiency, potentially enhancing patient experiences and outcomes.

We are ensuring care remains accessible and patient-centred by continuing to provide paper copies of all relevant information and exercises for patients who are unable to access online versions, including those affected by digital poverty.

Environmental sustainability:
Savings from switching the externally printed booklets to digital are estimated to be 487 kgCO2e per year from this switch. This is based on the assumption that patients will spend a total of 15 minutes reading the exercise booklet across their treatment and 5 minutes per info booklet.

Savings from internally printed booklets are 139.04 KgCO2e per year based on a reduction of 1,747 pages printed across the 5 weeks and extrapolated to a year. This combined saving of is the equivalent to 24,078 single use hospital gloves or 28.5 acute outpatient face to face hospital appointments per year.

Economic sustainability:
The cost of external printing is currently £5200 per year and internal printing paper cost (not including electricity/ toner costs) is £125.36 per year. This totals £5325.36 per year.

Existing trust-approved digital platforms and in-house staff are being used, so no additional costs or external resources are required.

Social sustainability:
At this stage, we have not yet collected any qualitative or quantitative data that supports the preference for digital copies over paper copies in terms of social impact or broader health benefits. Without empirical data, it is not currently possible to draw definitive conclusions about the comparative advantages of digital formats in these specific areas.

While existing research highlights the benefits of digital information—such as improved efficiency, accessibility, and environmental sustainability—it is essential to recognise that digital exclusion can exacerbate health inequalities. *Inclusive Digital Healthcare: A Framework for NHS Action on Digital Inclusion* (2024) reports that 7% of UK households lack internet access, and approximately 10 million adults do not possess foundation-level digital skills. The framework identifies several groups at heightened risk of digital exclusion, including:

- Older adults
- Individuals from socioeconomically disadvantaged backgrounds
- Socially excluded populations (e.g., homeless individuals, asylum seekers)
- People living with disabilities
- Those with limited English proficiency

Given these disparities, it is imperative that paper-based information remains available for patients who require it. Ensuring equitable access to healthcare information—regardless of format—is fundamental to promoting health equity and avoiding the unintended consequences of a digital-only approach.

Discussion:
Despite these benefits, there are several limitations. Variability in IT literacy among both patients and staff may impact the effectiveness of the digital approach. The centralised digital booklet format reduces the ability to personalise exercises for individual patients, which may limit clinical flexibility. Additionally, the lack of physical handouts removes visual cues that can serve as helpful reminders for

patients to complete their exercises. Finally, because materials are accessed on patients' personal devices, carers or family members may be less aware of the prescribed exercises, potentially reducing opportunities for support and encouragement at home.

Barriers encountered include patient preference for paper copies, limited access to smartphones, and inconsistent hospital Wi-Fi affecting digital access. Variations in patient cognition also pose challenges in navigating digital materials without physical support. Additionally, staff training is needed to ensure confidence in using and promoting the system. Addressing these issues is crucial for equitable access and consistent implementation.

Risks:
One identified risk is the possibility that patients may download the incorrect booklet, leading to them following the wrong exercises. While the probability of this occurring may be low—especially if QR codes or links are not clearly labelled or if patients are not confident with technology—the potential impact could be significant. Engaging in inappropriate exercises may result in ineffective treatment, delayed recovery, or, in some cases, injury.

To mitigate this risk, clear labelling of digital materials, thorough guidance from staff during distribution, and confirmation with patients that they have accessed the correct resource are essential. Regular review and patient follow-up can also help identify and correct any errors early, reducing potential harm.

Wider Relevance and Opportunities for Spread:
This project has strong potential for application in other contexts beyond its initial setting. It could be effectively expanded across other therapy services, including both outpatient and acute care settings, where patients require access to exercise programs or educational materials. This could also involve the use of digital videos to guide patients in proper exercise technique, thereby enhancing rehabilitation and improving post-operative outcomes Additionally, the approach could be used more broadly in any healthcare context where information booklets are routinely distributed—such as pre-operative education, discharge planning, or chronic disease management.

Conclusions:

This project offers clear and practical benefits, particularly in supporting sustainability and efficiency within the NHS. By reducing reliance on printed materials, it contributes to a lower carbon footprint and helps cut printing and paper costs—an important consideration in the context of NHS environmental targets and financial pressures.

Beyond environmental and economic gains, the digital delivery of information has the potential to streamline workflows, improve access for patients, and modernise communication methods in line with increasing digital integration across healthcare. While there are some limitations and risks to manage, the overall usefulness of the project lies in its ability to deliver the same standard of care in a more sustainable, cost-effective, and future-facing way.

The key learning was the importance of considering patients' varying levels of digital literacy and access to technology. Some patients struggled to navigate the digital materials or lacked access to

smartphones, which limited the effectiveness of the intervention for those individuals. Additionally, inconsistent hospital Wi-Fi further disrupted access, highlighting the need for reliable infrastructure. This demonstrated the importance of maintaining alternative options—such as paper copies—and providing clear guidance and support to both patients and staff to ensure inclusivity and smooth implementation.

As a society, we're still transitioning from physical to digital formats, and this has been demonstrated in this project. Surprisingly, some patients whom we expected to prefer digital versions actually chose printed booklets. This suggests that comfort and familiarity play a big role in their preferences. Instead of defaulting to paper, it's important to provide reassurance and education to encourage patients to use digital exercise resources, helping them feel confident and supported in the transition.

Steps to ensure lasting change include embedding QR codes and digital resources into daily workflows for sustainable use, alongside staff training to build confidence and consistency. Standardised digital materials have been created for easy access and maintenance.. Ongoing feedback from staff and patients informs improvements, while learnings are shared across departments to promote wider adoption.

We plan to collect data on patient and staff engagement with digital materials, usage of QR codes, and satisfaction levels. Surveys and interviews will assess shifts in attitudes and cultural changes related to adopting the technology, guiding ongoing improvements.

References

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NHS England » Inclusive digital healthcare: a framework for NHS action on digital inclusion

Older adults' preferences for, adherence to and experiences of two self-management falls prevention home exercise programmes: a comparison between a digital programme and a paper booklet - PubMed

Critical success factors

Please select one or two of the below factors that you believe were most essential to ensure the success of your project changes.

People	Process	Resources	Context
☐ Patient involvement and/or appropriate information for patients - to raise awareness and understanding of intervention X Staff engagement ☐ MDT / Cross-department communication ☐ Skills and capability of staff ☐ Team/service agreement that there is a problem and changes are suitable to trial (Knowledge and understanding of the issue) ☐ Support from senior organisational or system leaders	☐ clear guidance / evidence / policy to support the intervention. ☐ Incentivisation of the strategy – e.g., QOF in general practice ☐ systematic and coordinated approach ☐ clear, measurable targets ☐ long-term strategy for sustaining and embedding change developed in planning phase X integrating the intervention into the natural workflow, team functions, technology systems, and incentive structures of the team/service/organisation	☐ Dedicated time ☐ QI training / information resources and organisation process / support ☐ Infrastructure capable of providing teams with information, data and equipment needed ☐ Research / evidence of change successfully implemented elsewhere ☐ Financial investment	☐ aims aligned with wider service, organisational or system goals. ☐ Links to patient benefits / clinical outcomes ☐ Links to staff benefits ☐ 'Permission' given through the organisational context, capacity and positive change culture.