


UK

Interoperability and GS1 standards – a roadmap to success in pathology and medicines administration

<p>Challenge Their pathology system was extremely labour intensive, and relied heavily on manual data entry. Royal Papworth Hospital NHS Foundation Trust's pathology system increasing numbers of patients needing treatment, this process became progressively harder to manage, creating as much as 24-hour delays within the pathology department.</p> <p>Approach They began work on a larger-scale, complex project to integrate five separate systems, including one for electronic prescribing and medicines administration (EPMA), with their existing electronic patient record (EPR), leveraging GS1 standards. The results enabled them to share vital patient information, improve patient safety and increase traceability across two trusts.</p>	<p>24 hrs reduction in real-time pathology information being available to clinicians</p>	<p>All medicines administration information was linked into the patient record, providing clinical decision support to the trust's clinical teams</p>
	<p>Increased traceability and patient safety benefits saved over £50k in the first year</p>	<p>£42,000 saved by automation of medicines administration</p>

 Prior to 2017, pathology at Royal Papworth Hospital NHS Foundation Trust was a systematic but manual process. However, when the time came to integrate their pathology services with a neighbouring trust, they found the need to introduce an interoperable solution that could interact with both trust systems using GS1 standardised information.

During this time, Royal Papworth began work on a larger-scale, complex project to integrate five separate systems, including one for electronic prescribing and medicines administration (EPMA), with their existing electronic patient record (EPR). The results enabled them to share vital patient information, improve patient safety and increase traceability across both trusts.

Integration and interoperability for healthcare in England

Integration has become a top priority for healthcare organisations in the UK. This first came with the introduction of 44 Sustainability and Transformation Partnership (STP) regions across England in 2015.

Now these regions are evolving into integrated care systems (ICSs) to create a foundation for integrated health and social care where providers work together, sharing patient records, operational information and systems to improve patient care.

Hospitals, GP practices, and local authorities are now collaborating to bridge the operational siloes across the health and care landscape. However,

enabling different systems to seamlessly interact and share information is a challenge many providers face.

Tackling the challenge

For Royal Papworth Hospital NHS Foundation Trust, this became a key priority as part of their integration plans with neighbouring trust, Cambridge University Hospitals NHS Foundation Trust (CUH), to share a pathology service.

To make this happen successfully, they needed to have a process in place where they were able to link the systems at each trust, enabling clinicians to order tests and share patient information and pathology results in a timely manner.

Andrew Raynes

However, the system in place was extremely labour intensive, and relied heavily on manual data entry. Any order placed at Royal Papworth had to be transcribed into the EPR system, Epic, at CUH. Results would then be returned into Royal Papworth's document management system in PDF format and manually entered into their own EPR system, Lorenzo.

With increasing numbers of patients needing treatment at both hospitals, this process became progressively harder to manage, creating as much as 24-hour delays within the pathology department. Not all errors were logged, often due to the sheer volume of them from the clinical end when manual request forms were filled in incorrectly by clinicians. It would have been a full-time job tracking and tracing them. The Patient Administration Systems (PAS) database was notoriously inaccurate as well, with patient identifiers often entered in wrongly or not at all (e.g. NHS numbers) which lead to errors and/or delays in the lab.

At this point, the decision was made to undertake a complex integration project, to make sure their clinicians could order tests and receive results electronically.

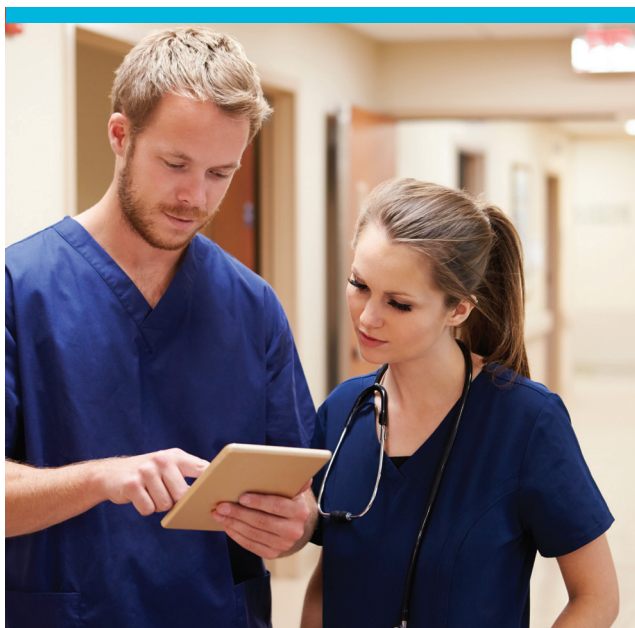
Achieving interoperability

The information technology team at Royal Papworth had to integrate a total of five individual systems as part of the interoperability project. However, the major challenge they faced was to create an interface between Epic and Lorenzo.

Integration at such a level had never been referenced by other trusts in England, so the task was the first of its type for the National Health Service, and they were able to achieve a bi-directional interface in just seven months.

Andrew Raynes, chief information officer and director of digital at Royal Papworth Hospital NHS Foundation Trust, said: "Our move to the new hospital on the Cambridge Biomedical Campus meant that the requests and results project to enable ordering and acknowledging lab results, required interoperability as a key component across five systems. This was highly complex and, because the project was the first of its type in the UK, it meant we didn't have any real reference points from which to learn.

"We had a highly effective project team, and through the leadership of our chief medical information officer, (CMIO) Dr Chris Johnson, chief operating officer, (COO) Eilish Midlane, the pathology team and our key stakeholders – including our partners at CUH, Clinisys and DXC Technology – we ensured regular touch points to monitor progress.



"Open standards such as Health Level Seven International (HL7) and Fast Healthcare Interoperability Resources (FHIR), meant interoperability was achievable. In this particular instance, the system was designed to recognise which laboratory the test was done in – Royal Papworth or CUH's laboratories – and to send information for the specific tests to the correct system where the analysis would take place.

Linking the two systems enabled blood test orders and results to be shared between DXC Technology's Lorenzo, and Epic directly, which enabled them to fully automate the pathology service and remove the manual burden.

“
Andrew Raynes
Director of digital and
chief information officer
Royal Papworth Hospital
NHS Foundation Trust

Barcode standards such as GS1's demonstrate just how vital interoperability is to scanning lab samples, ensuring a reduction of 24 hours to real-time information being available to our clinicians, which supports patient safety and efficient processes.”

EPMA was also implemented as a component of the Lorenzo EPR programme. Royal Papworth Hospital became the first organisation to use the Lorenzo infusions prescribing module, and digitised more than one million clinical documents in the process.

Both inpatient and outpatient areas of the trust were switched over to electronic prescriptions. In doing so, any prescribing and administration information could then be automatically fed back into the patient record.

Outcomes in pathology

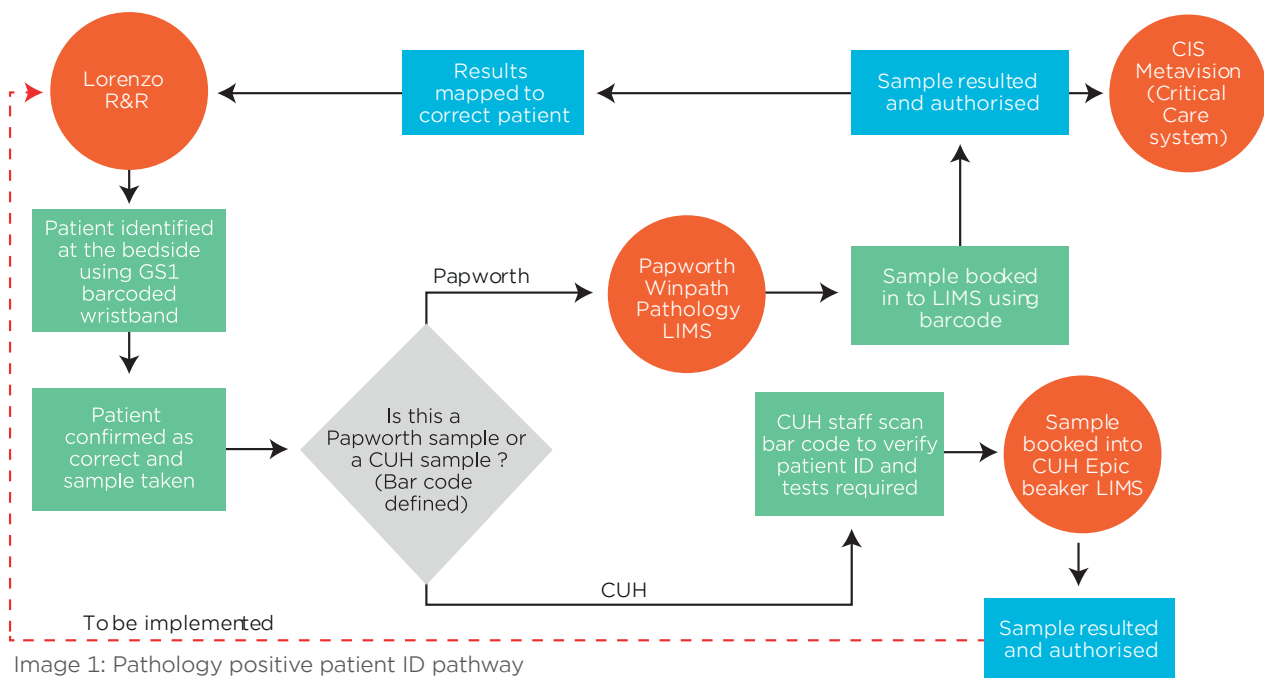
Using GS1 standards, staff were able to accurately identify the patient ahead of testing (using a GS1 barcoded patient wristband) and before samples were taken.

Barcodes were also applied to samples, enabling them to be tracked and traced within the pathology service and across the two trusts (image 1). This allowed them to generate a Positive Patient ID (PPID) pathway, resulting in the right tests being requested on the right patient using the right sample types, increasing patient safety and improving operational efficiency and traceability of specimens in the pathology department.

By introducing a system centred around GS1 standards, pathology staff were able to acknowledge laboratory results through scanning, saving valuable time.

Lab-based staff at CUH were no longer required to type details into the system. Instead details could be entered directly onto Epic, saving an average of between three and five minutes per specimen.

With the additional benefit of the bi-directional interface from Epic to Lorenzo, results could be accessed instantaneously, providing timely access for clinical teams, saving an average of 24 hours each time and reducing the risk of transcription errors from the printed results.



The impact on medicines administration

The adoption of GS1 standards at this stage enabled the Global Trade Item Number (GTIN) on each medication to be scanned and the details logged onto the EPMA system. Then, by integrating EPMA into the Lorenzo system, all medicines administration information was then linked into the patient record, providing clinical decision support to the trust’s clinical teams.

This integration with the patient record allowed for conflict-based warnings to be generated instantly, alerting the clinician to any potential duplication, drug interactions, and contraindications.

Fewer missed doses were also reported on the trust incident reporting system. Staff were able to use the system to help standardise and trace prescribing and administration activities, attributing them back to the user and creating an audit trail that allowed for increased traceability and patient safety benefits, with savings of more than £50k in the first year.



Automation of medicines administration meant that administrative and pharmacy staff could spend less time completing forms and other admin tasks, saving **£42,000** for the trust each year. In doing so, the trust was also able to limit their carbon footprint by **£1,594**.

Additional benefits were seen for patients, for example, better bed management information has enabled clinical decision making, resulting in fewer days in hospital, reducing the length of stay and freeing up as many as 130 “bed days”. The discharge prescribing process was also streamlined, and clinicians no longer had to spend vital time rewriting routine charts.

Royal Papworth achieved considerable benefits from integrating their systems and achieving interoperability across both sites through the standardisation of data.

“The UK’s secretary of state for health and social care, and the Wachter Review’s tech vision, both say that interoperability is the way forward, and we have shown that to be correct,” added Andrew Raynes.

“Standards and open systems are what really matter, and Royal Papworth is ahead of the curve. We have put policy about interoperability into practice – it is achievable.”

Next steps towards becoming a GS1 exemplar site

Royal Papworth Hospital have now opened a new site which includes five operating theatres and two hybrid theatres, five heart catheterisation laboratories (for non-surgical procedure), and six inpatient wards with around 300 beds, including a 46-bed critical care unit and more than 20 day beds.

The trust is embarking on a journey to become a GS1 exemplar site – becoming fully GS1 compliant across all key areas. In order to achieve this, a nurse-led steering group has been set up and a roadmap for core enablers has been developed.

As a priority, they will be focusing on implementing Global Location Numbers (GLNs), RFID tagging for the asset management of medical equipment, and Global Service Relation Numbers (GSRNs) for patient and staff identification.

They also intend to extend GS1 barcodes to their smart fridges and for use during blood tracking as the development evolves, in order to establish a fully compliant and interoperable trust with end-to-end traceability.

About the author



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Andrew Raynes is currently director of digital and CIO at Royal Papworth Hospital NHS Foundation Trust.

He joined Royal Papworth from his former role as information management and technology programme director at Barking, Havering and Redbridge University Hospitals NHS Trust in East London.

Andrew Raynes has more than 20 years of experience working in the NHS and overseas within health, care and the private sector. Andrew has an MSc in Healthcare Informatics and is a Fellow of the British Computer Society (BCS). He is also a non-voting member of the trust’s board of directors.

About the organisation



Royal Papworth Hospital is the UK’s leading heart and lung hospital, treating more than 100,000 patients each year from across the UK. Since carrying out the UK’s first successful heart transplant in 1979, Royal Papworth now performs more heart and lung transplants than any other UK centre.

98% of patients say they would recommend Royal Papworth Hospital to their friends and family.

Royal Papworth Hospital is a member of Cambridge University Health Partners (CUHP), a partnership between one of the world’s leading universities and three NHS Foundation Trusts.

CUHP delivers world-class excellence in healthcare, research and clinical education, improving the health of people across Cambridgeshire and the wider regions.

<https://royalpapworth.nhs.uk>