

## UK

# Using barcode scanning technology to reduce medication errors in dispensing

<p><b>Challenge</b> The Royal Cornwall Hospitals NHS Trust supply process was not routinely closed loop, and required the re-keying of important information from one system to another. This open-loop system increased the likelihood of human error.</p> <p><b>Approach</b> In an effort to reduce the number of medication dispensing errors, the trust introduced barcoding into their dispensing process. They then assessed the prevented error rates, the speed of dispensing and staff perception, to review efficacy.</p>	<p><b>97%</b> of users agreed that scanning reduced the likelihood of medication errors</p>	<p>Overall prevented dispensing error rate was reduced by</p> <p><b>76%</b></p>
	<p>Faster dispensing and reduction in re-work correcting errors equated to 0.2 whole time equivalents or £4,400 per annum</p>	<p><b>42%</b> agreed that scanning improved their dispensing speed</p>

**NHS** **Royal Cornwall Hospitals** NHS Trust

There are an estimated 37.8 million dispensing errors made in England each year, representing 15.9% of all medication errors<sup>1</sup>. Small differences in drug name, strength and form, make dispensing more susceptible to human error. By introducing GS1 standards and universal unique identifiers, along with the use of barcode scanning technologies into the dispensing process, the Royal Cornwall Hospitals NHS Trust was able to reduce the overall prevented dispensing error rate by 76%.

Iain Davidson

## The role of technology in healthcare

Driving digital maturity within healthcare has become a key objective for the UK's National Health Service (NHS), and implementation of a comprehensive digital electronic health record is a large part of this.

By automating processes and maximising the use of digital technologies, healthcare providers have the capability to improve patient safety and clinical efficiency, releasing clinicians' time to care. Within the medicines domain, two key aims are closed-loop medicines administration and closed-loop medicines supply.

The utilisation of barcode scanning has revolutionised industries like retail and has the potential to deliver broader benefits within the healthcare environment.

The Department of Health and Social Care's Scan4Safety programme – based on a bedrock of GS1 standards – aims to embed the use of barcode technology, and the use of standards within the NHS.





## Human error and the patient safety risk

Implementing automation within acute hospital pharmacy settings is already having a profound impact. For example, robotics is currently being used to improve accuracy and efficiency in picking and labelling medicines in bulk. However, this supply process is not routinely closed loop, and requires the re-keying of important information from one system to another. This open-loop system increases the likelihood of human error.

## Tackling the challenge

In an effort to reduce the number of medication-dispensing errors within their trust, Royal Cornwall Hospitals NHS Trust introduced barcoding into their dispensing process. They then assessed the prevented error rates, the speed of dispensing and staff perception, to review efficacy.

The prevented dispensing error rates were monitored over two independent 12-day periods – the first period where barcode scanning was not mandatory, the second where it was. Any errors were recorded on an error-monitoring form.

To ascertain the effects on speed of dispensing, they timed a group of 26 participants using a test script. Each participant was asked to dispense items for the same named inpatient, both with and without the use of barcode scanning technology.

Staff perception was then assessed using a questionnaire. Further insights were gained in two focus groups with the 32 staff members that completed the survey.

## Achieved outcomes

**%** Where barcode scanning had been implemented, results demonstrated a significant reduction in overall prevented error rates in dispensing. Rates fell from **0.78%** to **0.19%**, a statistically significant reduction of **76%** ( $P < 0.001$ ).

The barcode-assisted dispensing process was also statistically significantly faster than the manual process with the median time to label eight test prescription items falling from 177 seconds to 165 seconds – a rate 6.7% faster than the original manual process ( $P = 0.015$ ).

When surveyed, 97% of users agreed that scanning reduced the likelihood of medication errors, with 42% agreeing that scanning improved their dispensing speed.



**Iain Davidson**  
Chief pharmacist  
Royal Cornwall Hospitals  
NHS Trust

The combined time savings as a result of a faster dispensing process and a reduction in re-work correcting errors, was equivalent to 0.2 whole time equivalent (WTE). That is a significant amount of time given back to the department so we can focus on other patient facing tasks.”

Assuming an average staff banding of band 3 (£22K per annum based on NHS Terms & Conditions), this equates to a saving of around £4,400 per annum.

“Barcode scanning has shown a clear improvement to patient safety and it should be routine practice across all dispensaries.”

Staff perception scores on ease of use of the technology and the impact on patient safety were high. However, only 67% of staff expressed that they would want to use barcode enabled scanning as an integral part of routine pharmacy operations. In focus groups, staff fed back that this lower than expected figure related to the need to better design both the software and the workstations to fit barcode scanning workflows and also in part due to the fear of becoming de-skilled.

## Delivering future patient safety improvements

Building on these results, the trust now has plans to integrate GS1 standards into other steps within the dispensing process and barcode medicines administration.

Their ultimate aim is to achieve a complete closed-loop medicines administration and supply system, with data recorded end to end at every touchpoint throughout the process.

Soon, they aim to use barcode scanning on wards to improve patient safety when nurses are administering medicines directly to the patient, at the point of care.

Beyond the walls of the acute care setting, Royal Cornwall Hospitals NHS Trust have identified the potential to further extend these benefits out into the community. Implementing GS1 standards and barcode scanning into community pharmacy, the care home setting, or directly in a patient's home, can provide additional levels of safety by instantly warning the caregiver or patient to any medication alerts.

## Conclusion

The outcomes achieved by Royal Cornwall Hospitals NHS Trust, clearly demonstrated that the adoption of GS1 standards and barcode scanning technologies could not only improve patient safety, but also release much needed staff capacity.

However, organisations and IT companies need to consider how barcode scanning changes the workflow, and design their systems accordingly, to facilitate the change management process that is required with staff.



## About the author



Iain Davidson  
Chief pharmacist  
Royal Cornwall Hospitals NHS Trust

Iain joined the Royal Cornwall Hospitals Trust as chief pharmacist in April 2010. Prior to this he was chief pharmacist at Newham University Hospital and worked as a clinical pharmacist at the Chelsea and Westminster Hospital NHS Foundation Trust and Guy's and St Thomas' NHS Foundation Trust.

As chief pharmacist, Iain has overall responsibility for the management and optimisation of medicines within the trust and has taken a lead on the digitalisation of this area, with the automation of dispensing, digitalisation of ordering, and the implementation of electronic prescribing and medicines administration.

He is a keen advocate of the electronic patient health record, having completed a Masters qualification in Health Informatics at the University of Sheffield, and was also in the role of chief clinical information officer at the Royal Cornwall for two years. He is also a founding Fellow of the Faculty of Clinical Informatics.

## About the organisation



**The Royal Cornwall Hospitals NHS Trust** is the main provider of acute and specialist care services in Cornwall and the Isles of Scilly.

It serves a population of around 430,000 people, employs approximately 5,000 staff, and has a budget of approximately £380m. The trust is responsible for the provision of services at three main sites – Royal Cornwall Hospital, West Cornwall Hospital and St Michael's Hospital – with a total of approximately 750 inpatient beds.

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