

CASE STUDY

# Beyond pre-analytics: Improving pre-laboratory processes to impact time to diagnosis in primary care



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## 1. Project Abstract/Overview

As the population and demand for primary care services increases, so does the demand for blood testing. In many cases, blood samples are sent from a primary care clinic to a Core Lab, a central clinical laboratory that serves multiple primary care clinics. While the analytical phase of testing is highly automated, pre-laboratory and pre-analytical pathways are highly manual, relying on multiple people and processes, with minimal data on the sample's journey.

In partnership with Abbott, Eastern Pathology Alliance (EPA) evaluated these pathways to identify opportunities for efficiencies both inside and outside of the laboratory, improve outcomes for patients and deliver integrated clinical care between primary care and the laboratory. As a result of these efforts to streamline and optimize processes, they reduced the time per collection, reduced time to process and allowed for more accurate reporting of clinician expectation turnaround time.

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## 2. Project Partners



Consolidation and network formation are placing increased demand on laboratories



Laboratories (typically) have little control over their pre-laboratory processes, including blood collection and logistics



65% of all laboratory errors occur during the pre-laboratory and pre-analytical processes<sup>1</sup>



70% of laboratories only monitor two pre-analytical indicators (booking-in errors) and mislabelling of samples<sup>2</sup>



67.5% Of those that do record pre-analytical errors, use manual methods – leaving gaps in data around pre-laboratory processes<sup>2</sup>

<sup>1</sup>Green. The cost of poor blood specimen quality and errors in pre-analytical processes. *Clinical Biochemistry*. 2013; 46: 1175-1179

<sup>2</sup>Cornes, et al. Monitoring and reporting of pre-analytical errors in laboratory medicine: the UK situation. *Annals of Clinical Biochemistry*. 2016; 53(2): 279-284

### 3. Discovery

In 2015 as a result of the National Health Service Improvement (NHSI)<sup>3</sup> initiative to establish pathology networks, Norfolk & Norwich University Hospitals (NNUH), James Paget University Hospitals NHS Foundation Trust and Queen Elizabeth Hospital, Kings Lynn NHS Trust, established the Eastern Pathology Alliance (EPA) network. By centralizing primary care work to the hub at NNUH, the site now processes blood samples from approximately 7,200 patients and 17,500 tubes each day.

While procuring new analytical equipment, EPA identified the need to further optimize processes in specimen reception to address potential bottlenecks and optimize the flow of samples from specimen reception to the analytical equipment. EPA sought a solution that could optimize processes from “vein to brain.”

EPA also identified data gaps in the chain of custody from the point of blood draw to receipt into the laboratory, which is necessary to calculate accurate clinician expectation turnaround time.

### 4. Hypothesis

Automating and streamlining specimen reception would support EPA to process the increase in workload with no impact on turnaround times. Improving upfront phlebotomy processes and post-analytical reporting of urgent patient results would deliver additional value for primary care clients.

### 5. Key Partners/Stakeholders

Specimen reception staff, biomedical scientists and laboratory management from EPA worked in partnership with technical solution design specialists from Abbott. The project scope included staff engagement and training for those outside the laboratory’s control, including phlebotomists, GP practice nurses, GPs and practice managers.

### 6. Execution

After assessing the current processes, EPA and Abbott collaborated to implement a streamlined, automated specimen reception process for primary care samples, supplemented by a phased implementation of new technology at primary care sites and in the laboratory’s specimen reception. In addition, the team provided face-to-face training at each primary care phlebotomy site and for specimen reception end users.

<sup>3</sup>NHS Improvement pathology networking in England: the state of the nation. NHS Improvement Web Site. [https://improvement.nhs.uk/documents/3240/Pathology\\_state\\_of\\_the\\_nation\\_sep2018\\_ig.pdf](https://improvement.nhs.uk/documents/3240/Pathology_state_of_the_nation_sep2018_ig.pdf). Published September 2018.

## 7. Increased Time with Patients

### 7.1 SITUATIONAL ANALYSIS

Phlebotomists are typically expected to perform one procedure every 4-5 minutes, or 12-15 bleeds per hour. For every consultation, phlebotomists must fetch patients from the waiting room, make the patient feel calm and at ease, and answer any questions the patient may have. They must also confirm patient identity, collect the specimen in the correct tube according to the test requested, and log all the relevant data points for this process. Adherence to all these steps in a short timeframe is necessary in ensuring patient safety and accurate sample identification.

### 7.2 DISCOVERY

Of the 4-5 minutes per patient, phlebotomists spend 4 percent of this time completing manual tasks such as bagging samples in single-use plastic bags. In addition, they are responsible for ensuring accurate manual data capture of the collection date and time, to support the calculation of clinician expectation turnaround times for test results.

### 7.3 PROOF OF VALUE

The automated specimen reception technology implemented by EPA and Abbott eliminates the need for phlebotomists to bag tubes for transport, reducing this step of the process from approximately 14 seconds per collection down to 2 seconds per collection. This time allows healthcare assistants and doctors to be more engaged with their patients, and to increase the number of phlebotomy appointments to better meet the needs of the growing patient population.

“ We know we gain a few seconds on every procedure – this isn’t much time but it allows us to be less hurried, engage with the patients and to appear less distracted. ”

– **DIONNE BOWEN**,  
Healthcare Assistant, Mile End Road Surgery

“ We’re always under pressure to see more people... a few seconds saved for each session can add up to two extra slots to see patients in a week. ”

– **ALICIA BELL**,  
Patient Services Manager, Mile End Road Surgery

## 8. Same-Day Result Reporting for Primary Care

### 8.1 SITUATIONAL ANALYSIS

In line with the NHSi mandate, NNUH's pathology laboratory established EPA and created a hub and spoke model, transferring routine primary care work from other hospital sites into the hub laboratory.

### 8.2 DISCOVERY

GPs send approximately 12,000 tubes per day to the laboratory at NNUH. Throughout the day, 15 WTE manually sort, debug and rack samples and enter data. The multiple touch points per sample and manual steps meant tubes can spend 98 percent of their time "waiting" to be processed. This waiting resulted in samples taking 1 hour and 35 minutes from arrival to analytics, with the time increasing at peak times to more than five hours. This delay meant abnormal results were often reported to an after-hours service, potentially requiring patients to return to the hospital unnecessarily.

### 8.3 PROOF OF VALUE

The automated specimen reception technology implemented by Improved processes and the new automated specimen reception at EPA has reduced sample waiting times by 27 percent. Samples now take 28 minutes from arrival to analytics. The number of steps in the process has resulted in a 56 percent reduction in the time to process. This has reduced the bottlenecks at peak times in specimen reception and reduced the number of touch points of the sample, reducing the risk of lost specimens. These improved processes enable the lab to report more abnormal results during normal working hours, which makes for a better patient experience.

“  
We're getting results faster.”

— ALICIA BELL,  
Patient Services Manager, Mile End Road Surgery

“  
Results often arrive before the end of the day, Doctors like this because it means that they can make faster treatment decisions about urgent care for some patients, such as to give someone antibiotics or change medication.”

— Mile End Road Surgery

<sup>4</sup>NHS Improvement pathology networking in England: the state of the nation. NHS Improvement Web Site.  
[https://improvement.nhs.uk/documents/3240/Pathology\\_state\\_of\\_the\\_nation\\_sep2018\\_ig.pdf](https://improvement.nhs.uk/documents/3240/Pathology_state_of_the_nation_sep2018_ig.pdf). Published September 2018.

## 9. Chain of Custody for Pathology Samples

### 9.1 SITUATIONAL ANALYSIS

Managing samples and ensuring they are in the right place at the right time is a critical indicator of a lab's performance. Missing and delayed samples results can result in extra work for the lab, recall for the patient, or missed reporting for GPs, who rely on same-day reporting of aberrant results.

### 9.2 DISCOVERY

The phlebotomist is responsible for accurately recording collection time, but variability is high and good compliance can be difficult. Poor compliance can result in:

- Sample instability and increased reporting of unnecessary high potassiums

- Inability to calculate accurate clinician expectation turnaround time

### 9.3 PROOF OF VALUE

The automated specimen reception technology implemented by The automated specimen reception solution provides automatic capture of specimen collection time, transport data and timestamp, and the sample transport temperature. This accurate and automated information, coupled with optimized processes within specimen reception have resulted in:

- Reporting fewer high potassiums This means that the high potassiums that are reported are true high potassiums and that patients called the hospital have a genuine need to be there.

- Reporting high potassiums within surgery hours, resulting in effective patient treatment.

- Automatically calculating and reporting clinician expectation turnaround time.

- A full audit trail of the tube, enabling the laboratory to pinpoint and locate lost tubes more effectively. Since implementation, GP surgeries have not lost a single sample.

“ There hasn't been a lost sample since we've started using it. ”

— Mile End Road Surgery

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